Making The Desert Place: An Environmental & Cultural History Of The Creosote Bush From The U.s.-Mexico Borderlands

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MAKING THE DESERT PLACE: AN ENVIRONMENTAL & CULTURAL HISTORY OF THE CREOSOTE BUSH FROM THE U.S.-MEXICO BORDERLANDS

LIGIA A. ARGUILEZ

DOCTORAL PROGRAM IN BORDERLANDS HISTORY

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MAKING THE DESERT PLACE: AN ENVIRONMENTAL & CULTURAL HISTORY OF
THE CREOSOTE BUSH FROM THE U.S.-MEXICO BORDERLANDS

By

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DISSERTATION

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ABSTRACT

This project examines the historical, environmental, and cultural trajectory of a common desert shrub, called the creosote bush/\textit{Larrea tridentata}, revealing distinct and often contradictory ways in which the North American arid deserts have been experienced, shaped, and perceived. It examines the plant’s connection to the production of environmental knowledge within changing Indigenous, colonial, and 20th century epistemologies and value systems in the U.S.-Mexico borderlands region over the long-term. Utilizing diverse historical and ethnographic sources as well as innovative oral history methods, this study reveals the connection between the olfactory sense and human attachments to place. Although major resource plants often receive the attention of large-scale historical studies, by shifting the focus to the creosote bush, this work argues that this non-commodified so-called ‘wild’ plant has co-created place through its cultural and eco-sensorial relationships with the people of the U.S-Mexico desert borderlands.
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INTRODUCTION

The smell of the creosote bush has a way of connecting you to place in the deserts of the U.S.-Mexico borderlands. As young woman from Opodepe, Sonora, Mexico, my maternal grandmother developed a connection to the scrub landscape of the Sonoran Desert through the most common desert shrub, the gobernadora, as she called it, or *Larrea tridentata*. The day she ‘met’ the plant she had been carrying the worry of what to do for her infant daughter who had a secondary bacterial infection on her head after having had the chicken pox. She was outside when she first smelled the characteristic odor of the shrub and followed it to a dark green, sticky plant nearby. In that moment, my Nana said she *just knew* the plant was a good plant, “esta planta es buena,” she said to herself. She picked some plant material and boiled it and then dried another portion and cured the child’s infection quickly with the help of the plant.

As an incoming PhD student in borderlands history at the University of Texas at El Paso, I heard this story from my mother, who had raised all of her children with the “good” medicine of the gobernadora that her mother had taught her about. I wondered what my grandmother’s story said about the history of people, plants, and place in the deserts where the creosote bush grows and which also straddle (transcend) the nation-state border. My Nana’s story spoke to me about the senses and place-based knowledges of the home, often nurtured over generations by women. I realized the power that sat within those simple everyday relationships with the natural world that were so important for people’s health and well-being. Those types of practices fell distinctly outside of the structures of public health and the state, as well as “modern” medicine. My Nana’s experience was not uncommon, nor was the knowledge she gathered and passed on.

The creosote bush—also called *guamis* in Chihuahua, and greasewood, *shegoi*, and *hediondilla* in Sonora and Arizona, as well as myriad other names specific to place and the
different people of the deserts in North America—is an old medicine. Despite the oft-repeated perception of the desert as a ‘wasteland’, seemingly devoid of water and life, the borderlands deserts have nourished and nurtured human life for millennia. The creosote bush’s foremost identity has been that of medicine: it is arguably the native desert plant with more historical medicinal uses than any other in North America. Additionally, and relatedly, there is a salient eco-sensorial identity to the plant that has further embedded it in place – its distinct smell. Its aroma signals the coming of rain and is known and understood by people in the region where the creosote grows as ‘the smell of desert rain.’ The scent is often deeply tied to nostalgic feelings of home.

This dissertation is set in the places where the creosote bush grows, in the Chihuahuan, Sonoran, and Mojave Desert region that straddles the US–Mexico border, from San Luis Potosí to southern Nevada and Baja California to west Texas. It is a complex, layered place with a long history of human movement and cultural hybridity, of conquest and violence imprinted into the landscape. For many fronterizos (borderlands people) the border wall/scar is a constant reminder of the imposition of power from above and beyond. But, if we turn our gaze to the natural environment, we can see beyond geopolitical borders to illuminate the ways place is made and nurtured as part of a shared history between human and non-human nature in the borderlands deserts. The central goal behind this project is to examine the interplay between the
production of knowledge and the natural world through the history of the creosote bush. What effect did perceptions about the plant have on the cultural and physical landscapes? And in what ways did the creosote bush impact centuries of borderlands desert peoples? How did people live with, utilize, and perceive, the desert shrub?

I treat *Larrea tridentata* as a site of memory, like a sacred landmark of a million little points spread out over the arid lands of the US–Mexico borderlands. It is a borderlands plant both because it grows along the US–Mexican border, but also, and perhaps more importantly, because it lives at the physical and marginalized ‘edges’ of modernity. It has been displaced in waves over centuries, pushed to the outskirts, yet it persists. This work reveals the importance of the creosote bush as both a cultural and environmental characteristic of the borderlands deserts. Ultimately, this dissertation insists on the place of vegetal nature in U.S.-Mexico borderlands culture and history. It argues that the common shrub shaped the arid landscapes and the people of the borderlands, while it was in turn shaped and shifted, made and unmade, in the landscapes and in the minds of the people who lived and grew with it in the arid lands. I further argue that the medicinal relationship between the plant and the people persists as a way that borderlands communities stay connected to nature and to cultural heritage. In this sense, connection is an act of cultural resistance that is inherently tied to place and local place-based, *embodied*, knowledges.

Diverse people shaped and shifted the creosote bush by determining its identity as friend or foe at different times. This study of the creosote bush examines the production of knowledge around the plant over the longue durée by early paleo-desert peoples, Spanish colonial documenters and the women and Native people they described with the plant, nineteenth century European and U.S. botanists and topographical engineers, twentieth century ranchers and
rangeland scientists, and, finally, by borderlands peoples in the twenty-first century. Over time, the plant’s identity was shaped by diverse borderlands peoples and newcomers with differing perceptions about nature based on the ways they made their lives, that is, based on their distinct political, ideological, social, and material realities. In other words, how people perceived the creosote bush had to do with who they were and where they came from. The consequences of the plant’s determination as foe had physical repercussions for the plant and the lands where it grew; it was physically removed en masse over time, whether as part of rangelands management or through development.

In addition to the knowledge people produced about the plant and the deserts over time, this dissertation locates the ways the creosote bush shaped the people and landscapes of the region. As one of the first plants on the scene upon the arrival of the relatively young deserts of North America, the creosote bush has become a defining species of the arid borderlands and a dominant plant in all three hot arid deserts: the Chihuahuan, Sonoran, and Mojave Deserts. As such, it is characteristic of what can grow often where nothing else can. In addition to shaping and making the deserts, the shrub had a salient impact on the cultural landscape of the borderlands deserts, through its material uses and the practices connected to it as a medicine. It was often women, and mothers, who knew the plant and utilized it as a beneficial ally for healing themselves and others. The nurturance of healing in the home, the smell, and the memory of it, often had a notable impact on borderlands people’s identity, sense of themselves, and how they were made.

The underlying framework of this project speaks to the fact that the history of the gobernadora helps illuminate two distinct ways of perceiving and interacting with the creosote bush-filled deserts over time: as abstracted space versus embodied place. Place-based
knowledges of desert nature are reflected in everyday practices with the plant, like those of my Nana, who experienced the gobernadora in the desert as part of a cultural landscape, accessible and beneficial. On the other hand, when divorced from experiential knowledge, the creosote-filled deserts become ‘empty’ space and the plant worthless. Because it thrives in the ‘middle of nowhere,’ where it is often the only plant that grows for long stretches, the plant has been excluded, uprooted, poisoned, and pushed to the outskirts of developing areas, considered useless as a commodity and distinctly in the way of ‘progress.’

Because there is no creosote bush archive, nor a historical archive of desert plants, a project like this one is not possible without the technology that makes a robust number of digitized documents available for search online—in English and Spanish. The fact that the creosote bush is such a dominant and common plant, though, has had two important effects on sources: there are abundant natural history and biomedical publications about the plant as a scientific object; and, at the same time, its ubiquity has often caused its invisibility within textual sources, at least on the surface. This presents, on the one hand, an opportunity to historicize the botanical and scientific sources, but it also presents the challenge of finding ‘needles in haystacks.’ Thus, from the beginning, I have thrown a wide net and gathered as many details as possible from digitized sources online. But this project, by its very nature, pushes me beyond a complete reliance on textual historical sources and approaches, or a “text fetish,” as environmental historian John R. McNeill described it in the American Historical Association keynote in 2020, and into oral history methods that shed light on environmental relations outside of the archives.
One of my methodological interventions uses ecological oral history along with the olfactory sense, in which the interviewees smell the plant and share their emotions and memories around it.\(^1\) Ecological, or environmental, oral history allows me to utilize the plant itself as a source, and to document what I call eco-sensorial attachments to place. In other words, how our senses intersect with the plant’s chemical signals in the air, which is remembered in often nostalgic and formative ways that speak to how the environment seeps into people’s ideas of self and identity.

Scholarship that focuses on nature and the border is somewhat scarce, but the field of borderlands environmental history has more recently provided an appropriate frame for ‘crossing borders,’ with perspectives about natural resources that occur on both sides of the border. This literature has generally followed the natural world in some form or another through transnational paths —whether through copper veins, water, air, or the built environment— and revealed the ways that people confronted and exploited diverse environments through economic, political, and ideological frameworks.\(^2\)

As yet, these studies have not examined the role of plants or people-plant environmental relationships in the region, with the exception of works by Cynthia Radding on agave and

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culture, as well her recently released *Bountiful Deserts*.\(^3\) Outside of Radding, in the broader field of history, typically only plants considered major commodities, like cotton, tobacco, and corn, have been worthy of study by historians. And even then, the plants themselves tend not to take center stage, rather they set the context for an oftentimes global economic analysis of their extracted and processed ‘parts.’ With this dissertation, I am proposing that plants and other ‘marginal’ environmental agents have value beyond their economic exploitation and are imperative to historical analyses because they reveal new and different aspects about people and nature that contextualize our past and inform our future. In many ways, I am arguing to my field of history that historians should be looking at so-called ‘useless’ plants, examining the ‘small stories’— the ordinary. Perhaps it is fitting that as a borderlands scholar, I am insisting on centering the ‘margin’ in more ways than one. This work is the first large-scale borderlands historical study to focus on a specific plant. As such, it will broaden the fields of borderlands and environmental history by focusing more directly on vegetal histories.

In other humanities fields, plant studies are going strong. Diverse scholars are examining the representation of plants in literature, art, film, science, and philosophy.\(^4\) They illuminate the ways plants are politicized through our perceptions and relationships with them, whether as

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friends or enemies. In the hard sciences, plant studies are causing something of a schism between biologists that argue plants have cognitive capacities, make choices, have agency, and others who adamantly insist the opposite is true. This dissertation stands apart for its alignment of environmental-cultural historical analysis with an ear to plant studies literature. In this sense, it uncovers the political interactions between plants, borderlands peoples, and governments. In addition, this work contributes more generally to the humanities through my study of eco-sensorial attachments to place, or how our senses attach us to our environment, with the help of oral history. Ultimately, this topic is rooted in the belief that plants have always been fundamentally important to the survival of people, and that there is a compelling history to be told about the creosote bush from a borderlands perspective.

Chapter 1 introduces the creosote bush through Indigenous people’s histories and establishes the plant as an early and integral inhabitant of the hot deserts of North America when the climate began shifting toward aridity in late Pleistocene. It further introduces the creosote as the “woman’s plant” from the perspective of the peoples of the deserts. I argue broadly here that the shrub helped *make* the desert place, rooted into the land and its peoples.

Chapter 2 reveals, however, that the creosote bush has another history that was far more antagonistic. European colonial missionaries and explorers who first came to the deserts largely considered the ‘hediondilla’ a useless plant. It was representative of the worst type of land in colonial Spanish accounts, the ‘waste’ in wasteland. Their perceptions of arid lands, people, and plants in the so-called ‘New World’ were based on European biases against nomadic people in general, and Muslims more specifically. Here I propose that not only were the people of the northern arid lands laden with these negative stereotypes associated with the desert and mobility, the creosote bush and other arid lands plants were cast simultaneously as undesirable within an
assumption of ‘arid inferiority’—biases rooted in European environmental understandings of deserts based on biblical and classical interpretations that were often divorced from lived experience.

Chapter 2 then moves from the general to the specific. By the mid-eighteenth century, missionaries in Sonora and Baja California deserts described Indigenous and Spanish women using the creosote bush as medicine, a knowledge produced by Indigenous peoples and then taken up by colonist communities and practiced by women in hybridized forms. As outsiders lived on the land for a period of time and made their lives in place, knowledge about nature became important to their survival. The difference between the general disdain for the desert landscapes described in the first part of the chapter, and the uptake and use of Indigenous knowledge about the creosote bush medicine in the latter part is, I argue, one born from women’s domestic practices and the necessities of making lives in colonial northern New Spain. The abstraction of landscapes and the vilifying of the creosote bush was a luxury, ultimately, that women could not afford in their everyday lives.

Chapter 3 begins with sources from the late Spanish colonial eighteenth century and moves through the early twentieth century to track the creosote bush’s role in nation-making. It shows the trajectory of the creosote bush within state-sponsored projects aimed at discovering, cataloguing, and exploiting their natural resources. From the Spanish Royal Botanical Expedition, through the Mexican Boundary Survey, to the revolutionary Mexican state’s use of the plant in modernizing the nation, these governments were looking inward at their exploitable natural resources. States seemingly came to know ‘themselves’ in this way through the abstraction and reduction of nature. Thus, I argue, in order to be made useful to nation-states, the plant had to be disconnected from its context in place, dissected and reduced to its chemical
constituents, separated from its very nature and the knowledges of the people who lived alongside it in order to be transformed by way of science and outsiders in labs from “useless” to exploitable.

Chapter 4 continues looking at knowledge produced about the arid lands where the creosote bush grows, here, in the context of ranching and range science in the twentieth century, when shrublands were replacing much of the desert grasslands. There was an all-out war against the shrub in the mid-twentieth century, waged by ranchers on both sides of the border who blamed the plant for receding grasslands. To ranchers and range experts, shrubs like the creosote bush became enemies that invaded and displaced grasses. As such, I argue the plant was incorrectly cast as an active agent of destruction of grasslands and a poison to the rest of the landscape. This period reveals an antagonism against the creosote bush that was born from the intersection of rational scientific responses to environmental problems of the time and the persistence of the ranching industry. As culture and economies directly inform and shape people’s perceptions about the natural world, they influence the identities we attach to plants, and literally shape the natural environment.

Range experts commonly viewed the natural world as a resource to be exploited. In a very rational calculation, they viewed range grass as a meat-producing product that translated into market value. Any threat to ranching profits was met with defensive measures. But the plant was ultimately doing what plants do, that is, the creosote bush was covering bare ground, which is a form of repair rather than destruction. When they accused creosote of “taking over” the range, they also revealed a lack of awareness of the ecosystems of the rangelands and revealed more about themselves and their impulses to (literally) kill plants that interfered with their ideal form of landscape, than about the true biological workings of the creosote bush.
Much of Chapters 2, 3, and 4, tell histories about people and governments with certain worldviews and political economies based in exploitation, extraction, and adapting arid nature to themselves. Chapter 5 connects back to some of the themes raised in Chapter 1, focusing on everyday desert people and what they say about their relationship to the creosote bush in the twenty-first century. Using ecological oral histories, this chapter examines the creosote bush as a medicinal as well as a sensorial connection to nature, within frameworks of identity, memory and place. The continued use of the creosote bush as a medicine by women within domestic spaces speaks to the ways borderlands desert people have remained connected to nature outside of modern market-driven forms. This can be viewed as cultural resistance that is tied to local place-based, *embodied*, knowledges. In deliberately moving toward experiential and personalized experiences of the plant, this chapter ultimately reveals that when the plant is experienced outside of commercial or extractive perspectives, it is a healer and a beneficial ally that has shaped the land and people who have grown alongside it.
Do you understand? When I am done telling you these stories, when you’re done
listening to these stories, I am no longer I, and you are no longer you. In this afternoon
we briefly merged into one. After this, you will always carry a bit of me and I will always
carry a bit of you, even if we both forget this conversation.

—From Invisible Planets, Hao Jingfang

In the arid desert lowlands of North America, on sandy and gravely soils, sometimes
where no other plant can flourish, that is where the creosote bush grows. If you were to trace a
wide strip from Central Mexico at the start of the Chihuahuan Desert ecoregion in a diagonal
motion going north and west, over the U.S.-Mexico border and the Sonoran Desert all the way to
southern Nevada at the northernmost tip of the Mojave Desert, you could approximate the place
of Larrea tridentata. In other words, its distribution essentially mirrors the boundaries of the
three (now) U.S. and Mexican borderlands deserts—the Chihuahuan, Sonoran, and Mojave.

Although each of these deserts holds notable differences—in rainfall, altitude, vegetation,
and animal life—the creosote bush is considered both a “defining element and keystone species
of North American warm deserts.” As such, it represents a continuity among them as the
dominant plant in all three desert systems. In fact, one can drive in some parts of these deserts
and see nothing but evenly spaced creosote bushes dotting the landscape for miles. Thus, from

5 Laport, Robert L. Minckley, and Justin Ramsey, “Phylogeny and Cytogeography of the
North American Creosote Bush (Larrea tridentata, Zygophyllaceae),” Systematic Botany 37, no.1
the deserts of Wirikuta in the state of San Luis Potosí (Wixárika/Huichol country), with a pocket even farther south in the Otomí Valle del Mezquital in Central México, all the way to the Timbisha and other Newe/Shoshone people’s lands as far north as Death Valley, California, the creosote bush and the people have a rich history that connects the wide region of North American arid lands.

The creosote bush arrived in North America from South America anywhere between the late Pliocene to the mid Pleistocene, most likely around 1 million years ago. Its distribution responded to the shifting climate of the late Pleistocene by creating a niche in the lowest elevations in what are now the North American deserts—the Bolson de Mapimi, Chihuahua, perhaps—and expanded and contracted from there as the post-glacial climate moved variably but ultimately from tropical toward arid.

Paleohumans are believed to have begun entering the region by the end of the Pleistocene, about 11,000 years ago. In Native desert people’s creation stories from the region, specifically Chemehuevi and O’odham, the earth and the people were originally made from sweat, or perspiration rubbed off from the Creator’s chest/breast (or vagina in one story). One O’odham story reads “he wandered around in the nowhere till he thought he had wandered enough. Then he rubbed on his breast and rubbed out moah-haht-tack, that is perspiration, or greasy earth. This he rubbed out on the palm of his hand and held out. It tipped over three times,

6 Laport, “Phylogeny and Cytogeography of the North American Creosote Bush”
but the fourth time it stayed straight in the middle of the air and there it remains now as the world."\(^9\)

Immediately after Earth Doctor, in this particular O’odham origin story, made the greasy earth, the first thing he made was the Šegoi” in the O’odham language, or greasewood bush, the first plant, the one that would hold down the earth, as it were. The story continues into other associations with the creosote bush, all indications of the plant’s great importance to the O’odham culture. But it locates the plant at the beginning of the O’odham world, the Sonoran Desert, and identifies the greasewood as the original plant in establishing—*birthing*—what became the desert. Greasy earth and the greasewood point, perhaps, to the nature of desert plants known for their high content in resinous chemicals that appear oily and sticky and smelly. Either way, grease or something like it, figures quite prominently in O’odham, and to some extent Chemehuevi, creation of the desert. The Spanish language provides at least two excellent words for ‘greasy perspiration’ where English does not. One could say the desert place was birthed from sacred *mugre; una roña sagrada.*\(^{10}\)

O’odham refers to at least three groups of people who have inhabited and intimately understood the arid Sonoran Desert and its riverine environments in what are now the states of Arizona and Sonora. Together they were referred to as Pima by Europeans (though this term can be complicated and refer to a number of Indigenous peoples of Sonora). Akimel O’odham, the river people, are generally considered the mostly sedentary and live around the Gila River. Tohono O’odham, the desert people, called Papagos by the Europeans, meaning bean-eaters, were seasonal movers and partial agriculturalists. Hiá Ch-ed O’odham, hiá meaning sand, are

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\(^9\) John William Lloyd, *Aw-Aw-Tam Indian Nights Being the Myths and Legends of the Pimas of Arizona as Received by J. William Lloyd from Comalk-Hawk-Kih (Thin Buckskin) Thru the Interpretation of Edward Hubert Wood,* (Lloyd Group, 1911), 27.
associated with the excessively arid and hot region around the lower Gila and Gulf of California, where the Colorado River empties itself. Hiá Ch-ed O’odham were non-sedentary and able to make their lives in the most challenging environment.

The O’odham knew how to live in their place: understood where the water was, where food could be gathered, how to hunt animals, and planted seeds on floodplains where plants like tepary beans, specifically adapted to the desert environment, who needed only one good soaking to produce a crop. (You can still find tepary beans planted long ago growing along the flood plains of mountains in the desert even now, like a reminder that past is here with us in the present, that sometimes there is little difference.) Understanding how to live along with an arid environment required a profound paying-attention that was gathered, cultivated, and passed down over generations. In other words, coming at the knowledge that was required to make life in desert spaces was in no way a passive project, nor easy.

The O’odham first plant understood similarly how to make its life in arid lands. This had to do in part with the adaptations it made over time to increasing aridity and different geographies. An example of species autopolyploidy, the creosote bush duplicated its genome as it established itself in new areas, from the progenitor diploid population which occurs generally in the Chihuahuan Desert, to the tetraploid and hexaploid polyploids which are generally distributed in the Sonoran and Mojave Deserts, respectively.\(^{11}\) This shows the species moved from North-Central Mexico northwest toward California over time. This while establishing associations with native bees, insects, and desert animals.

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The plant’s ability to utilize very little water to its maximum potential is its defining characteristic. Adaptations that have enabled the plant to catch and retain water have been both morphological (mechanical/physical) and relational. The creosote bush’s interactions with water have as much to do with the wind, soil, bacteria, other plants, and animals as they do with the plant’s shape and design, all of which make it possible for the plant to face even extreme aridity with dignity. Creosote bushes breath through their leaves. The plant’s small leaves are an adaptation that helps it prevent the loss of water during photosynthesis. In that capacity, the plant must find a balance between capturing sunlight and carbon dioxide, on one hand, and water loss on the other, which is the trade-off. It mitigates this in many different ways. It often positions its leaves generally to the east, where the sun rises, so it can avoid solar energy uptake except in the mornings when there is most humidity and less intense heat from the sun.

The plant additionally responded to its environment, over time and space, by increasing the amount of resinous coating on its leaves as it moved into more arid environments in the borderlands deserts. Nordihydroguaiaretic acid, NDGA, is the unique and chemically potent antioxidant that covers the creosote bush’s leaves. It is responsible for the sticky coating that protects the plant against water loss, ‘sunburn’, and (most) herbivores—the ‘grease’ in greasewood. This chemical is behind what would become the plant’s primary interaction with humans—as medicine. Creosote bushes in the most arid environments, like those of the Mojave Desert, have higher concentrations of NDGA on their leaves.¹² Thus, the foremost creosote-people connection is directly connected to the plant’s ability to survive in extreme environments.

¹²Kristin Nicole Zuravnsky, “Understanding the Roles of Polyploidy and the Environment on Nordihydroguaiaretic Acid Variation in Larrea Tridentata” (Master thesis, Salisbury University, 2014.)
The protective ‘medicine’ seemingly became more concentrated as the circumstances became more challenging.

It can be easy to view the northern Mexican and U.S. Southwestern deserts as barren, inhospitable spaces for humans. The universal definition of deserts is associated with a lack of water and water is representative of life, at least an easier one. It is not hard, then, to think of the desert along with ideas about death—or at the very least as a difficult environmental border that must be crossed before getting to where you are going. Many die there trying to get to an easier place to live. But paradoxical as it is, deserts have also always sustained a diversity of life.

Early desert peoples understood that the current U.S-Mexico borderlands deserts contain all the stuff of survival, if only in minimalist fashion. Environmental resources like water, food, and fiber for building materials often get the bulk of the attention—for good reason. What is often left out is the salient role of medicine to desert life. But medicine abounds in these deserts. If we take a closer look at North American arid places, it is hard to find a plant that has not been valued at some point as medicine.

To Indigenous peoples of the North American deserts, relationships with plants have been and continue to be profoundly interwoven with their ability to make their lives and were facilitated by long-developed personal relationships and knowledge produced and shared over generations. Plants like the creosote bush have been understood in holistic and specific ways; they were and continue to be seen as individuals and subjective. In addition to knowing where, when, and what to eat, the people knew the medicinal plants and their myriad uses and turned to them in times of need. The creosote bush stands out among them for its numerous uses, which helped facilitate the health and survival of Native people in the challenging arid environments of North America.
Native Serrano creation places medicinal plants at the beginning of their story as people. The Serrano are one of many peoples who have lived in and around the Mojave Desert in Southern California, along with Chemehuevi, Paiute, and Mojave among many others. Franciscan friar Francisco Garcés, the first European to meet them, called them “root-diggers.” Garcés’ more disagreeable colleague, the friar Pedro Font called the non-sedentary Serranos “ultimately so wild and untamed, dirty, disheveled, ugly, small, and stunted, that if not for their human form, one would have a hard time believing they are men.” Font did not comment very much on the use of medicinal plants but, as for all desert peoples, they were just as important as those that could provide food and fiber—many plants provided all three.

Serrano elder Dorothy Ramon, the last living Serrano speaker, recounted the importance of the medicine plants in her book Wayta’ Yawa’ Always Believe. She told the story “Long ago when the world began there were many Indian peoples here on earth. Their Lord was living here, with them, he was alive, not dead. He was like us, alive here. And he would speak to them. He would explain to the people about how to live, about how to get along here on earth. And there were lots of people. Perhaps different tribes. Our Lord came to them. He asked them whether they would allow themselves to be transformed to make medicine, so that medicinal plants would grow. They were to become medicinal herbs. Only those that believed were transformed. And so many plants exist now on Earth. ‘Herbs,’ as whites call them, grow on earth. They were to become the Indian’s medicine.” The people became the medicine, and later they also volunteered to become the animals of the desert as well.

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13 Julio César Montañé Martí, Fray Pedro Font diario íntimo y diario de Fray Tomas Eixarch, (México, D.F: Plaza y Valdés, S.A. de C.V, 2000), 143. [my translation.]
The deserts where the “Indian medicine” of the Serrano and other diverse Native groups grows, sit largely within the Basin and Range Province of the Western United States and Northwestern Mexico. This physiographic region was created in part by the subduction of the Farallon oceanic plate underneath the continental plate beginning about 60 million years ago. The shallow angle of the subducting ocean plate continued in effect squishing up the land above it as it moved inland. Eventually, it took a deep dive into the mantle and below, ending the mountain-building events and effectively relaxing the accordion-like texture of the upper layers of the earth. That ‘relaxation,’ along with the effects of other tectonic activity along the Pacific coast slowly opened up the space between the ranges causing massive block faulting and rifting, beginning about 17 million years ago, which left the valleys, or basins that we see now. This accounts for the wrinkled texture seen on maps of the U.S. and much of Mexico.

The basin and range topography provided shifts in elevation, and thereby ecological conditions, that increased the biodiversity of the region. Desert people made use of the environmental diversity in ways that increased their survivability. Just as distance from the equator affects the climate in a given latitude, elevation similarly changes the environmental conditions and very quickly. As you go up a mountain in the desert, the vegetation, animals, and water availability all vary. This is part of the reason why desert life has always been tied to mobility. People and animals made use of the ranges as well as the valleys and in-between—and all of the plants, animals, and water sources they held. The topographical variation of the Basin and Range region accounts for the way that, over time, eroded mountain ranges, pulled by gravity, created the deep sand-filled basins below in which the creosote bush would later, incrementally, make its home.
The creosote bush belongs to a genus of woody, evergreen shrubs of which there are five species—four of them in South American arid and semi-arid lands mostly in the Argentina Monte. All of them are well-adapted to arid lands. One species in particular, *Larrea divaricata*, is so similar to the North American creosote bush that they can be called ‘sister’ plants. No one knows exactly how the shrub “jumped” from South America to Mexico in what is called an “interesting case of disjunct amphitropic distribution,” but the most likely scenario is that its hairy seed pods, or schizocarps, came to North America attached to migrating birds. According to scientists in the 1970s, the creosote bush did not arrive to the region more than 16,000 years ago, judging by their somewhat recent appearance in packrat middens. In the 1990s, however, the plant was placed in the Death Valley, CA region in lake sediments that dated it back to approximately 75,000 years ago. Then, a 2012 study that examined DNA sequence divergence dated the shrub’s arrival closer to 1 million years ago, while another study that looked at the creosote gall midge, *Asphondylia auripila*, a creosote bush specialist fly, placed the species in North America somewhere around 4 million years. Another molecular phylogenetic study found that, although the polyploid populations developed during the Holocene, the original diploid would have arrived in North America 4-8 million years ago. But no matter which of these estimates is more accurate, the plant was in the region before it was ever hot and dry.

The arid deserts of North America are generally believed to be quite young, fully forming only about 10,000 years ago. That is approximately after the last glacial period slowly waxed and

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17 Ibid.
finally waned, and the climate settled into a drying pattern. Enormous lakes, like Lake Cahuilla where now only the Salton Sea is left, slowly shrank into smaller bodies and dry playas over time, dramatically transforming the landscape.

Another ancient lake sat in New Mexico, where White Sands National Park now is, before it was the Chihuahuan Desert. Without an outlet at the time, the large basin was filled by water from the Rio Grande which started to accumulate about 2.5 million years ago. Called Lake Otero, it hosted people and now extinct megafauna along its shores together in the wetlands for thousands of years. Children jumped and ran around in the mud and mother and baby giant mammoths walked together upwards of 23,000 years ago. Their famous footprints preserved in what are now the gypsum sands show people were in the area far longer than previously thought. Now, much of the white sands that filled old Lake Otero and its deep history are punctuated by almost no vegetation—except for creosote bushes.

But how is it that the migrating *Larrea* species was able to make a home in the region for potentially millions of years before the climate became hot and dry? I have not yet found an elegant answer to that question, though the most likely scenario is that the plant found pockets of low-lying arid and semi-arid places to root itself and moved in and out of them as the climate allowed.

In southern Nevada near the California border, in the Amargosa Desert where the creosote is abundant, there is more to be learned about the formation of these deserts from Shoshone stories. The Western Shoshone, or Newe, live in what is now the state of Nevada, the southern part of which houses vast stands of creosote bushes, called yatumb or yatumbi, within the northern boundary of the Mojave Desert. There is a story that marks what could have been the end of the glacial shifts and the transition to arid lands during the Pleistocene era. It is a story
of a song—the “Song of the Yatumbi.” In 1989, an unnamed Western Shoshone elder, his niece, and an ethnobotanist hired by the federal government as part of the cultural resources report requirements for the proposed Yucca Mountain high-level radioactive waste disposal facility sat under a rock shelter in the Mojave Desert to discuss plants, but what the elder said about the creosote bush, called yatumbi, dominates the written report. “In the beginning there was a song just for this plant. The song belongs to the creosote but is sung by the turtle—the desert tortoise.”

The story he told began when there was an abundance of water and rain. One day, the tortoise and coyote quarreled over the hide of a big-horned sheep carcass. They both had large families, it seems, and coyote won the hide after a jumping contest. That is when tortoise, in his anger, began to sing the song of the yatumbi. The following day “the heat started up,” causing ponds of water to boil—coyote and his family were boiled into carcasses—“when he started the song, then that’s when the earth got hot,” the niece translated. The song ties into late Pleistocene climate shifts neatly, and effectively places the creosote bush and the transitioning landscape in tandem, the coming arid deserts co-created by both the shifting climate and the plant that would come to dominate in all hot deserts of North America.

It was in this setting, about 10,000 years ago in southern California in a valley called Lucerne, that a fuzzy white creosote bush schizocarp might have been rolling around in the breeze, or hanging onto the back or the paw of a packrat, or perhaps on the coarse hair of one of the last of the giant sloths in the area, before being squashed open by its massive supinated foot.

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20 Ibid, 12.
and deposited on the rocky sand of a shallow bajada. The seed pod contained five segmented chambers, or mericarps, each carrying one single tiny black seed. Creosote bush seeds germinate rarely in today’s Mojave Desert’s extremely arid climate, but this particular seed presumably got the water it needed to sprout, likely from a perfect rain, not too much, not too little. Its delicate relationship to its surroundings would start there.

Once sprouted, its first fundamental work was rooting itself in the soil beneath, taking advantage of the still-wet soil. It would first send a taproot straight down into the soil as far as possible, depending on the soil makeup, depth to bedrock, and slope. Then it would sprout shallow but long lateral roots all around it to capture as much water as possible close to the surface. The creosote bush makes itself a successful competitor for water in an extremely arid climate to a large extent by developing both deep and shallow roots.

After establishing roots, it would turn to growing its branches and leaves. The shape of the creosote bush, the way it grows, is mediated first by water and then nitrogen in the soil. Typically, with less access to water and on a steeper slope, a creosote bush’s branches will be long and wispy, in conical form, in order to lead as much rain as possible straight down to its base. Where it has adequate access to water, it grows in a rounder, hemispheric shape in order to gather as much desert ‘litter’ underneath it—wind-driven sand and dead leaf and plant matter—that helps nourish itself and the soil. Over time, the litter layer develops into a mound that can house numerous desert animals and insects which further enhance the soil for the plant. Older plants have more pronounced ‘mounds,’ a clear sign of these processes over time.

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After less than one hundred years—forty to ninety years typically—the shrub’s original crown or root from which its first stems had grown began to die in the middle and the entire wooden ‘root’ began to break apart into segments. Each of those segments would have continued to grow branches out of their periphery as the oldest middle parts died off over time. Eventually, continued growth from the periphery of each segment, or ramet, would begin moving apart and look on the surface like many individual plants in a circular pattern, but all nonetheless with the same mother root and identical DNA. The process took time and, in the case of the clonal colonies to which it would belong, seemingly did not stop.

This may have had something do with the naturally occurring bacterial networks in the soils beneath the plants in the Mojave Desert. This plant established a number of mutualistic relationships that have enabled its persistence. A study in 2012 tested the soil around the “King Clone,” a name which the plant was given in the 1980s, and other younger clones in the area, bringing to light what went on in the rhizosphere of the ancient clone. They found a soil teeming with microflora that play integral parts in nutrient uptake and the maintenance of plant and soil health. Plant growth-promoting rhizobacteria, specifically, were found attached to the plant’s roots and likely helped facilitate its long life.22 PGPRs are associated with adaptations that allow the plant to continue growing—something which would be essential for a plant to clone itself, and especially useful in the extreme environment of the Mojave Desert, where germinating seeds are few and far between.

In the late 1970s, UC Riverside biologist Frank Vasek discovered the ancient origins of the plant through a view from above, literally, while looking through military aerial photographs.

of the Lucerne Valley for an environmental study he had been hired to make. The picture from above the desert looked quite different from the view on the ground and provided the biologist with a clue that perhaps the circular shapes of individual creosote bushes were in fact all part of one original ‘mother’ plant—a clonal plant that had reproduced vegetatively rather than sexually. If so—and judging by the size of some of the ‘circles’—they could be very old indeed.

Vasek developed a method to estimate the age of clonal bushes using a combination of radiocarbon dating and a count of growth rings on other sample plants, and then measuring from the original root to the outer growths. It was in this manner that he was able to estimate that the largest of the circular bushes was between 11,700 and 9,600 years old. He named the plant “King Clone” and published his study in the *American Journal of Botany* in 1980. He received quite a bit of attention for it, especially from nature enthusiasts who wanted to protect the ancient plant. According to Vasek, “We believe it was one of the first life forms to colonize the Mojave Desert when the last glacier receded and has been a continuous resident there ever since.”

Vasek’s discovery led to the purchase of a 17-acre parcel of surrounding land by the Nature Conservancy of California in 1984, which is now called the Creosote Rings Preserve. Although there are many other very old plants in the larger clonal colony, the conservationists of the time were only concerned with the biggest and oldest one (people were very impressed by the fact that it was older even than the 5,000-year-old Methuselah bristlecone pine!) In a landscape dominated by creosote bushes, the others were, in comparison, just ordinary desert shrubs.

As one of the early inhabitants of the Mojave Desert, this particular shrub bore witness to the entire trajectory of life in the arid lands of the region. From its first appearance with the receding Ice Age, to its relationship with early human inhabitants, through European arrivals and violent conquests, to the equally violent history of modernity and settler colonialism, it remains there, 100 miles east of Los Angeles, guarded from ATVs by just a flimsy wire fence.

What happens between fungi, bacteria, and plant and tree roots underneath the soil is a fascinating network (often) of cooperation that we are beginning to become more aware of. Sometimes called the “Wood Wide Web,” this phenomenon speaks to networks of mycelium in the soil that have been observed to work cooperatively, sharing and exchanging resources through roots, even helping other trees to heal from plague or sickness. The root structure of the creosote bush, too, has a relationship with microbes, as mentioned before, that enable the plant to clone itself and live a very long time.

But what happens beneath the soil can also similarly be observed above the soil, especially in the case of the creosote bush, which is a consummate ‘nurse plant’ of North American arid lands. Over time, the plant creates a kind of microhabitat within and under its branches that provides shelter and nutrients to an incredible amount of living things. The shade under the creosote bush is itself a whole world for some organisms. It often provides the only protection for other plant species and countless insects, birds, and animals from the intense heat of the desert.

This is directly linked to the relationship between desert wind and the creosote bush. Over long periods of time, the bush’s root and branches can trap windblown sand at its base. Eventually the shrub will sit above a high mound of sand, which in turn becomes home to many burrows of rodents, insects, and reptiles—like the desert tortoise (the one who sings the song of
the creosote bush) which prefers to shelter under the creosote bush—and who, in turn, helps stabilize the soil. In addition to living among the creosote bushes, desert wood rats, kangaroo rats, and the black-tailed jack rabbit also feed on the creosote bush’s fresh branches, leaves, and seeds, a somewhat rare occurrence for mammals.

Birds, bees, grasshoppers, and tiny insects have developed specific attachments to the creosote bush and are considered associated species and specialists. Few plants provide for as many insects as the creosote bush. The relationship between the plant and its specialists represents a millennia-long dance between different species that binds them intimately with one another.

For instance, the creosote bush is home to a tiny lac insect, *Tachardiella larrae*, whose female deposits her resin or “gum” onto the branches of the bush in reddish-colored beads encasing herself within it. She lays her eggs and dies on the branches of the shrub, within the lac shell that she builds. This resin has been collected and used as glue by countless desert Native peoples—to fasten arrowheads and seal and repair pottery. Frederick Coville, botanist on the Death Valley Expedition of 1891, documented that the Koso/Panamint mix the lac with pulverized rock to create a very strong adhesive which was malleable at high temperatures and very hard when cool. The ‘gum’ had medicinal purposes in addition to utilitarian ones. The

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Nevones/Pima Bajo in Sonora would swallow it to treat dysentery and the Comcáac/Seris of Baja California would melt it into water and use it for contraception.  

The biogeography of some creosote bush associates is even shaped by their reliance on the plant. For instance, the creosote bush makes a little home on its branches for creosote gall midges, flies of which there are fifteen different species associated with the plant. Sometimes one can spot bright green or dry brown galls attached to the branches. These are home to the creosote gall midge. The fly deposits its eggs along with a fungal spore that induces the plant to build a fresh green, perfectly round growth, or gall, made of creosote bush leaves and stems that provides shelter for the eggs until the baby flies hatch and fly off, likely to another creosote bush.

Carl Lumholz once wrote of the creosote bush and its flowers that, “though, strictly speaking, nothing in nature is ugly, the greasewood could not be called beautiful, except, perhaps, when covered in the spring with its small yellow, jolly flowers. It may be compared to a person radiant with health and good cheer, for which he is liked, though he may not be handsome.” In the U.S.-Mexico borderlands deserts the shrub’s “jolly” flowers are visited by over 120 native pollinator bee species and over twenty oligolectic bees—species of native bees who forage exclusively on creosote bushes, referred to as the guild of Larrea bees.

*Bootettix argentinatus* is almost imperceptible as it perches on the branches and leaves of the creosote bush, its coloring perfectly mirroring the green and brown of foliage and branches.

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Even the sliver of light filtering through the branches is represented on this grasshopper’s body. In addition to the creosote grasshopper, there are three other grasshoppers and katydids associated with the creosote bush, who either feed entirely on the leaves or live on a single shrub, making the plant their exclusive territory.

The gobernadora tended to human as well as non-human life in the arid deserts of North America. The history of people’s early interactions with the plant can be read in archeological and ethnographical studies, as well as in oral tradition. Sometimes called “the woman’s plant,” the creosote bush has a long history especially as a beneficial ally to women, particularly in questions of menstruation, pregnancy, and childbirth.

“It wasn’t like the way they want you to believe; that Indian woman gave birth in the fields all alone and went back to their jobs right away. No! The mother rested and was kept warm. She was fed with songs and good medicine.” The good medicine referred to by Ruby Modesto was the creosote bush. For menstrual pain as well as for postpartum healing, a heated sandpit would be prepared for the woman in a special menstruation or birthing hut. The pit would be dug in just her size, graded in such a way that she would be able to lean her head back comfortably. Her relatives would build a fire in the pit, sometimes with mesquite roots, and once it had burned itself down, the coals would be raked out. A fresh layer of sand would then be used to fill it in and “ahtukul, creosote branches, with resinous leaves, were laced over the sand, then came a blanket.”

Ruby Modesto, a Cahuilla/Serrano woman from the Mojave Desert told this history to a university student in the 1970s. Ruby’s grandmother Magdalina also spoke of her postpartum experience in the heated sandpit, “the earth was warm. They covered me with blankets and put

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more sand on top to seal in the heat. The sand came up to my breasts which were left uncovered so I could nurse the baby. It was so warm and felt just right. The heat and the earth are healing.”

In other versions, creosote leaves would be pounded into a paste that was spread onto the woman’s abdomen. The woman would always be given a tea from ahtukul to drink. She would then lay in the sandpit and a handwoven rabbit skin blanket would be placed over her body and “I went to sleep. The ahtukul felt so good.” This would continue for up to a week for a new mother.

In the Serrano creation story told by Dorothy Ramon above, the first people became the medicine plants. Perhaps that is why Indigenous tradition advises that plant medicine should always be spoken to: “You can talk to the plants. You really can. I don’t mean you just walk up to a plant and say, ‘hey bush!’ But I mean be sincere. Be humble. The plants are like friends. Some of them have powerful spirits.”

The Western Shoshone elder from earlier also talked about the need to speak to the yatumbi, its relation to people, its medicine, and the relation of the people and plants to place. Healing was a situated practice, along with what grew along with you. Through his niece’s translation, he said “anybody could go out and get it, anybody that knew the plant could then make his own medicine. He said it wasn’t used by a medicine man, you know. It could be picked by anyone.” Provided they talked to it. Especially if it was being foraged for medicine. He described how you should tell the plant what ailment you needed help with and, because you both “grow on the land,” the yatumbi would cure you. For the Shoshone, it seems, the dominant

30 Ibid, 8.
31 Ibid, 35.
creosote bush was a sort of democratic ‘commons’ plant, available to anyone who needed it and asked. And there was a distinct relationship between people and plants that grew together.

Histories from the Mojave Desert, like these, show the ways in which healing was necessarily an *emplaced* practice. Plants were treated and interacted with as living beings who could be asked to assist people in a relation of reciprocity and ‘listening.’ Medicinal plants were especially revered, not only because they were seen as original peoples in many creation stories but because they were as essential as food in their ability to influence people’s health and life in the deserts.

People in the Chihuahuan Desert were using the creosote bush as medicine as well, since about 1,000 years ago. There is an interesting history of one of the oldest forms of medical technology, that is, water infused with plant material, what we often call tea, used by a little-known desert people in the Rustler Hills of West Texas. Archaeological records are valuable in filling in the unwritten historical picture of early Indigenous desert people and their material culture and healing strategies. Coprolites, that is fossilized human feces, have been helpful in piecing together the environments, diets, and habits of arid lands people thousands of years ago. Pollen analysis in fossilized feces showed the use of creosote tea by the hunter gathering people from what is called the Castile culture.

The people of North American deserts were typically nomadic hunter gatherers, as the environment was one in which mobility was quite literally life. The exceptions were around the rivers where some people settled in sedentary or mixed sedentary cultures with agriculture. The people who found shelter in the challenging environment of the Rustler Hills, one which provided little access to water, are known for their compassionate burials, their unique woven baskets, and their healing strategies with desert medicine. Presently, it is an environment of low
hills and sparse vegetation of yucca, cactus, and more creosote bushes than anything else, though there is evidence that, in the past, it may have been more of a mixed grasslands area. In this setting in the karst landscape are several caves which have for over thousands of years provided temporary shelters and burial grounds for people of the region. These include the archaeological sites of Caldwell Shelters 1 and 2 and Granado Cave used from 1,800-450 years ago (from about A.D. 200 to A.D. 1450.)

Although very little is known about the people referred to as the Castile culture, it can be assumed from their material culture that they understood how to live in their environment—they used yucca for shoes, made burden baskets for foraging grass seeds and other edible plant materials, cooked desert agave plants like lechuguilla and sotol in earth ovens, and utilized the creosote bush, Salix (an analgesic, aspirin,) and Ephedra (bronchial dilator among other uses) for medicine in the form of water infusions, or tea. Some burials indicate the presence of arthritis and archaeologists assume that many of the people struggled with diarrhea due to the high mineral content of the nearest water sources, both conditions for which creosote bush has been used as a therapy by Native peoples where it grows. Two coprolites contained high enough levels of creosote bush pollen to point to its consumption as a tea, rather than amounts that might be consumed environmentally. Such coprolite analysis is a fascinating window into material culture and ailments like common colds and diarrhea, as well as their treatment, which cannot be traced by bone fragments.

33 Casey Wayne Riggs, “Terminal Late Prehistoric Botanical Foodways and Foraging Catchments of the Eastern Trans-Pecos Archaeological Region of Texas” (PhD diss., Texas A&M University, 2018)
34 Ibid.
The selection of medicinal plants was not random—medicine plants were well-known by people who inhabited all the North American hot arid lands. Whether through olfactory or visual senses, medicinal plants were understood and essential to lives. In the desert of West Texas, someone drank creosote tea presumably for a stomach ailment and in doing so, left evidence of their everyday lives and vernacular healing strategies.

This small detail becomes ever-more important in the context of the persistent and ongoing use of the very same medical technology—creosote tea, té de gobernadora—which continues to be utilized by borderlands desert people of the present. This line of continuity provides something of a thread that links the past and present with the people and the plant. The creosote bush’s long history and identity as medicine provides a real contrast to the shifts in perception and arid lands uses that would come later with conquest and colonialism.

This chapter has integrated sources from science and natural history with histories from Native arid lands people who have lived, along with the plant, in the region over millennia, offering a picture of the beginnings of North American arid lands and current borderlands deserts to establish the common origins of aridity and the creosote—the first plant—in the making of the deserts. It further highlights the importance of medicinal plants for making lives in the deserts. This study will continue to explore the theme of healing with the plant throughout the dissertation, as the plant’s identity as medicine has persisted as its foremost relation with people to the present.
CHAPTER 2: COLONIAL DESERTS: THE PRADOXICAL LIFE OF THE HEDIONDILLA, 1580S-1800

Of poor shrubs, useless thorn bushes and bare rocks, of piles of stone and sand without water or wood, of a handful of people who, besides their physical shape and ability to think, have nothing to distinguish them from animals, what shall or what can I report.\textsuperscript{35}

—Johann Jacob Baegert, Jesuit priest writing about his time in Baja California, 1755-1767

Despite being an original inhabitant of the arid U.S. West and Mexican Northwest—an old medicine, a millennia-long survivor in some of the most water-challenged and hot environments, and an enduring ally of the people of the deserts—with conquest and colonialism the creosote bush would be seen as a “worthless shrub” by early European explorers. This chapter begins by interrogating colonial ideologies about the value of people and nature of arid lands, offering an environmental analysis of some of the colonial literature produced in the region. It posits that to many Europeans who came with the conquest, aridity was inherently foreign, undesirable, and unclean.

Not only were the people of the northern arid lands cast within these negative stereotypes associated with the desert and mobility, the creosote bush and other arid lands plants were cast simultaneously as undesirable within an assumption of ‘arid inferiority’—arid lands biases rooted in European environmental understandings of deserts from biblical and classical interpretations that were often divorced from lived experience. In eighteenth century, diaries

written by Franciscans, who were some of the first Europeans in the deserts where the creosote bush grows, the plant was a symbol of the sterility and ‘worthlessness’ of the lands where it grew.

The chapter will then move chronologically into the earliest sources specific to the creosote bush, which help us zoom into details about colonial life that highlight the importance of healing, nature, and the role of women in the colonial medical sphere of northern New Spain. In the colonial contact zone of Sonora, as a practical everyday medicine commonly accessed by Indigenous and Spanish women in the mid-eighteenth century, creosote appears as a beneficial and helpful ally. In moving from the abstracted, generalized judgements about the deserts in the early colonial period to the on-the-ground lives and practices referenced in eighteenth century religious and botanical sources about plants, this chapter tracks the beginning of a paradoxical theme that may be the defining character of this plant’s history—that of the plant’s supposed “uselessness” as a resource, alongside its obvious use as a common medicine on the ground.

This brings up questions about the different ways arid environments were perceived and valued by diverse people who subscribed to varying economic, social, and political ideologies. Of course, Europeans were not alone in imagining the deserts; making lives, as in the socially produced space of Lefevre, implies an inherent imagining of place. Ultimately, the colonial history of the creosote bush highlights some of the differences between the ways nature was perceived and thus valued and utilized by diverse peoples over time.

Although scarce, colonial sources about the shrub provide a mode of reading relationships to nature. Methodologically, the problem in this period becomes avoiding the trap of centering of archival documents produced by missionaries and other colonial agents. We rarely find the voices of everyday people and women, especially Native populations, within the
colonial sources. But looking at specific practices with the plant by women, described within missionary accounts, helps shift the focus from the documenters to the women as historical actors. It is a different way, perhaps, of interrogating the sources, and one which respects non-dominant communities and the environmental knowledge they have produced.

People and plants— and traditional medicine—constitute the kind of environmental history that can be viewed outside of literatures which center the European trajectory and peoples. And the creosote bush, as well as other arid lands plants, help fill a gap in colonial literature of the ‘North,’ resituating arid lands, their plants, and peoples in order to tell a uniquely different story of desert cultures that does not focus on its inferiority or scarcity, but rather on the richness of these “bountiful deserts,” as Cynthia Radding has written about.36

Since the earliest written accounts of North American deserts, the plant was largely invisible to the earliest chroniclers. They saw the shrub-filled deserts generally as empty and sterile if they described them at all. In their journeys they searched the landscape for greener places of settlement where there was easy access to water and sedentary communities of Native peoples. Early chroniclers were largely blind to the land’s uses and meanings outside of their paradigms of progress. And the creosote bush was often emblematic of what they saw as barren and useless. As the inverse of their ideal landscapes, the desert was an irrational landscape.

Furthermore, as a quintessential plant of non-sedentary spaces, the colonial history of the creosote bush shows the ways in which arid lands became implicated within European ideas about the inferior and “uncivilized” Indigenous populations who lived within its geographical

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range. These included the arid places of northern Mexico they were traversing, called Gran Chichimeca and, farther north, the Tierras Nuevas.

Chichimeca meant different things to different people at different times, but even before Europeans arrived in the Western Hemisphere, the idea that hunter gatherers from the arid northern lands were culturally inferior and ‘barbarian-like’ was already established among the Nahuatl-speaking Mexica/Aztec peoples who ruled to the south. But their understanding was complex since they also identified in part as Chichimecas who migrated south to central Mexico and traced their origins from hunter-gatherers. To them the term represented “both the self and the other. Its meaning contained for them the ideas of savagery and barbarism, but also the positive attributes of manliness, virility and an ancient past.”

Although their understanding was multi-layered, to the Mexica/Aztecs, the people of the North were generally perceived as culturally inferior and somewhat ‘savage.’ They hunted with arrows and gathered plants, seeds, and roots to eat, they worshipped the sun and the moon, and their forms of sacrifice had to do with animals like deer and killing humans with arrows, rather than mass human sacrifice and the cutting out of hearts.

Europeans who colonized the western hemisphere brought along their own complicated sets of ideas and understandings about the people and the lands they would conquer, while at the same time adopting and compounding the negative meanings attached to the Nahuatl term chichimeca. Those ideas often had to do with the political and religious justification for enslaving and exploiting the people and the resources of the lands, as they saw them. The subjugation of the lands and people of Gran Chichimeca and the Tierras Nuevas beyond it,

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38 Ibid.
would be exacted at different times through war and accommodation, and by the slow northward
creep of pockets of mining, slaving, ranching, military outposts/presidios, missions, and
agriculture. But those outcomes were predated by the intellectual tools of imperialism, as Diana
K. Davis writes, stemming from European notions of aridity and deserts and the people who
lived there, that were seemingly transplanted to the New Spain.\(^{39}\)

We see the preconceived notions held about arid lands and arid lands people in Spanish
colonial sources, as early as the first accounts written by Europeans who went north in the
sixteenth century. In 1581, the Chamuscado Rodriguez Expedition travelled from the mining
region of Santa Bárbara in southern Chihuahua and followed various river valleys through the
Chihuahuan Desert to what is now northern New Mexico. Hernán Gallegos was a Spanish
soldier and documenter of the expedition. In his subsequent account he wrote, for instance, of the
non-sedentary desert peoples of the Conchos River area, “these people are very ugly; they go
around naked like Arabs and are lazy, even for very little work, and dirty [in the sense of pigs]
and sustain themselves on much squash and ground mesquite and agave and prickly pears and
they fish from the river.”\(^{40}\) Gallegos described what he and many other early chroniclers
considered important, that is, what people looked like, how they dressed, their perceived capacity
for work, whether they lived in settlements or not, if they cultivated food, and what they ate. In

\(^{39}\) Diana K. Davis, *The Arid Lands: History, Power, Knowledge*. Cambridge,

\(^{40}\) Barbara De Marco and J.R. Craddock, *Relación de Hernán Gallegos sobre la
expedición del padre fray Agustín Rodríguez y el capitán Francisco Sánchez Chamuscado a
Nuevo México, 1581-1582* (UC Berkeley: Research Center for Romance Studies, 2013), 10. [my
translation. The source has the phrase “come alarbes” which would mean something like they eat
Arabs; I have corrected it to como and use it as such.]
doing so, Gallegos implied a hierarchy that placed nomadic pastoralist and hunter gatherer cultures at the very bottom.

The conflation of non-sedentary Native peoples of North American deserts with “Arabs” or even “naked Arabs” was not uncommon in sixteenth century writings about the so-called Chichimecas. The word “alarbe,” (from al’arabe) was used in Spanish to describe something or someone of Arabic origin, but its connotations were generally derogatory and had roots in classical era environmental determinism as well as in the history of Christian and Islamic power struggles.  

We see something similar in the writings of Spanish Franciscan Jerónimo de Mendieta in the late sixteenth century. In his history, Mendieta described “Chichimecas and other arabs living on the frontier of Chichimeca,” in contrast to the rest of the Native people he encountered, as impertinent, hostile, and immodest. Later, in another context, he associated the word “alarbe” with people removed entirely from “the aid of the word of God and without the sacraments of the Church.”  

In short, people in North American arid deserts became easy stand-ins for racialized Others that Muslims had already been to Western European Christians for centuries. ‘Chichimecas’ became imbricated with all of the negative associations the term ‘Arab’ encompassed at the time in works already addressed, as well as in others including those of Gonzalo de las Casas and Bernardino de Sahagún. The commonalities were as described: they were nomadic, lived like animals, were naked, dirty, heathen. They were not Christian, they were hunter gatherers rather than settled cultivators, used bows and arrows, they were barbaric, lived

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41 Davis, *The Arid Lands*.  
outside of the city/center, were lazy, exotic, and unashamed. The ideas brought to the Americas with the conquest were thrust upon the Indigenous populations who lived in arid lands and who were also nomadic or semi-sedentary, etc. Preconceived biases about arid lands and peoples would then have specific material impacts on the histories of people and place in the North American deserts.

If Europeans imposed their previously held notions of the ‘Other’ onto Native peoples in the Americas, then it is useful to consider what biases they may have already held about the value and worth of desert lands, as they saw them. It is easy to assume that our current narratives about deserts being “empty” or “wastelands” are natural perceptions rather than part of a long cultural trajectory that ranked people and geographies onto hierarchies of worth. Diana K. Davis’s work on arid lands history is helpful in revealing some of the classical and Christian origins of European perceptions of deserts. Since very early written accounts by Herodotus and Strabo, beginning in the 5th century BCE, the deserts were described as barren and “more suitable for wild beasts than for human beings.”

At the same time, writers like Aristotle were putting forth the beginnings of environmental determinist thought, dividing the world in temperature ‘zones’ and using climate and geography to explain the general character of people. These writers centered their own environments—temperate climates—as morally, physically, and intellectually superior to others, establishing themselves as the normative standard by which to judge the extent to which other ‘zones’ were habitable, and by extension, the extent of other people’s humanity. Following this,

44 [These ideas are not only European, similar narratives around the inferiority of arid lands and people are also seen from China in its borderlands dynamics with Mongolia. But because this history is tied directly to European colonialism, I will leave China out of the analysis here.]

45 Davis, The Arid Lands, 25.
specific biases around deserts have roots in the establishment of cities, the Greek polis, as the intellectual and cultural centers of civilization, while anywhere outside of the polis was considered less developed, and increasingly so by degrees the farther away from the ‘center’ it was. The places just outside the city where “proper” cultivation of land and livestock-raising occurred were still considered part of the civilized world, if a bit less so, but beyond that were the marginal “empty lands”—unpopulated, uncultivated wilderness that was likened to barbarism.⁴⁶

In the following centuries, with the rise of Christianity, deserts effectively became religious spaces. This meant that although interpretations of them were not monolithic and not always negative, the desert remained an abstracted space, foreign and exotic. But by the time Christian Europeans crossed the Atlantic, the primary and most widespread interpretations of the desert had taken on negative moral associations, as ‘wilderness’ became synonymous with aridity and deserts became seen as divine punishments for human transgressions.⁴⁷ These were some of the notions and presumed “knowledge” of deserts that future chroniclers of the “New World” would come to the Americas with. It makes sense, then, that soldier Hernán Gallegos would portray Chihuahuan Desert peoples with the negative connotations that had historically been attached to aridity and its inhabitants— influenced by religious ideas as well as those from popular environmental determinism.

Of that which was written about the lands where the creosote bush grew alongside the desert peoples, there is a similarly distasteful characterization from Bernardino de Sahagún: “chichimecatlalli is where the chichimecas roam. It is very bad, very sterile, and completely

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⁴⁶ Ibid, 34.
⁴⁷ Ibid, 37.
lacking in resources.” And beyond the current states of Zacatecas and San Luís Potosí which were at the northern margin of Gran Chichimeca, in the Tierras Nuevas of current day Chihuahua and Coahuila and beyond, Gallegos described the un-cultivated desert lands where the so-called ‘very ugly’ people of the Conchos River lived, as “all very bad, [wretched in other translations] dry and barren and the worst seen on the trip thus far.” It is likely the creosote bush’s extreme lack of relevance to agriculture or capitalist commodification that explains its archival marginality within written sources up until the mid-eighteenth century, when it was finally referred to by name by missionaries in the Sonoran Desert. Up to that point, the plant’s existence in earlier sources must instead be detected within descriptions that refer to the land as matorral/scrub, monte/bush or shrublands, and through adjectives like sterility/estéril and worthless/ inútil.

Although the shrub was largely unaccounted for in these early written sources, its material ubiquity across the North American deserts can be assumed in most arid spaces (even when accounting for its growing distribution over time). The creosote bush grows in ecological regions ranging from very arid to semi-arid—and at elevations below 5,000 feet/1500 meters, in places Indigenous people moved through, gathered food and medicine from, and hunted within, but rarely settled, though there are notable exceptions that include the Tohono O’odham/Papago in northern Sonora and Arizona.

The plant’s range covers the lowlands of the Chihuahuan, Sonoran, and Mojave deserts, beginning from the region north of Mexico City in the states of San Luis Potosí and Zacatecas

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50 [This will be discussed further in Chapter 4.]
(and a small patch in Queretaro) and continuing north through most or parts of the following states: Baja California, Nuevo Leon, Durango, Coahuila, Sonora, Chihuahua, Texas, New Mexico, Arizona, and California. During Spanish colonial times, the home of the creosote bush included what was then considered “La Gran Chichimeca,” the ‘wild’ lands bordering Mesoamerica to the north, and the shrub dominated farther beyond in the “Tierras Nuevas,” in what are now the more northern parts of Mexico and the U.S. southwest.

Proximity to agriculture was a heavily weighted aspect of Gallegos’ perceptions and descriptions of the people and lands as the group travelled farther north along the Rio Grande toward New Mexico. As they came upon semi-nomadic peoples who cultivated squash, for instance, he described them as “less dirty” than the former people who did not cultivate. The expedition continually asked the Native people they met in the Chihuahuan Desert where they might find people who planted corn, wore clothing, and lived in permanent homes, the foremost qualities for them—“the main thing we were looking for.”51 This is a theme that appears repeatedly in Spanish colonial sources about North American deserts. The drylands were often places they were trying to get through in order to find signs of more ‘civilized’ places and people where it was easier to missionize, control, and extract resources (with the exception of mining settlements where Native people would be brought in to work).

Agriculture, the cultivation of corn and other crops, as well as the amount of clothing worn by people, signified more to Gallegos and others than just their practical material associations. Clearly, more access to water and food would have made for easier locations to live, and for missions and other military/religious/domestic settlements. But the desert— in its

51 De Marco, Relación de Hernán Gallegos, 19, [my translation.]
symbolic opposition to all things pragmatic, with its austere, scrubby, sparse vegetation and lack of abundant water — stood in as the abstracted reverse of the lusher landscapes they sought.

The cultivation of plants further symbolized a kind of environmental morality where ‘civilized’ people put the land to ‘good’ use, as opposed to ‘barbaric’ nomadic peoples who utilized cultivation lightly. They were often referred to as lazy on account of their marginal agriculture, an ironic description considering the amount of effort and knowledge it took to make lives in arid lands. And the wild ‘thorny’ scrub vegetation of the deserts, such as the creosote bush, only represented a lack, a hindrance to what would otherwise be desirable land.

Dry, so-called sterile, lands and their people were equated with uncontrollable environments and with the most “heathen” of peoples. This idea was commonly expressed in all three hot deserts of the region in the colonial period. Father Jacobo Sedelmayr, an early Jesuit missionary in northern Sonora in the eighteenth century, put it this way: “although the Company (of Jesus) does not excuse itself from work even in sterile lands to win souls to God, it must not be forgotten that for better reduction, teaching, and quieting of the Indians, it would be better for them to cultivate a land which would maintain them better.”52 As was more often the case than not, the toolkit of imperialism used to “quiet” Native communities included agriculture as a means by which to ‘reduce’ Native peoples in marginal regions.53 This made it easier to track and count people, thereby making it possible to police and control them, as well as their labor in the missions, haciendas, and mines. Sedelmayr continued, “…to the south nearby there live Pimas and Papagos [Akimel and Tohono O’Odham] in dry, sterile, and therefore inadministrable country, for which reason they are the most heathen, whom we hope to bring to the flock of the

church.”54 The moral-religious charge of “heathen” had to do with how and where people made their lives—in arid lands.

But Native desert peoples would not leave their lands willingly. The O’odham people, whose creation story began with the greasewood, were also the most heathen to Sedelmayr on account of the indomitable lands where they chose to live. Despite repeatedly being offered “more fertile areas where missionaries would have been present to instruct them in Christianity,” the people did not want to leave their place. 55 Another German Jesuit similarly pondered this idea from the “godforsaken waterless desert” of Baja California in the eighteenth century: “the native Californians themselves, who seem to thrive on anything and for whom it is the most delightful place on the face of the earth, either because they do not know better, or because of the innate love all men feel for the land of their birth.”56 Whether for the latter reason or not, we can be sure that the people knew far more about where they lived than missionaries believed, and that the choice to stay came from the knowledge and experience of place that helped them to thrive in “the worst” of all lands, to the priests’ disbelief.

These determinations extended to nature as well, as seen in one eighteenth century account from the second Juan Bautista de Anza colonizing expedition that went from Sonora to northern California. The Diario Íntimo of Father Pedro Font documents the landscape, vegetation, and people in some detail, opening a window into how the deserts were understood and judged by European outsiders. Fray Pedro Font’s diary stands out from the others written by members of the Anza Expedition, those by Francisco Garcés and de Anza, for instance, for its

54 Ives, “Sedelmayr’s Relación,” 111, [my emphasis.]
56 Baegert, Observations in Lower California, 49.
detailed accounts of landscape, vegetation, and peoples of arid northwestern New Spain. In it, we first encounter the dreaded hediondilla which translates from Spanish to stinking, fetid, and malodorous but is also used to describe something or someone who is dirty and repugnant. Font adds that outside of the region, “en tierra afuera,” the plant is called gobernadora, Spanish for governess, on account of its dominance.\footnote{Julio César Montané Martí, \textit{Fray Pedro Font diario íntimo y diario de Fray Tomas Eixarch} (México, D.F.: Plaza y Valdés, S.A. de C.V., 2000), 143 and 150, respectively.}

In 1775, as he passed through the deserts of “Papaguería,” the ancestral lands of the O’odham peoples, and then through California’s Imperial Valley, he wrote that there was nothing about the land that was “worthy of praise.” The dust was the worst nuisance, the ground was thin loose sand that got kicked up by the many animals and people on the trail, and nothing much grew there except a few scattered short mesquite bushes in the distance.\footnote{Martí, \textit{Fray Pedro Font diario íntimo}, 67-68 and 143, respectively.} The one thing that grew in abundance, though, and riddled the landscape was the creosote bush—what he called hediondilla—“a shrub of bad omen, there is no lack of it on these salty lands, and with no advantage or profit”: it was a harbinger of the very worst land, useless, ominous even, a bad omen.\footnote{Ibid, 150.}

In his account, Font provided the first written mention of the creosote bush as part of the arid landscapes where it thrived and give further insight into what was known about the plant in the eighteenth century.

He mentioned the plant as a bad omen more than once in his diary. Right before the company came out of the desert and into the San Jacinto Mountains of Riverside County, Font wrote that the creosote bush \textit{belonged} intimately to such bad lands, “the hediondilla continued until the top of the hill, that bad omen, that only she can survive in lands so wretched, and so
proper for her.”60 When he mentioned other arid lands plants, like mesquite and a shrub he called “chaparro,” likely white bursage, Ambrosia dumosa, he added that they either serve no purpose at all, in the case of the chaparro, or he associated them entirely with food that Indigenous people eat, and therefore not to his preference, in the case of the mesquite.

Font was even more descriptive (and degrading) of the desert people. The Diario abounds in judgements about the people’s flatulence, deceitfulness, boorishness, their bathroom and sexual habits, physical appearance, and lack of shame. While receiving a tour and history of the ancestral Sonoran Desert ruins called Casa Grande from an Akimel O’odham/Pima Gileño governor, Font laughed out loud, reducing the man’s history to “confused hoaxes” mixed with “some truths,” which subsequently caused the man to stop sharing, saying “he did not know anymore.”61 Throughout his account, Font commented mostly on the physical appearance and smell of the Native people he encountered. At one point he connected people’s diet with their appearance in an environmental determinist analysis, positing that the Tohono O’odham/Papago were “very ugly” and had darker skin on account of all the ground mesquite, grass seeds, and “other coarse things” they ate, which further made for a “very corrupt stench” when they were together. Shortly after he mentioned the hediondilla plant, Font wrote of the people in the area, “these Indians are very ugly, dirty, and stinky”— “son estos Indios bien feos, sucios, y hediondos.”62 In coupling the creosote bush and the people using the same word, Font depicted, in a literal way, the shared negative environmental associations between the desert plant and people.

60 Ibid.
61 Ibid, 69.
62 Ibid 77. [My emphasis]
Of the many analyses that can be made from Font’s account, the following are most notable for this study: that the creosote bush was abundant in the lowlands of the northern Sonoran and Mojave Deserts; that to Font, the creosote bush had no value whatsoever, and even further symbolized a premonition of “bad” things to come, thereby endowing the plant with a moral-religious charge; and that by the late eighteenth century, Europeans in the region already had knowledge of the plant, such that they had given it specific names in different areas—one associated with its geographical dominance and the other with its smell, its primary eco-sensorial character. He further helps distill the ways that land, vegetation, and people were similarly cast in negative ways that had to do with a lack of understanding about human and non-human life within arid lands.

This point is important in that it shows the difference between the ways arid spaces were understood when they were historically and culturally lived, that is socially produced, over generations by diverse peoples, versus when they were beginning to be settled outside of historical and cultural understandings by outsiders. The outsiders perceived them mainly in the abstract, and without knowing the land’s history, rhythms, and nuances. This epistemological difference, when wielded by those in power, made it possible for arid nature, human and non-human, to be continually abstracted and divorced from its humanity, dignity, and worth. And because deserts where the creosote bush grew were considered some of the most marginal and worst for settling, the general approach over time would be to make them ‘useful’ to the extent they could be part of the colonial extractive regime.

But the history of the creosote bush does not explicitly belong within the history of colonial extraction because—for better or worse—it was never considered an economic commodity in any real way. Rather, it was distinctly in the way of progress and civilization. Its
use as a medicinal resource by everyday people, especially women, though, opens a window into the ways people were making their lives in colonial Sonora, and the importance of plants in doing so. Sources that reference the medicinal uses of the creosote bush can help shift the perspective onto the lived experiences of nature and its role in everyday life. They further reveal some of the ways European settlers, especially women, may have learned and adopted Indigenous knowledges of nature and the creosote bush over time.

Moving on from Font’s general disdain for the plant as a symbol of what the desert lacked, there are Jesuit sources written in the period that reference the common use of the creosote bush as a medicinal plant by both Native people and Spanish women in Sonora. By the eighteenth century, missionaries in the desert fringes of New Spain began documenting medicinal resources, efforts that signaled the beginnings of what would later become more formalized botanical expeditions in the region at the turn of the nineteenth century. Jesuits missionaries were some of the first to take an interest in studying the healing traditions of the region. They also documented their own previous knowledge of European lay medicine and compiling it into practical guides for use at various northern missions. Later in the 1790s, Spain would fund The Royal Scientific Expedition to New Spain, led by Martín de Sessé who, along with a team of Spanish botanists, naturalists, and doctors, would document New Spain’s botanical and other natural resources by official crown sponsored Linnean standards of Western Europe.

Even though Franciscans had been missionaries within the region of Nueva Vizcaya/Chihuahuan Desert as early as the sixteenth century, it was the Jesuits who first wrote about Indigenous plants and medicinal resources. Juan Esteyneffer (Steinhofer,) who missionized in Sonora and Chihuahua, is considered the earliest commentor on the topic in the region. His
practical manual from 1711, *Florilegio Medicinal*, was “a principal source of contemporary domestic medicine” for the period and combined Indigenous and European botanical and medical technologies intended to be used by other Jesuit priests in northern New Spain for the care of the “poor who have no recourse to doctor or drug store.” Despite his inclusion of a handful of native plants, the *Florilegio* remains marginal as a source for Indigenous medicinal knowledge since “most of the plant remedies that he discusses are European,” while the creosote bush goes unmentioned. It is difficult to guess why the creosote bush was not mentioned by Esteyneffer, especially because he had spent about a decade in the Sonoran Desert, moving from mission to mission, including with Kino in Pimeria Alta, where the creosote bush would have been a very common medicine used by Native people and Esteyneffer the one priest who was very interested in the topic. I can only surmise that perhaps ca. 1700 was a time in which there was less knowledge exchange or perhaps the plant did not make it onto his short list of Native plants because he did not consider it important enough.

Although priests played an outsized role in the colonial medical/healing sphere (at least in much of the literature), healing was not exclusively in the hands of the mission officials, as we can assume from Esteyneffer’s Indigenous-informed analysis, even with its European bent. In other words, he was around Native people and learned about their plants. But literature on the topic shows that epidemics helped establish European priests as healers and sources of comfort, while helping propel religious conversion, since the outsiders were seemingly immune to the epidemic diseases.

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But there is enough documented evidence of the ways Native peoples confronted outside illnesses with their own healing/religious modes outside of colonial institutions. One example comes from eighteenth century Central America, where Maya peoples utilized their own technologies through temascal/steam baths in confronting smallpox breakouts, a tradition that was systematically suppressed by the church.\textsuperscript{65} The temascal is also seen later, in the mid-nineteenth and early twentieth centuries by Cahuilla and other groups in southern California’s Mojave Desert, where tribal elders used them to ward off and treat smallpox and the Spanish flu. In this case, Native elders consulted their own knowledge of medicinal desert plants in steam baths and the preparation of medicinal teas using the creosote bush, called ato-kol, and Mormon tea, \textit{Ephedra viridis}, in addition to a handful of other native plants, in what was a successful public health campaign enacted outside of “modern” professional medical technologies in the period.\textsuperscript{66}

Still, Esteyneffer’s influence on Jesuit medical knowledge was significant, and his work would later be consulted and added to in future writings about the resources of New Spain that included medicinal plants such as the ubiquitous creosote bush. Jesuit preists Ignaz Pfefferkorn and Juan Nentvig were assigned to various missions on the northwest ‘frontier’ of New Spain in the mid-eighteenth century in Sonora and Arizona (and Baja California briefly). Like Esteyneffer, they both attended to the sick and had an interest in documenting all of the region’s resources as they saw them, including the native plants. Like many of the Jesuits in the region, neither of them was Spanish and instead came from what is now the Czech Republic (Nentvig)

\textsuperscript{65} Martha Few, \textit{For All of Humanity: Mesoamerican and Colonial Medicine in Enlightenment Guatemala}, (Tucson: University of Arizona Press, 2015), discussed in chapter 2.

\textsuperscript{66} John Bruno Romero and Ha-Ha-St of Tawee, \textit{The Botanical Lore of the California Indians with Side Lights on Historical Incidents in California}, (New Yok: Vantage Press, 1954), 4-5.
and Germany (Pfefferkorn.) Nentvig and Pfefferkorn would both close out the Jesuit period around 1767. Together they provide the earliest written sources that document the creosote bush, mentioning it not as an abstract scourge on the land (as would Font a couple decades later) but as a common medicinal plant in the region used by Native people and Spanish women.

Juan Nentvig arrived in Sonora in 1751 and wrote his account, *Rudo Ensayo: tentativa de una prevencional descripción geográfica de la provincial de Sonora* in 1763. Nentvig’s entry pertaining to the creosote bush, which he called hediondilla, can be considered the very first North American written documentation of the creosote bush and reads:

> El propio efecto [de deshinchar] hace la hediondilla, cubiansi [o cubiasisi]
> que quiere decir crines de berrendo, frita en sebo y aplicada en unciones
> con la dieta correspondiente (pues es tan fuerte, que si la persona que da
> las unciones se lava las manos se le engarajan); y de este mismo modo
> cura á los tullidos.

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67 The account was written by an anonymous author in the service of “Dios y del Rey Nuestro Señor” and later attributed to Nentvig.
68 The first written source on the genus *Larrea*, and the sister plant of the creosote bush, was from South America in a 1646 map made in Chile by the Jesuit General Procurator, Alonso de Ovalle.
69 Rafael Pérez-Taylor y Miguel Ángel Paz Frayre, *Materiales Para la Historia de Sonora*. Mexico: Universidad Nacional Autónoma de México, 2007), 201. [The authors use the anonymous version, usually attributed to Nentvig, called *La descripción geográfica, natural y curiosa de la Provincia de Sonora, por un amigo del servicio de Dios y del Rey Nuestro Señor, año de 1764*, which includes a different spelling, cubiansi, than other versions, and which includes the meaning of the word in Ópata.]
The hediondilla, cubiansi/cubiasisi [in Ópata,] meaning pronghorn mane, has the same [anti-inflammatory] effect, which fried in tallow and applied in unctions [salve, oil] with the corresponding diet (well, it is so powerful that if the person who applies the unctions washes their hands they seize up/become gnarled); and in this same way the paralyzed are cured as well.70

Nentvig’s entry provides a colonial Spanish name from Sonora: hediondilla. It also gives the Ópata word for the creosote bush, cubiasisi, which translates loosely to ‘pronghorn mane.’ The pronghorn, *Antilocapra americana*, is an antelope-like, hooved mammal native to Western and Central North America that the Ópata call cubida/cúbida.71 The creosote bush continues to be referred to as hediondilla by some, mainly in Sonora. Nentvig also gave some insight into what the plant was utilized for and how: in massage for inflammation, rheumatic conditions, and paralysis. The “corresponding diet” would have likely been related to the withholding of washing along with a fast or avoiding certain foods, the influence of which most likely came from Spanish colonists, rather than the other way around.72 The advice against washing one’s hands because of the plant’s “powerful” nature is harder to interpret but likely stems from similar ideas as the “dieta.”

70 Buckingham Smith, *Rudo Ensayo, Tentativa de una Prevencionál Descripción Geográfica de la Provincia de Sonora, sus Terminos y Confines* (Albany: Munsell, Printer, 1863), 63.
The creosote bush entry from Nentvig’s fellow Jesuit Ignaz Pfefferkorn’s *Sonora: A Description of the Province*, written in German some years after the Jesuits had been kicked out of Mexico, also mentions the powerful nature of the plant. The violin-playing Jesuit spent most of his time in Sonora within Opata, Eudeve, and O’odham/Pima communities in addition to serving the Spanish soldiers and families in the area. He arrived in the O’odham/Pima village of Atí in 1756, then later transferred to Cucúrpe, Sonora, where he stayed until the Jesuit expulsion in 1767. In his account he provides several points of insight and commentary on the ‘hedionda’ plant’s olfactory association, Spanish women as doctors, the plant’s effectiveness (though reluctantly,) as well as its geographical dominance in some areas:

*The hedionda (fetid) herb is very common in Sonora. It gets its name because it gives off an odor which is almost unendurable to a somewhat sensitive nose, this when one but touches or moves it a little. The doctors in Sonora (that is, the old Spanish women) make use of this herb in treating different illnesses. They are frequently able to help the sick person with it; often, though, it fails. It is really a very powerful remedy, however, for worms in children as well as adults. The herb consists of little round leaves which grow in large quantities on a thick and fairly large bush. Some areas*

of land are covered with such shrubs for a distance of two and three hours.\textsuperscript{74}

The creosote bush makes another appearance on the Domínguez-Velez Expedition in 1776, placing it for the first time outside of Sonora. While in central Arizona, on an unsuccessful attempt to carve a path from Santa Fe, NM, to Monterrey, CA, Franciscan Silvestre Veléz de Escalante wrote in his journal “in this plain or little valley, besides the tamarack, there is a great deal of hediondilla, which is a shrub with great medicinal virtues, as has been found in New Mexico.” \textsuperscript{75} Again, Escalante called the plant by the same name and recognized the medicinal “virtues” of the plant outside of Sonora, without expanding.

The final eighteenth century source that discusses the creosote bush as a common medicine comes from Baja California and highlights another important aspect of the plant’s role in women’s health. In the 1790s, as part of Spain’s Royal Scientific Expedition to New Spain, led by Martín de Sessé, a team of Spanish botanists, naturalists, and doctors documented New Spain’s botanical and other natural resources. José Longinos, the Spanish naturalist on the team, wrote about the creosote bush in arid Baja California. He was the first to mention the plant as—what Ruby Modesto described in the previous chapter—a “woman’s plant,” related to its uses in contraception, birth,


\textsuperscript{75} Herbert Bolton, “Escalante in Dixie and the Arizona Strip,” \textit{New Mexico Historical Review} 3, no. 1 (Jan 1928): 55.

Bolton translated what on the Expedition they called the “taray” tree as a tamarack, Larix laricina, which is an interesting species of pine tree, and not likely to have been growing in the U.S. Southwest and even less likely to have been growing next to so much creosote bush. The tree is most likely to have been either the tamarisk (whose exact arrival to the U.S. Southwest is debated) or a type of willow, Salix.
and menstruation. He called the plant gobernadora, a name first mentioned by Pedro Font in 1775, and referent to the plant’s geographical dominance.

*Las hierbas medicinales que más usan y abundan son las siguientes. La gobernadora, que toman las indias para abortar y no hay duda que esta planta tiene la virtud, cuando menos, de facilitar la expulsión de las secundinas y la menstruación cuando está detenida, según he observado.*

*The medicinal plants that are most used and most abundant are the following. The gobernadora, which the Indian women take to abort, and there is no doubt that this plant has the virtue, at least, of facilitating the expulsion of afterbirth and menstruation when it is stopped, as I have observed.*

The sources highlighted above give hints as to the intersections of Native and colonial ideas and practices around medicine and nature as well as the diverse social spaces of women and healing in colonial times. By examining the actual practices described with the plant and the women who used it, this particular reading identifies Indigenous knowledges of the plant within a literature that has more often focused on European missionaries and colonizers. In doing so, environmental knowledge, connection to place, and relationships amongst diverse women are all brought to the fore.

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76 Jose Longinos, *Diario de las Expediciones a las California de Jose Longinos*, ed. Salvador Bernabéu (Madrid: Ediciones Doce Calles, 1994), 139.
By the eighteenth century, the vast arid lands of New Spain’s northern borders had been occupied to some extent or another by Spanish and other European settlers and colonizers in concentrations of mining, agriculture, livestock raising, missions, and military outposts/presidios ventures for over two centuries. Despite this, the conquest of the North was far slower and population centers were smaller due to the generally semi-sedentary and nomadic forms of life, compared to the central valley of Mexico. The primary challenge for early colonists in the North was in limiting Native mobility and relocating them into small centers in order to extract their labor and to induce them to accept Catholicism.

The negative impact of colonization on the Native peoples of the arid lands of New Spain cannot be underestimated. From the 16th century onwards, people were enslaved and forcibly relocated for their labor. In addition, much has been written about the effects of European diseases, the consequences of which included enormous population losses, thereby “undermining native economic, sociopolitical, and religious systems.”77 It is easy to imagine that within this “disease environment,” relationships with known Indigenous plants and healers would have been of outsized importance. Or, on the other hand, did foreign diseases help usher in the dominance of European medical ideas within a “medical conquest,” where the Indigenous healing culture slowly deferred to the colonizers’ theory of healing and which ultimately centers Europeans?78

It is hard to estimate the details of close contact and interconnection between the diverse peoples on the ground between the beginnings of the conquest and the mid-eighteenth century when the creosote bush comes into the written record, but the fact that it appears at that time is

77 Daniel T. Reff, Disease, Depopulation, and Culture Change in Northwestern Spain, 1518-1764 (Salt Lake City: University of Utah Press, 1991), 15.
revealing of a hybrid and perhaps even communal nature of a shared space between different peoples. It also conforms with the culturally and biologically mixed populations of colonial northern New Spain that were in place since the beginning of colonization, as historians such as Cynthia Radding and Susan Deeds have described.

In the colonial healing contact zone, the picture given by the sources about the “hedionda” show a combination of distinct traditions, as Kay has argued more generally. What they add to this history is a focused inclusion of Native and Spanish women, the plants they used, and the ways they may have exchanged and produced knowledge in bidirectional ways which depict healing in the region as a “complex social ritual involving family and community” as well as the natural world. Eighteenth century northern New Spain was a period before the professionalization of medicine. As such, it provides an in-between point before the mainstreaming of ‘modern’ and male-centered medicine. Colonial accounts help decenter Jesuit missionaries as doctors, putting healing on the “fringes” of colonial new Spain in the hands of women. Nentvig, Pfefferkorn, and Longinos all “refer to the Indian practitioners as ‘medicine men,’ but…also assert that old Spanish women had set themselves up as the primary herbal doctors of the region. This observation is confirmed by Harris's (2005) assertion that women

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79 Susan Deeds, Cynthia Radding, and Cheryl Martin have written extensively about colonial borderlands.
tended to be keepers of botanical knowledge in most societies dependent on hunting and
gathering or small-scale agriculture.\textsuperscript{82}

This is an important nudge in the direction of tracing the transference of lay healing
knowledge at the contact zones of colonial New Spain. We see in Nentvig the ways humoral and
Indigenous domestic healing had begun to mix, with the use of the hedionda along with the
‘dieta.’ And Pfefferkorn and Longinos further show that the plant was both utilized by women—
and often for specific uses in women’s health related to menstruation, contraception, and birthing.
Women’s health along with the mixing of humoral and Indigenous healing forms and plants
bring up two questions. The first asks about the social interactions between women and the forms
in which women have, over time, exchanged knowledge about natural medicine with each other
in what we will call the historical process of ‘women talking.’ The second question has to do
with the counterintuitive place of abortion within Reff’s ‘disease environment’ in light of the
well-documented impact of colonization on birth rates and life expectancy in the arid lands of
New Spain.\textsuperscript{83}

In addressing the former question, it is helpful to think about the colonial ‘world-ending’
context of epidemic diseases that brought unimaginable death for human bodies but also
metaphorical deaths, that is, transformations of language, lifestyles, landscapes, methods of
survival, and social spaces. Healing practices were must have been of utmost importance,
especially at contact zones between diverse people. In response to the disease climate, “folk

\textsuperscript{82} Rebecca Crocker, “Healing on the Edge: The Construction of Medicine on the Jesuit
Frontier of Northern,” \textit{Journal of the Southwest} 56, no. 2 O’odham and the Pimería Alta
(Summer 2014): 307.

\textsuperscript{83} Reff, \textit{Disease, Depopulation, and Culture Change in Northwestern Spain}, 16.
practices of diverse racial groups commonly intersected in the areas of healing and casting spells on enemies or prospective lovers, and brought Indians, mestizos, mulattoes, and Spaniards into close contact.”\(^8^4\)

Healing with plants, midwifery, and other “petty witchcraft,” belonged within the realm of women. As such, women would have been the everyday foci of resistance through plant healing and magic, outside of the more formal spiritual healing performed by medicine men (and sometimes women.) Although inter-ethnic interactions are usually documented within spheres of men, we know that women were present in many domestic spaces where men labored, whether around missions, pueblos, haciendas, in mining camps, and in rancherías. In colonial Nueva Vizcaya, for instance, Native women often accompanied men who went to work at mining reales and took domestic employment in washing and cooking.\(^8^5\) Here, as in other labor and social spaces, mestizas, Native women, and other “castas” came in contact with one another. Without trying to romanticize inter-ethnic relations between women, theses spaces would have been points of word-of-mouth knowledge-sharing about everyday domestic modes of survival within community. Plant medicine would have presumably been a pertinent topic of conversation.

Longinos was perhaps the first to mention the creosote bush in this context. From him we are aware that gobernadora was used by Native women in arid Baja California to induce abortion, to birth the placenta effectively and quickly postpartum, and to bring on menstruation. We know, in sources produced after Longinos, that the creosote bush, haaxat in Comcáac, was used for a multitude of conditions by the Comcáac/Seri along the arid gulf coast of Sonora in general. The same resinous substance that Coville described being used a glue product, which is

\(^{8^5}\) Deeds, *Defiance and Deference*, 60.
deposited on the plant by the lac insect, was also used by the women as a contraceptive, which Richard Felger documented in the twentieth century.86 Comcáac women also used it for the opposite, mixed with *Krameria grayi*, when they needed help conceiving.87

In addition, the plant was used similarly for menstrual (as an emmenagogue) and fertility problems, and in the context of childbirth by the Tohono O’odham and Akimel O’odham in Arizona and Sonora, and with the Cahuilla, Mahuna, and Serrano people of the southern California desert, the Yoreme/Yaqui of Sonora, and later by Mexican women in Chihuahua and Durango.88 But the plant is not mentioned as an abortifacient again, unless by later sources citing Longinos, as far as I have found. This is perhaps due to the problematic nature of abortion as viewed by Catholic outsiders. According to Kay, instead of asking directly about abortion methods, missionaries, typically the ones who documented traditional medicine in New Spain, would instead “ask their charges about ‘delayed menstruation,’” but there is little doubt that there was much distinction between the two in the colonial period.89

Abortion was not always the immoral act that it became over time with the conquest. Women long had had the knowledge of abortifacient plants and utilized them in the colonial context, as we see in the Caribbean in Londa Schiebinger’s work on the “peacock


88 See Native American Ethnobotany Database online.

flower” *Poinciana pulcherrima*. Insecurity about the future, fear of enslavement, and rape were all certainly possible reasons to seek abortion if you were an Indigenous woman in the colonial period. And we do find additional hints in the sources as to the reasons why Indigenous women in Baja California and Arizona/Sonora might have sought abortions in the colonial period, though the sources are not specific as to the method. In the twentieth century, Frank Russell described Akimel O’odham/Pima women inducing abortion because they were still nursing the previous child and because “it was believed to be prejudicial to the welfare of the nursing child, which the mother loved the more ‘because she could see it.’” Russell further reported that illegitimate pregnancies were also aborted, “at three or four months.” Twentieth century sources like this can only help us imagine what the reasons might have been in the colonial period, but one source notably traces the reasons behind Native women’s abortion in Baja California. During the colonial period, women in Baja California are said to have practiced deliberately ending a pregnancy because of the belief that their first pregnancy would birth a weak child and, additionally, they practiced abortion when they felt they already had too many children.

One further question that might be considered is whether the very low birth rate that is often mentioned in colonial sources was, in part, purposeful? Certainly, disease contributed to low birth rates, as did likely the general instability brought about by forced labor and other

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92 Russell, Ibid.
93 Leticia Sara Rivera González and Maria Elisa Villaloando, “Salud y medicina en el norte de México,” En López Austin y Viesca (Eds.), *Historia general de la medicina en México. México Antigua*, vol. 1 (México, D.F., 1984): 365-384, as cited in Biblioteca Digital de la Medicina Tradicional Mexicana website. [I was not able to access the actual book as of yet.]
colonial practices that transformed lives on the ground, displacing and destabilizing communities. It would be intuitive to think that having more children would have been of primary importance, at least to colonial powers. But perhaps women resisted.

We know that with knowledge Indigenous women held about the natural environment, plants like the creosote bush were used to facilitate their choices about having children, for any number of reasons, some already discussed. Nora Jaffary writes about central Mexico, that “the combined instance of high rates of extramarital sexual activity and low birthrates in particular contexts in colonial Mexico suggest that women’s practices of contraception, abortion, and infanticide were more common than historians have hitherto acknowledged.”

Taken in the context of sexual freedom and resistance to monogamy and marriage, which was commonly documented by missionaries in the arid lands and specifically in Baja California, this is likely to have been the case in northwestern New Spain as well.

Let us think about the processes behind the hediondilla/gobernadora being used as a plant medicine in the sources discussed here. Someone went out into the desert and foraged the plant in the landscape. They might have had a specific bush that they preferred, perhaps it was even one that had been accessed by generations of their people over time, as would later be documented by Nabhan about Tohono O’odham woman Laura Kerman. They might have paid attention to which plant had more green leaves or looked ‘healthier’ and ‘stickier.’ Perhaps they would have only taken what they needed so as to not over-harvest from one individual plant. They likely would have talked to the shrub, asked for permission, and left a ‘gift’ in exchange, as Native people do and have done over time, in gratitude. Practices such as foraging may not have

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95 Baegert wrote extensively about this in hunter gatherer communities in Baja California.
left a major mark in the landscape, but they forged everyday profound connections to the environment, reproduced lives, and created place.

The lay use of plants is a salient way to study something like cultural persistence, as Native medicinal knowledge and practices are commonly considered to some of the most resilient over time and into the present within Mexican communities.96 Where the creosote grows, it has been understood and utilized as medicine by the people who lived there and who held the knowledge, and “the knowledge of medicinal plants, helped to maintain the crucial balance between the individual and the environment (both physical and spiritual), which served as the basis for health.”97 In the case of this plant in the colonial context, as we have seen from their practices, women were more often than not the carriers and the transmitters of the knowledge amongst themselves and within the diverse mixed communities in which they lived. This speaks to a cultural resiliency that was strategic, shared, and extended by women of Indigenous and mixed ethnicity over time in order to maintain themselves and their health.

Healing was an important cultural form that connected people to nature and place. As a situated practice shaped by what was around in the environment, practices with the creosote bush reflect the expansion of Native practices within relationships with nature that were practical and helpful but also physical and chemical. The creosote bush did similarly in order to be able to thrive in hot, water-scarce environments, which exhibits its flexibility and attunement regarding its surroundings—including to other species, changing water availability, climate and soils. Because arid lands plants are uniquely shaped to live in water-scarce places, they more often have higher concentrations of certain phytochemicals that make them toxic, and also “very

97 Crocker, Healing on the Edge,” 308.
“powerful” medicines, depending on the method of preparation. Over generations, desert people came to understand the nuances of living and healing in the arid lands. Both plants and people respond to where they live and grow, in extended processes of learning how-to live-in place, a reconciliation of self and environment.

But early chroniclers like Pedro Font did not see the medicine in the desert lands that he believed had “ningun provecho/no advantage or profit.” They were interested in something else. And, perhaps more importantly, they did not have the necessity of learning how to live in the desert, or of accessing its many resources that had facilitated the lives of roaming peoples for centuries if not millennia. The second De Anza Expedition was tasked with colonizing Monterrey, California. They relocated numerous families from Sonora and Sinaloa and thousands of livestock, less in a process of learning how to understand new environments and more of one that superimposed themselves and their ways of life onto a ‘new’ land. Font perceived the people and plants of the arid lands they were traversing across in terms of what they lacked, waiting for when they would arrive at more ‘rational’ and accommodating coastal vegetation and abundance of waters. It is not hard to understand in the context of colonialism writ large in which “provecho” and extraction often took precedence over processes of adaptation that would change people to suit the place, rather than vice versa.

“How then is it credible that someone should have decided of his own free will to establish himself amid such sterile and arid rocks,” asked German Jesuit Johann Jakob Baegert, who missionized in and around the San Luis Gonzaga mission in Baja California for 17 years, from 1740-1767. He could not conceive of why people would choose to live there. The dialectic here speaks to more than necessity. Like Sedelmayr, who commented on Tohono

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O’odham desert people’s attachment to place, Baegert pondered the unfathomable fact that “each is as much enamored as is any other people, yes, even more so, for, quite unreasonably, no one would under any circumstances allow himself to be transplanted fifty or more hours away from his birth-place.”99 In the same sentence, Baegert would write about the horribly scarce resources of the land, the disgusting and lazy nature of the people, and then comment on how happy and healthy they were, the irony being lost to him completely—“The California natives seem to have nothing, and yet they have at all times whatever they need and as much as they need of it. That is because they do not care to shoot the arrow of their ambition farther than after whatever their poor country produces, and that they are always able to reach.”100

What caused some to “see the medicine” and others to disparage it? The answer lies in certain political ecologies and economies stemming from ideas of ‘arid inferiority’ brought by Europeans to North American deserts, who saw the deserts more suspiciously than those who rooted themselves in the region and aimed to live within its constraints. Focusing on everyday life with plants, though, shows the actual forms that rootedness took, and we can further see the ways the production of Indigenous environmental knowledge dispersed and changed during the colonial period, while persisting through women’s social healing spaces. The abstracted “land so wretched” where the creosote bush grew, which Font recognized could only be “proper” for a plant such as herself, was concurrently a place that people had lived in and understood on multiple spiritual, practical, and sensorial levels; a place made “proper” for living by people who knew and loved it.

99 Baegert, 56.
100 Ibid, 50.
CHAPTER 3: NAMING LARREA TRIDENTATA: BOTANIZING AND NATION-MAKING IN THE DESERT BORDERLANDS, 1800-1930

The late eighteenth and nineteenth century history of the creosote bush includes the beginnings of the formal botanizing of the North American deserts, from the south by Spanish botanists, beginning with the Royal Botanical Expedition to New Spain, better known as the Sessé and Mociño Expedition (1788-1804,) and later with European and United States botanists from the east coast. The methods these botanizing projects had in common were to document, name, and collect specimens to take back to Europe or to the East Coast of the U.S. In doing so, they would deracinate knowledges in and of place in order to reconstruct the natural world in their own scientific ‘language’ and to their own understandings, participating in the broader colonial extractive project that “interrupted existing networks of historical and material relations among people, plants, and animals wherever it applied itself.” ¹⁰¹ I argue that the North American

lowland deserts were environmental, geopolitical, and/or metaphorical borders to those who were tasked with observing them. Their aridity and limited resource pool made them intrinsically foreign and desolate to outsiders from Europe, who made up the majority of botanical documentarians in the nineteenth century. This chapter will begin by examining the chronological history of the creosote bush within these colonial and early national botanizing projects.

As part of the Sessé group, Jose Longinos, “California’s first naturalist,” realized the first continental, that is land-based, scientific exploration of the Pacific northwestern borderlands of New Spain and provided the first botanical description of the gobernadora. The expedition was commissioned by King Charles III as a continuation of the sixteenth century work begun by Francisco Hernández de Toledo, for the purpose that “the products of my fertile dominions of New Spain be methodically examined, sketched, and described…for the general and important purpose of fomenting progress in the Physical Sciences, of removing doubts and misconceptions in Medicine, Dyes, and other useful arts.” True to his directive, Longinos would include the gobernadora under the heading of medicinal plants, along with only three other plants, in an appendix to his journal listing “natural products” with the potential to be exploited commercially in both Californias, due to their wide availability and, presumably, their efficacy.

Appointed by Charles as the only naturalist on the expedition, Longinos received equal pay and instructions as Sessé, the Director, and tensions between them seem to have begun as soon as they arrived in Mexico in 1787, as evidenced by the excessive letters of grievance from

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both himself and Sessé to the viceroy. \( ^{104} \) So much so that Longinos eventually requested to be separated from the rest of the group to explore the two Californias, travelling four thousand miles from San Blas to Monterey in 1791 and 1792. Longinos was temporarily accompanied by Don Jaime Senseve, the professor of pharmacy on the expedition, who returned to Mexico City halfway through. Longinos requested a draftsman for the journey but was never provided one; his equipment amounted to one army tent. His cases of specimens of plants and animals would eventually make their way back to Spain in 1793. The naturalist died in Guatemala in 1803 after writing his diary of the expedition up the California peninsula. But the ubiquitous arid lands plant was not included in either of the eventual publications from the expedition.

We can surmise that the gobernadora was not collected in the first three years of the expedition for a few reasons. First, the group stayed in and around Central Mexico, where the plant does not grow— Querétaro being the only state they visited where they might have encountered the plant. But this is unlikely because the specimens collected in the early period, referred collectively as Icones Florae Mexicanae (and the only group that can be geographically identified with any certainty), were included in the manuscript/report of Plantae Novae Hispaniae, which was sent to Madrid along with paintings of plants in 1791. This was when Longinos was still at work in California. According to Rogers McVaugh, who has written exhaustively on the expedition and the herbarium it generated, these early paintings are identified by a number written in the corner of each plate, from 1 to 460. Our plant is among the more than

\[ ^{104} \text{Ibid.} \]
eight hundred other existing un-numbered plates which were presumably not produced in the first three years.105

The archive of the expedition’s work, with its thousands of specimens, notes, and paintings went from Mexico, Central America, and back to Madrid in 1803. Keeping track of everything was made more complicated by the subsequent French invasion of Spain, the death of Sessé in 1808, Mociño’s exile to France with much the collection in tow, and then Mociño’s death in 1820. In short, many materials and even crates were ‘lost,’ and not identified until after Mociño’s death.106 The publications that would eventually come from the Sesse & Mociño Expedition in the late nineteenth century consisted of the *Plantae Novae Hispaniae*, mentioned above, and the *Flora Mexicana*. The latter was finally published almost a century later by the Mexican Secretaria de Fomento in 1894 from the more complete expeditionary materials—notes, herbaria, and paintings—pulled together by Sessé and Mociño once back in Spain but left far from finished at their deaths. This was the comprehensive manuscript of the entire Royal Botanical Expedition, but, as McVaugh noted “why such a striking plant was not included among the descriptions that formed the *Flora Mexicana*, we can only conjecture.”107 It is important to note that the gobernadora is not the only plant left out of the publications that came out of the expedition.

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Although the Sessé and Mociño paintings did not include the locations where the specimens were collected, which is a problem that has plagued the history of the expedition, Longinos’ gobernadora is one plant which is not difficult to locate. He was the only member of the Royal Expedition who collected specimens in the deserts of northern Mexico where the plant flourishes. According to Longinos, he collected more than thirty boxes of plant, animal, and mineral specimens while in Baja California, and sent at least two shipments from California to Madrid, via Mexico City, between 1791 and 1793. Thus, it was likely that one of Longino’s Baja California gobernadora specimens was used to produce the painting that the renowned Swiss botanist Augustin P. de Candolle would later use to name and publish the plant as *Zygophyllum tridentatum*, the first Linnean classification our plant would be assigned.

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Simpson states that Longinos included a list of the specimens sent in an appendix to his journal. I do not have Simpson’s translation, instead I have been using the Spanish publication and his appendices there do not include a list that is conspicuously labelled as including the specimens he sent, so I can’t be sure yet. I’ve requested the Simpson translation through Illiad and am waiting.
Between the 1820s and late nineteenth century, when the *Flora Mexicana* was published, the only knowledge of the expedition’s findings was through Augustin Pyramus de Candolle. Mociño met de Candolle in 1812, during the former’s exile to Montpellier, France. It was there that de Candolle was able to study the Expedition’s collection of paintings that Mociño had carried with him from Spain. De Candolle decided to make a thorough examination of the entire collection, correct the many mistakes he had noticed, and assign names to many that had none—“to resolve the chaos,” as he said. Mociño gifted the Swiss botanist with around three hundred duplicate paintings he had with him, and, in a monumental and very rushed task, De Candolle employed over one hundred artists to copy the remaining originals (over one thousand) in the ten days before Mociño returned to Spain.

De Candolle published many of the plant names for the first time, including our zygophyllaceous shrub, in his *Prodromus*, beginning in 1824. The De Candolle collection of paintings, held in Geneva, can also be found in various forms and quantities at the Field Museum of Natural History and the Gray Herbarium Library at Harvard. The paintings Mociño had with him when he died are held as the Torner Collection of Sessé & Mociño Biological Illustrations at the Hunt Institute. The first

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110 Rogers McVaugh, “Botanical Results of the Sessé and Mociño Expedition (1787-1803 II. The Icones Florae Mexicanae,” in *Contributions from the University of Michigan Herbarium*, 101.
historical representation of our North American species, *Zygophyllum tridentatum* DC, used by De Candolle is pictured above.\(^{111}\)

The very first identification of the new genus to which the plant belongs was made before De Candolle, though, by José Antonio Cavanilles in his *Anales de Historia Natural* from 1800. He named the new South American genus *Larrea*, which he had previously called *Hoffmansseggia* [sic], conceding to the name given it in 1797 by Casimiro Gómez de Ortega, head of the Royal Botanical Garden of Madrid.\(^{112}\) The name honored Juan Antonio Hernandez de Larrea, Spanish botanist and Bishop of Valladolid. Using specimens collected by Dr. Luis Née on the Malaspina Expedition, the five-year maritime expedition that successfully measured the entire western coast of the Americas in the late eighteenth century, Cavanilles identified three species of *Larrea* in the arid regions of South America. One of them was *divaricata*, the closest relative and an almost identical plant to De Candolle’s *Zygophyllum tridentatum*; the two species would be considered the same plant by many into the twentieth century.

There was little to no formal botanizing done in the deserts where the creosote bush grows for some time after Longinos in 1792. The next mention of the plant came from a specimen collected by one of De Candolle’s students in 1827, Jean Louis Berlandier, while collecting plants in the Chihuahuan Desert in San Luis Potosí.\(^{113}\) By this time, Mexico had won its independence from Spanish colonial rule, and subsequently turned to its political and


\(^{112}\) José Antonio Cavanilles, *Anales de Historia Natural No. 4.* (Madrid: La Imprenta Real, 1800), 119-123.

\(^{113}\) Conservatoire et Jardin Botaniques Geneve digitized herbarium, Specimen G00342465-SIB 241559/2, dated Dec. 16, 1827, collected on his way from Mexico City to Laredo.
geographical settling of boundaries in the North. As part of those early Mexican efforts to unite and secure its northern regions against U.S. and Spanish intrusions, a boundary commission, or Comité de Límites, was created in 1827. It was comprised of military and civilian personnel tasked with documenting the nature and geography of the region, as well as a draftsman to make illustrations, effectively showing the importance of the natural sciences and the military in producing knowledge through observation in the establishment and understanding of a geopolitical boundary, something we will see again with the U.S. Mexico Boundary Commission. It included Jean Louis Berlandier, who travelled from Geneva to Texas via Mexico City, as the botanist on the Comité. He would send thousands of specimens from northeastern Mexico and Texas back to his mentor in Geneva, many of which would be published in *Plantes Nouvelles D’Amerique*, 1833-1846, by the Swiss botanist and friend of De Candolle, Stefano Moricand. He renamed the shrub *Larrea mexicana*, departing from De Candolle’s *Zygophyllum tridentatum*, using the Berlandier specimen for the identification.¹¹⁴ Moricand wrote:

“It looks a lot like *L. divaricata. ca.* [Cavanilles], but it differs from it by its leaves very manifestly petiolate and non-sessile, and whose lobes are not divaricate. I believe it is the same plant featured in Icones Mex. ined. of Moc. and Sess. quoted by De Candolle Prod. 1, p. 706, no. 18, under *Zygophyllum tridentatum*; at least this imperfect figure as regards the leaves that I saw in this author, relates to it well, and I think that it is by some typographical error that the diagnosis that he gives of it indicates the tridentate petals; for in the figure quoted they are represented whole as in my plant, and the other details of the fructification of this

figure are also suitable for mine. Having infused the leaves of this Larrea in pure
water, I found it the next day covered with a film of a brilliant golden yellow, and
having removed it with a white paper, it remained as golden.”

Despite the seemingly incorrect “three-toothed” identification by De Candolle, however,
the tridentata would stick.

Two years before Berlandier, Irish botanist Thomas Coulter was independently collecting
plants in the Sonoran and Mojave Deserts of northern Mexico and southern Arizona and
California. Frederick Coville wrote that “Coulter was the first botanist who penetrated the
Colorado Desert” (that is, part of the Sonoran Desert at the mouth of the Colorado River and the
Gulf of California/Sea of Cortez) “remarkable for the aridity of its climate and the peculiarities
of its flora.” Coulter, too, like Berlandier, had been a student of De Candolle in Geneva and
shipped numerous live cacti to him, which De Candolle quickly published. In a letter to his
former mentor, Coulter wrote that the desert he encountered in southern California was “truly the
Kingdom of Desolation.” Although he collected at least one specimen of Larrea mexicana in
Sonora, as we know from his 1825 field book, his subsequent article did not include a botanical
discussion.

Thus far, no field botanist had written about the plant in its environmental context, other
than Longinos. Neither Cavanilles, De Candolle, nor Moricand ever ‘met’ the plant in the
deserts, rather they knew it only as a ‘specimen’ of itself, in parts. All three of them would

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115 Moricand, Plantes Nouvelle, 72-73.
116 Frederick V. Coville, “The Botanical Explorations of Thomas Coulter in Mexico and
117 Richard G. Beidleman, California’s Frontier Naturalists, (Berkeley: University of
California Press, 2006), 129. As quoted by Beidleman in a letter to De Candolle from Coulter.
118 Thomas Coulter, “Notes on Upper California,” The Journal of the Royal Geographical
Society of London 5 (1835), 59-70.
receive the recognition of having their names attached to the plant, De Candolle, especially, through his association with Mociño and through the field work of his numerous students. After observing the ‘specimen,’ they described the shape and amount of leaves, flowers, and seeds, and sometimes experimented with their properties—Cavanilles and Moricand both mentioned in their descriptions of the plant that the color of water infused with *Larrea* leaves was yellow, perhaps hinting at the plant’s exploitation as a dye or some other “useful” endeavor, but no contextual knowledge or information accompanied their descriptions, other than sometimes the region or country in which it was collected.

The next few decades would mark an acceleration in the exploration of the arid regions of the southwestern U.S. that resulted in a boom of writings about the deserts and, thus, of our creosote bush. These begin to appear in the 1830s, expand in 1850s, and continue through the 1880s in the context of U.S. westward expansion and settlement, and took the form of diaries and surveys on topography, geology, biology, railways, and borders. Here marks the time when the arid lands and their “peculiar” vegetation were first introduced in a substantial way to wider U.S. audiences—public, scientific, and governmental. The travels and expeditions that define this period of nation-making highlight the role of the natural sciences in promoting the exploitation of the arid lands for economic market and state expansion.

In fact, it was men from the Eastern U.S., including Colonel William H. Emory and John C. Frémont, and countless others, who would set the parameters for measuring the value of the borderlands deserts, with the vegetation forward in their minds. Ultimately, their opinion was that the “barrenness” and “desolation” of the deserts made them fit only for the extraction of minerals, grazing, and in some parts for agriculture.
Similar to the shipping of collections to European botanists, the bulk of the botanical materials collected in the mid-nineteenth century U.S. explorations—field notes and specimens—were sent back far from the deserts where they were collected to important botanists back East, for the most part, most notably Asa Gray, George Engelmann, and John Torrey. They would be examined and interpreted by men who never knew the plants in their environmental contexts but would nonetheless name and publish them as part of comprehensive texts on the botanical resources of the country, while adding to their own institutional or private herbaria. It was through this disconnected structure that plants from the region became part of the nation—dead specimens listed in a dead language, objects effectively de-cultured and abstracted.

The men who travelled the arid regions and met the creosote bush in situ typically left diaries or some form of report where they noted clues to the plant’s contexts, filtered through their individual lenses, of course. Their descriptions included the expansiveness of ‘new’ lands, endless mountain ranges, the valleys and plains below them, ventured at geological explanations of the landscape and noted the rocks and minerals therein, marveled at new species of cacti, noted the availability of water and lack thereof, most often with eye toward the ways in which the arid lands could be made useful for the country, in other words how they could best be exploited. When it came to the creosote bush, by and large, their descriptions tended to follow a typical set of impressions having to do with desolation, barrenness, and a generally offensive presentation and smell.

There were a couple of notable exceptions to this, the first of which is seen early on, in the second Frémont Expedition of 1843-1844, when our plant is encountered in California’s Mojave Desert by John Charles Frémont, the ‘frontier’ explorer nicknamed “the Pathfinder.” His expeditions were topographical surveys that pushed to Oregon and down through California.
Frémont was many things, including a math teacher, military officer, civil and topographical engineer, politician, and explorer. He was a Southerner from Georgia who opposed slavery and was responsible for multiple massacres of Native people in California, including the Sacramento River massacre. He was twice discharged of his duties after various charges of misconduct and insubordination, including mutiny. His published report from his first and second expeditions was widely read and gained him much popularity.

Frémont would be the first ‘American’ to describe the vegetation of the desert Southwest in detail and sent all his plant specimens to John Torrey. As he left the San Joaquin Valley and entered the “dismal” Mojave Desert at Tehachapi Pass, he wrote first about the “yucca trees,” *Yucca brevifolia,* the celebrated Joshua tree, as the “most repulsive tree in the vegetable kingdom,” before turning his attention to the zygophyllaceous shrub which was characteristic of “this poor country.”119 In Frémont’s words:

> “we continued in a southerly direction across the plain, to which, as well as to all the country so far as we could see, the yucca trees gave a strange and singular character. Several new plants appeared, among which was a zygophyllaceous shrub (zygophyllum Californicum, Torr. & Frem.) sometimes 10 feet in height; in form, and in the pliancy of its branches, it is rather a graceful plant. Its leaves are small, covered with a resinous substance; and, particularly when bruised and crushed, exhale a singular but very agreeable and refreshing odor.”120

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120 Ibid.
Frémont’s pleasant characterization of the shrub is an outlier in the documented history of the plant in this period, but he touched on one important detail that had not before been described in any detail, that is, the plant’s smell. De Candolle and Moricand had not noted it, nor did Berlandier or Longinos, who both collected the plant in the field. Font, who had preceded Frémont in the Southern California desert by almost a century, despite referring to the plant as hediondilla (stinky) as the Spaniards did, never went into detail about the distinct and characteristic smell. The “Pathfinder” further stands out as the only outsider who considered the smell “agreeable” and “refreshing.”

It was the same quality, though in the negative, that provided the shrub with its most popular moniker in English—the creosote bush. It was given by William H. Emory, surveyor and topographical engineer on General Kearney’s Army of the West military reconnaissance expedition during the U.S.-Mexico War in 1846, which traversed parts of all three hot North American deserts on its way from Kansas to the Pacific Coast of California. He was to provide the government with information on the geology, animal, and plant life of the region and produce a map. Emory was accompanied at times by Lt. John William Abert, son of the head of the Corp of Topographical Engineers, and Captain Abraham R. Johnston, who both also provided reports on the journey and described the creosote bush. The plants specimens were sent to Torrey to report on. Abert, in a letter to Torrey from 1847, drew the botanist’s attention to the plant that he had collected in southern New Mexico, mentioning that Col. Emory had also collected specimens and that Emory “calls it the Kreosote plant on account of its odor.”

Why Abert wanted to bring Torrey’s attention the creosote bush in particular is not elaborated.

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121 J.W. Abert to John Torrey, Jan 17, 1847, J.W., John Torrey Papers, Biodiversity Heritage Library, https://www.biodiversitylibrary.org/item/218075#page/2/mode/1up
Emory was first introduced to the plant in New Mexico by the name hedionda, “a new plant, very offensive to the smell,” a name he originally miswrote as “iodeodonda.” In his published report he notes that Torrey informed him the plant was Moricand’s *Larrea mexicana* and referred to the shrub later in his report as “our new and disagreeable friend.” Emory wrote that when crushed, it smelled like “kreosote,” a distilled coal or wood tar used in the preservation of woods, especially railroad ties, and in medicinal remedies at the time.

Captain Johnston also complained about the smell of the shrub along the western edge of the Chihuahuan Desert in southeastern Arizona but in doing so, he was the first to associate the smell of the shrub with rain. His report describes the scant vegetation, with the evergreen “stink-bush” on the sides of the hills providing the only green color to be seen. Commenting on its abundance, he wrote “this creosote plant shows something; and a shower of rain which fell upon us, although very slight, made the atmosphere smell of some vile gas.” Johnston, who would later be killed near San Diego by the Californio lancers in the Battle of San Pascual only two months later, touched upon the salient eco-sensorial and cultural aspect of the shrub that people of the deserts refer to as the smell of desert rain, though he did not necessarily recognize it as such. Still, it is an important detail to note the different interpretations that the smell of the creosote bush elicited in some outsiders.

Two other accounts by men not formally part of the U.S. military give us further insight into the creosote bush. U.S.-born Josiah Gregg and German-born Friedrich Adolf Wislizenus, both colleagues of George Engelmann, and both with a penchant for the natural sciences and

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122 Lieut. Col. W.H. Emory, *Notes of a Military Reconnaissance from Fort Leavenworth, in Missouri to San Diego, California, including part of the Arkansas, Del Norte, and Gila Rivers*, (Washington: Wendell and Van Benthuyesen, Printers, 1848) 51 and 54, respectively, accessed online through BHL, https://www.biodiversitylibrary.org/bibliography/46796

123 Emory, *Notes*, 584.
travel, were busy collecting specimens in the deserts, specifically in the Chihuahuan Desert of northern Mexico and New Mexico, in the mid nineteenth century. They both wrote accounts of their travels on various merchant and military expeditions around the period of the U.S.-Mexico War. Wislizenus did not write about the creosote bush in his 1848 *Memoir of a Tour to Northern Mexico*, but he did collect the specimen that Englemann named *Larrea glutinosa* in the appendix of the book. Englemann wrote the botanical appendix using the plants Wislizenus collected, along with others previously provided by Gregg. Wislizenus included a correction to the *Larrea entry*, stating that, after review of the manuscript by John Torrey, the “*Larrea glutinosa* (n. sp. No. 10) seems to be *Larrea Mexicana* of Moricaud, described and figured in a work to which Dr. E. had not access.”

Writing during the U.S.-Mexico War, the German immigrant turned citizen did have much to say about the state affairs between the U.S. and Mexico. Deserts and mountain ranges being the preferred “barrier between states,” he proposed a border drawn from Laredo, TX, running west to the Gulf of California as ideal for the “extension of the ‘area of freedom’ for mankind” and humbly offered that “policy as well as humanity” demanded it. Wislizenus was highly critical of the Mexican government’s lack of attention to its northern regions, writing “one half of this northern territory may in fact be a desert, and entirely worthless for agriculture; but to a great commercial nation like the United States, with new States springing up on the Pacific, it will nevertheless be valuable for the new connections that it would open with the Pacific, for the great mineral resources of the country, and for its peculiar adaptation for stock-raising.”

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125 Ibid, 85.
126 Ibid.
Wislizenus voiced the common impression of arid lands that found them suitable only for railroads, mining, and cattle, as if the places that existed had no previous histories or relations but instead were a blank slate to play out U.S. capitalist imaginaries.

Josiah Gregg was a merchant and physician who botanized along the Camino Real de Tierra Adentro, from Santa Fe to Mexico City, between 1846 and 1848. Gregg learned to speak Spanish and stands out for his attention to the local culture of the plants he collected. He was the first of this period to document the gobernadora’s medicinal uses. From Montclova, Coahuila, with U.S. troops in the Fall of 1846, Gregg wrote in his diary “the gobernadora (or hediondilla) is a slender shrub growing three to six feet high: the leaves in decoction taken internally, or applied externally to pelvis, said to be excellent for diseases of bladder, especially retention of urine.”

Gregg’s “Herbarium” includes the following entry for the Larrea mexicana, numbered 563: “Near Venado [San Luis Potosí] Dec 20/48-Gobernadora-sudorific-used in vapor sweats- Internally in extract- Dose of latter said to be 3-5 grs. Also sudorific or diaphoretic. Abounds this far South, and scantily to San Louis-Thence to Mexico not met with- Flower yellow, shrub. (3-6x).” The x signified abundance and the 3-6 most likely had to do with the height of the shrub. In Wislizenus’s appendix, Englemann notes that according to Gregg, it also called guamis in northern Mexico. This the first time this name comes into the record. Guamis continues to be used popularly in the Chihuahuan Desert region.


George Englemann, “Herbarium of Josiah Gregg,” 1847, Biodiversity Heritage Library, https://www.biodiversitylibrary.org/item/123762#page/1/mode/1up

128 As attributed to Gregg by Engelmann in Wislizenus appendix. Guamis is likely a Rarámuri word, though this has not been confirmed in the archive as of yet.
Collectively, the men who wrote about the creosote bush in the mid-nineteenth century were hardly the benign, passive observers of Mary Louis Pratt’s *anti-conquest* botanists, even in the critical sense. They were far more explicitly implicated in the violence of conquest, whether as civilian scientists attached to military campaigns, or, for the most part, U.S. military personnel who were also documenting the nature of the lands they traversed. Frémont, for instance, was killing ‘Indians’ while also collecting plant specimens and remarking on the gracefulness of the creosote bush in his expeditions.

By 1848, the American intervention in Mexico, or the U.S.-Mexico War, was over and the Treaty of Guadalupe was signed. In it, Mexico lost more than half its territory to the U.S. The work of conquering over, the U.S. began the work of establishing and getting to know its new, largely arid, lands. The Mexican Boundary Survey was created to mark the actual boundary line, in congruence with the treaty, and had to be agreed upon by representatives from both countries. They were also to report to the U.S. War Department on the possibility of a railway route to the Pacific coast and to collect information on the agricultural, mineral, and botanical resources, as well as describe the general topographical character of the region—mountain ranges, rivers, and such—and produce maps. Thus, it was outsiders like Emory, from the military reconnaissance mentioned earlier and eventual leader of the Survey, virtually ignorant of the area and its cultural and historical contexts, who would mark the border, define, assign value, and present the possibilities for the region.

But for his part, Emory did not see himself that way. He was passionate about ending “hypothetical geography,” a practice that had become common since Baron Von Humboldt, whereby he said men made sweeping, generalized descriptions, and even maps about regions they had never seen with their own eyes. This “unsubstantial information,” he said, led to the
misrepresentation of entire regions, something which he was especially well-suited to remedy, being a celebrated mapmaker himself.\textsuperscript{129} He was likely referring, in part, to the John Disturnell map, which caused the Mexican and U.S. surveyors on the ground much difficulty due to its incorrect placement of Paso del Norte. It was in the habit of the time to take maps at their words, so to speak, and then add to them with information from other maps. Disturnell had essentially taken a copy of a copy and added to it with information from Frémont’s map and then made numerous distinct editions of the map over the years. This led to the biggest dispute on the Survey, which was due in part to the Mexican and U.S. sides using different editions of Disturnell’s map.\textsuperscript{130} Thus, Emory probably took pride in being an actual field surveyor and mapmaker, and in presenting the most accurate maps and observable measurements of a region that had been sparsely travelled in the past by ‘Americans.’ If it was a step up from Humboldt’s “hypothetical geography,” it was a still a far cry from any account of the region from the people who lived there who knew and understood the places intimately.

Within the various reports contained in the Boundary Survey, the creosote bush itself provided its own boundary of sorts, where verdant green landscapes ended and the “sickly” brown of the lowland deserts began. While descending into the desert east from San Diego to the mouth of the Gila River, Christopher Parry, botanist and zoologist on the Survey, wrote “the country thus characterized is, however, barren and desolate in the extreme; water is scarce, and pasturage of the poorest description. Thorny cacti and arid shrubbery usurp the soil, not only of


the mountain clefts, but also of the open valleys. At this point, indeed, we may say, *the desert proper commences*; for it is here we have the first appearance of the desert plants *Larrea Mexicana* and *Fouquiera Splendens.*"\(^{131}\) The shrub would be their “constant companion for the remainder of the journey” East.\(^{132}\) Lieutenant Michler would add of the same area in his report, “this whole country is truly a desolate region; rich, however, in geological and mineralogical material”— desolate but exploitable for something at the very least.\(^{133}\) As to the agricultural potential of these lands, Parry did not see the possibility in the lands where the creosote bush dominated, but, again, alluded to the almost painful aspect of that type of desert scenery— “this is truly a desert, though it is not… destitute of every kind of vegetation… several shrubs are peculiar to this tract, which, if they serve no other purpose, at least afford relief to the eye.”\(^{134}\)

The worst characterizations in the report were reserved for the creosote bush and the “Indians” of the most arid parts of the border. Lieutenant Nathaniel Michler, part of the Army’s Corps of Topographical Engineers and trusted by Emory, was to survey the westernmost part of the border from Nogales to San Diego. His report provides some of the most jarring of words for the people and the plant. Near Pilot Knob in what is now Imperial County, CA, he wrote “the plain is a perfect desert, marked by an entire absence of water, destitute of vegetation, save some few sickly plants: the *Larrea mexicana* and the *Fouquiera*, the natural growth of such barren localities, only add to the gloomy sensation produced by the scorched sterility spread out to view, with jagged ridges of hills lying in the background… We turn from this barren view and

\(^{131}\) Emory, *Report Vol I*, 127. [italics are mine]
\(^{133}\) Emory, *Report Vol I*, 104.
look with pleasure upon the bright green foliage which marks the course of the Colorado.”\footnote{135 Emory, \textit{Report Vol I}, 104-105.} The colors green and brown provided something of a framework for what the men of the Survey valued, a familiar reminder of what they knew. What they did not recognize was the brown sterility of the most arid lands, the color provided a contrast for them that revealed the difference between ‘good’ and ‘bad’ lands.

That interpretation seemingly bled into the people of the desert as well. Reminiscent of Franciscan Father Font, who traversed those lands a century prior, Michler wrote of the “dark brown Indians” around Fort Yuma, in the Sonoran Desert, as “curiosities.” He wrote that they were “naturally lazy” and “incapable of self-government,” as they had degenerated after the fall of the Spanish missions. Before, they had been just “children of nature” but now they were “avaricious...a herd of drones and beggars.” The women he described as “beautifully developed” and “superbly formed,” in the same sentence where he described them as “degraded, coarse and uninviting...their persons filthy and their actions still more disgusting.”\footnote{136 Emory, \textit{Report, Vol I}, 107.} Later in the report and in true Linnean-style, he described the form of the men and woman as an anthropologist of the time might have:

They are medium height, well formed, and slender; not muscular, the deltoid muscles alone being largely developed...they have large noses, thick lips, and high cheek-bones; their chests are well developed and figures manly, indicating activity but not strength...The women are under medium height; their figures are fine and plump; the bust is well developed, the mamma firm...”\footnote{137 Ibid, 109.}
Like Font before him, Michler did not hold the people and plants of the arid lowlands in the highest regard, but more importantly he seemingly did not see the Native people as completely human either. As for the “sickly” plant that dominated in the vicinity, it represented sterility, barrenness, and the opposite of ‘green.’

John Milton Bigelow was a medical doctor as well as one of the civilian botanists on the Boundary Survey, but soon after, in 1853, he joined the Pacific Railway Survey as botanist under Lieutenant Amiel Weeks Whipple, who was tasked with finding the best route for a railroad from the Mississippi River to the Pacific Ocean. Bigelow had a deep interest in the intersection between botany and medicine and promoted the use of medicinal plants in his career. Despite this, he had no kind words for the creosote bush in his report, nor, it would seem, any knowledge about its common medicinal usage. His words further confuse and contradict in ways similar to Michler’s description of Native women above:

“After crossing the dividing ridge between the Rio Colorado and Mojave creek, we saw the celebrated, but totally useless, *Larrea Mexicana*, or creosote plant, giving the surrounding scenery a most beautiful and verdant appearance. This plant is one of the most repulsive that can well be imagined. It is the surest indication of a sterile, worthless soil that can be found in the vegetable kingdom; for wherever it flourishes, little else can be found.”

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Is it the so-called ‘objective’ gaze of the outsider that can be so detached as to make such dissonant descriptions? Bigelow does not expand on what he meant by “celebrated” but we can assume he did not believe it deserved the designation.

One other positive observation came from Arthur Schott. Employed on the Boundary Survey, Schott was primarily a poet with interest in botany; his illustrations are prominent in the final report, especially those he made of Native people. He wrote in a letter to John Torrey during the survey work in the desert of west Texas, “I had to wonder what nice and graceful shrub the Larrea is. In its inflorescence is a peculiarity not given in the engraving of [either reads E or &] report and that is the petals are all thus vertically annexed, that one margin is looking up and the other down, it is nearly like the waterwheel of a propeller.” It is a discerning observation little seen in the survey. In the same letter, Schott mentions the abundance of medicinal plants in the region, “the Flora here seems to be exceedingly rich on plants for botanic and medicine purposes. I collect notes and remarks for this research as much as I am enabled to get.” But, although the second volume of the Boundary Survey, in the botanical section, states that Schott’s memoir of his observations would be forthcoming, none seems to have been published. Still, it is noteworthy that Schott was paying attention to the medicinal nature as none of the other survey members were— not even Bigelow who had a particular interest in it.

\textit{Larrea tridentata} would be the final ‘official’ Linnean classification that the plant would receive and would be a return to De Candolle’s original three-toothed description. It was assigned by Frederick Coville, of the Death Valley Expedition in 1891. He was able to settle the name with the help of Pyramus de Candolle’s son and the original Sessé and Mociño plate from 139

\footnote{Arthur Schott, \textit{Arthur Schott to John Torrey}, March 20, 1852, Arthur Schott and John Torrey correspondence, 1851-1869, BHL, \url{https://www.biodiversitylibrary.org/item/124409#page/57/mode/1up}}
a century before: “through the kindness of Dr. Casimir de Candolle I have been able to examine a tracing of the original plate upon which the description was founded. There can be no doubt that it is the common Mexican form of our well-known creosote bush.”

Up to this point, the creosote bush had not been mentioned as having potentially commercial exploitable properties. But by the late nineteenth and early twentieth centuries this would begin to change, as the technology of science made it possible to further reduce natural materials into smaller and smaller chemical ‘parts,’ discovering their ‘useful’ properties. In 1880, *The American Chemical Journal* published a piece by J.M. Stillman, then instructor of chemistry at U.C. Berkeley, on creosote bush lac, a red resinous substance that is deposited on the branches by the then-unidentified insect, *Tachardiella larreae*. Stillman had received a specimen and performed an analysis in lab. He wondered if it might have commercial uses similar to those of the gum lac of India, which was commonly used as a wood finish and dye, among many other uses. After Stillman, in 1898, Clement B. Lowe wrote another analysis of the plant as part of pharmaceutical investigations into its capacity as a drug. This was published by the *American Journal of Pharmacy*, using the Native medicinal uses of the plant as a point of departure for analyses. This time, interest was in the plant’s resinous substance, which would, in the next decades, be identified as the antioxidant NDGA (nordihydroguaric acid).

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But perhaps this shift to when the creosote began to be seen as an object of some utility is most well-depicted by first moving into sources from the Mexican state in the late nineteenth and early twentieth centuries. To begin with, the nineteenth century was a difficult time for the nascent Mexican state, marked by constant internal crises after the ousting of the Spanish empire in the 1821, the war with the U.S. from 1846-1848, a civil war referred to as the Reform War, from 1858-1861, and a French invasion shortly thereafter, which established a five-year monarchy that ended in 1867. After a military coup in 1876, Porfirio Díaz became the president, later dictator, almost uninterruptedly until the Mexican Revolution, the civil war that started in 1910, brought an end to the Porfiriato period in 1911.

Díaz’s regime was known for its “order and progress” slogan, and for its efforts to modernize the nation through economic expansion, open markets, and infrastructure, namely telegraph lines and railroads. The Díaz period of ‘progress’ was also known for the extreme oppression and dispossession of indigenous people, especially on its northern border, where the ‘Indian problem’ had become a cause for much U.S. criticism. In order to help develop the policies of ‘progress,’ Diaz turned to ‘men of science’—called los Científicos. They were a group of social elites—businessmen, intellectuals, and journalists—advisors who were steeped in ideas of French positivism and social Darwinism.

The Porfírian elites largely considered working-class urban and rural people and as impediments to progress, within a perception of modernity that included pro-Hispanic cosmopolitan ideas and the ideal of the ‘modern city,’ as historian Mauricio Tenorio Trillo has documented very well.\textsuperscript{143} The rural ‘hinterlands’ were distinctly un-modern, though they provided the source of much of the elite’s wealth. Government policies in rural spaces included

the dispossession of rural and indigenous lands and genocidal campaigns against the Yaqui people in Sonora. The investigation and documentation of plants in this period conformed to Enlightenment and positivist ideas which were looked to as part of a larger progressive campaign to modernize Mexican science and medicine through European models.

During the Porfiriato, elites generally viewed the creosote bush as being as backward as the communities in the Northern deserts that lived where it dominated. Porfirian efforts to modernize the nation through agriculture extended to the north, which had been perceived as a wild hinterland occupied by hostile and backwards indigenous nomads and plunderers. The northern deserts, and their ubiquitous shrub vegetation, presented a challenge to the progress of the railroads and extractive agricultural development that Porfirian Mexico desired. The dominance of gobernadora would have literally stood in the way of this kind of progress. The creosote bush, like other inhabitants of the desert, would be cleared in order to make space for large scale modern agricultural export industries like cotton.

One literary source documents this perception very well. The positivist científico writer, journalist, and foreign diplomat under Porfirio Diaz, Victoriano Salado Álvarez, wrote an historical novel in seven parts, *Episodios Nacionales*, in which he fictionalized Mexico’s past in an exercise that was, arguably, literary nationalist propaganda. But its value for this study lies in its descriptions both of the desert and the gobernadora plant, specifically, and what they can reveal about elite conceptualizations about the north and its plants during the Porfiriato. *Episodios* included one book called *Emigración* that recounted in dramatic fashion when Benito Juárez’s government, fleeing Napoleon III’s French army, made the long march north to Paso del Norte in 1864, where they established a temporary capital. One short portion from the chapter
called “Paso Del Norte” finds the caravan marching through the Chihuahuan desert, and describes the landscape:

“the only inhabitant of the desert, the only one who could withstand its rigors, the only one who ventured its scary, sad life in those merciless badlands was the gobernadora, the horrible parasitic plant that looked like a leprosy over the land. Bald, sad, with its branches splayed out in the air, it had the look of barbs ready to pinch any daring passer-by…” 144

Later in the story, the caravan’s postmaster, in disgust, let loose a tirade against the plant, calling it:

“a horrible condensation of this traitorous desert…that comes out from the earth captious, hostile, hidden, mysterious, as if it were an innumerable legion of spiders armed with hook-filled legs that latch on and turn clothes to rags. It looks like the soul of the dust that fills this solitude, with its air of death, with its horrible calm that assassinates.”

The post administrator concluded his rampage with “‘you will never, despite all your science, convince me that that piece of nature’s refuse, which is only good for making the landscape more dismal, belongs to the vegetable kingdom!’” 145

Going as far as divorcing the plant from the vegetal kingdom and ‘science’ altogether, the passage is also interesting in that it adds ‘hooks’ where the plant has none. Anyone familiar with the plant would have known that, but not being from the North, perhaps the cosmopolitan Álvarez was unfamiliar with the actual plant, or maybe it was simply poetic license to make the plant seem more predatory. Regardless of whether the gobernadora in the story was

145 Álvarez, Episodios, 118.
used generically as a symbol for all that was bad about the desert plants, or whether Álvarez was truly familiar with the plant, the anti-creosote rhetoric serves its purpose for this study. As one of the few direct written references to the gobernadora plant from the pre-revolutionary period, Álvarez’s literary characterization of the desert and its ‘leprous’ inhabitant provides an important glimpse into elite perceptions of the desert ‘badlands’ and their native plants and people.

Part of the Diaz regime’s efforts to modernize the nation lay in the hands of progressive scientists from the medical community. Laborious studies sought to identify and classify plants alongside their unrefined common names, nombres vulgares, with the expressed goals of abstract scientific knowledge and practical export agricultural. Medical scientists like Dr. José Ramírez, member of the National Medical Institute of Mexico (Instituto Medico Nacional de México), which Carranza would quickly shutter for being “a nest of Porfirian científicos!” according to Xavier Lozoya) was a delegate to the Paris Universal Exposition in 1889 and 1900 and worked diligently to compile all previous Mexican botanical studies.146 This culminated in his 1902 publication of the Equivalent Common and Scientific Mexican Plant Names.147 It listed thousands of plants alphabetically by their common names and scientific binomials; the gobernadora’s short entry stated simply its scientific name with genus and species followed by the shortened name of the botanist who named it—Moïse-Étienne Moricand, its family name, and three common names: “Larrea Mexicana Moric….Zigofileas…Falsa Alcaparra. Gobernadora de México. Guamis.”148

146 According to Xavier Lozoya in: Xavier Lozoya and Carlos Zolla, Lo Invisible Es Verde, (Mexico: El Vidrio En El Espejo, 2015), 44.
147 Dr. José Ramírez, Sinonimia Vulgar y Científica de las Plantas Mexicanas (Mexico: Oficina Tipográfica de la Secretaría de Fomento, 1902).
148 Ramírez, Sinonimia, 103.
Efforts like Ramirez’s which aimed at identifying Mexico’s botanical patrimony were meant to further Mexican prestige abroad, most notably in Paris, and create a chemo-pharmaceutical industry the likes of the French.\textsuperscript{149} He writes:

“for those who are not well-versed in botany, like the majority of our practical agriculturalists, it will now be easy to identify any plant with this compendium, or use it when the need arises for the scientific name of any vegetable of which they do not recognize its properties, due to their ignorance of its scientific classification…and no less valuable will it be in gaining a perfect understanding of the geographic distribution of the plants which make up our flora… In this way, in the future, the confusion caused by common names will be avoided.”\textsuperscript{150}

Ramirez’s study highlights the dichotomy that characterized the perceptions around plants in Mexico during the Porfiriato. So-called vulgar indigenous names for plants fell short of state-conceptualized modernity; they could only be legitimized through their pairing with the proper scientific names. Botanical studies paralleled ethnological and anthropological studies of the time, which sought to compile “perfect” knowledge about indigenous people through “bone measuring and the anthropometry of Indians’ skulls.”\textsuperscript{151} The organized production of knowledge, or in this case its translation, about Mexico’s people and plants provided avenues for elites’ imagination and, thereby, their dominance and exploitation. In this sense, and to the people of the nation’s peripheries, Porfirian Mexico was a nationalist conquest through knowledge

\textsuperscript{149} Lozoya and Zolla, \textit{Lo Invisible Es Verde}, 44.
\textsuperscript{150} Ramirez, \textit{Sinonimia}, 5.
\textsuperscript{151} Mauricio Tenorio Trillo, “1910 Mexico City: Space and Nation in the City of the Centenario,” \textit{Journal of Latin American Studies} 28 (February 1996): 100.
production, a continuity of the systematization of nature. By and large, for Porfirian men of science, the abstract knowledge of plants was a path by which indigenous plants could be made ‘modern’ through their commercialization for export markets. But to know them, they first had to translate and pair them with their proper nombres científicos.

This is not to say that Porfirian botanists were unconcerned with wild plants and their economic uses. Fernando Altamirano, a medical doctor/botanist and founder of the same National Medical Institute of Mexico mentioned before, had a noted interest in discovering the industrial uses of wild plants. In a 1906 publication from the Ministry of Development, Colonization and Industry (Ministerio de Fomento, Colonización é Industria) Altamirano called for a partnership between his medical institute and agriculturalists in Mexico, proposing that the institute could help bring attention to little-recognized regional wild plants and their potential agricultural and industrial uses.\(^{152}\) The institute, for instance, initiated the studies on the wild guayule plant that revealed its industrial uses, and shared that knowledge with large agriculturalists who began cultivating it for its uses as an industrial rubber source.\(^{153}\)

Gobernadora was included in the Institute publication *Anales del Instituto Médico Nacional* in 1906 as a plant with industrial potential due to its sticky resin called lac, discussed before, though scientists did not know its origins at the time.\(^{154}\) Altamirano died shortly after, but his ideas around expanding the Institute’s role outside of medical purposes using wild plants and partnerships with agriculturalists were an early effort to use the Institute to help broader


\(^{153}\) It is interesting to note that revolutionary leader Francisco Madero’s family were large-estate guayule growers.

economic growth. Still, small producers or working-class peoples were beneath the científicos’ radar.

In December 1918, the Carranza government’s Secretaría de Agricultura y Fomento produced a special publication called Boletín Extraordinario, which outlined its vast goals and “practical” motives. It described a vision of modernity that existed in the service of rural and indigenous peoples as well as the middle and working classes, with educational outreach components. The Boletín confronted Mexico’s “agrarian problem” as a result of unequal distribution of wealth, and dispossession of indigenous lands, and vowed to “seek the improvement of the rural populations, ending the ancient monopolies that left our nation’s most valuable resource [the land] in the hands of a few.”155 The 140-page document stated the new government’s intentions were to “look for the most commodities for the nation’s inhabitants, giving them knowledge of the land and its numerous riches and making the means available by which they can be exploited as much as possible, and for the benefit of all.”156 As during the Porfiriato, outward presentation of the nation figured in its goals, whereby they meant to “form a prosperous, wealthy, and happy nation, worthy of being included in the assemblies of civilized nations.”157

The history of the laboratory on 44 Balderas Street is symbolic of some of the changes and continuities from the Porfiriato to the Carranza and subsequent governments. The old National Medical Institute building was reopened as the ex-Medical Institute with a changed mission. This was addressed in a message from the leadership of Biological Studies department

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155 Secretaría de Agricultura y Fomento, Boletín Extraordinario, 12.
156 Ibid, 4-5.
157 Ibid, 5.
outlining their new direction in the exploration of “national riches” as part of the government’s

Boletín Extraordinario from 1918:

“In the Biological Medical Section, medical-geographic, bacteriological, and medicinal plant investigations are made. These constitutes the preferred occupation of the ex-Medical Institute, and its research has not been abandoned, rather, it has been broadened, instead of limited like before, to a part of the larger plan with the practical purposes with which we now occupy ourselves.”158

The Carranza government opened the Biological Studies department in the same building as the Insituto Médico and continued its work, but with a twist. Instead of being shuttered, the laboratory of the National Medical Institute, upheld as the premier space for science in Mexico during the Porfiriato, had, in fact, been opened in a much more literal way—to the general public—as we shall see.

The Mexican Revolution and its subsequent governments presented both vast changes in ideological discourse and practice, as well as much continuity from the Porfiriato. The continuity from the Porfiriato can be seen in terms of developmentalist ideals meant to ‘modernize’ the nation economically and culturally, and in considering agriculture as a primary mode of accomplishing these aims. In fact, early post-Diaz governments utilized, in the case of Biological Studies, the exact same spaces and continued the same work. They perpetuated many of the same policies, as well, often upholding the status quo rather than revolutionizing government structures. But conceptions of modernity did shift somewhat in the transition, and they produced some practical results in the process.

The main difference between the conceptualization of modernity from the Porfiriato to subsequent governments, like that of Carranza, is that the latter both used more inclusive rhetoric and enacted small-scale industrial policies that aimed at engaging much of the Mexican population that had been left out of the Porfirian vision. They implemented more formally institutionalized outreach programs with urban working-class and rural Mexicans. In this ‘revolutionary’ imaginary, modernity would be accessible and inclusive of regular people within the plans for the economic development of Mexico. This was certainly different from the vision of the Porfirian elite, who saw working-class, rural, and indigenous people as backward.

Although much of the rhetoric did not translate into long-term results, in centering the gobernadora plant, this study has discovered some of the ways in which the praxis could match the revolutionary discourse. The gobernadora plant, in this context, was ‘brought into the nation’ by its involvement in government-initiated trainings around pequeñas industrias, or small-scale industries, which were being made available for the first time to a large swath of the population.

In the context of the economy, as well as the agricultural and industrial uses of plants, the Carranza government essentially ‘doubled down’ on any previous institutional efforts toward outreach. They made available trainings and access to all of the latest agricultural equipment, and experimental laboratories, through workshops which were free and open to the public and that anyone with any interest could attend: “the instruction will be given free to all persons, without distinction of sex.”159 The newspapers of the time promoted the entrepreneurial spirit, publishing calls to action to the general public. “We need nothing more than a little initiative and bravery.”

159 Secretaría de Agricultura y Fomento, Boletín Extraordinario, 39.
one such intervention stated, “to undertake businesses to develop our national resources” and help raise Mexico to “its proper place.”

Part of their plan included the opening of a National Agricultural School that would offer a six-year degree in all aspects of agriculture and industry, including training students on how to operate tractors and other “modern” equipment, all free of cost. The school would also include workshops for those who had interest in pequeñas industrias but could not find time away from work to pursue a degree. These courses would offer training on the operation of the latest agricultural equipment, as well as construction, repair of equipment, irrigation, soils science, and a multitude of other related topics. The government Boletín recounted workshops on the dairy industry that had already been held and had been well-attended, and wrote that in the future, they planned to expand into offering courses on sericulture, apiculture, and aviculture, conducting them at locations throughout the nation.

It was in this context that the gobernadora plant had a peak in interest. The plant was highlighted in government industrial publications and newspapers as a means of fomenting small industries. The plant was no longer referred to as a “nature’s refuse” but was conferred value for its potential to aid in bringing el pueblo into the revolutionary nation’s alternative modernity through commerce. In December 1919, the newspaper El Universal published an article titled “Upcoming Inauguration of the Industrial Laboratory: It will be of great utility for the development of small industry in the country.” It noted that the government laboratory would be

161 Ibid, 38.
162 Secretaría de Agricultura y Fomento, Boletín Extraordinario, 130.
open to the public, and anyone interested in finding out the chemical properties of plants and other materials could solicit the services of the national lab at no cost.¹⁶³

Publications from the Department of Industry, in their *Boletín de Industrias*, from 1920 and 1922, describe the gobernadora plant as a potential resource for small industries as well as a way of entry for everyday people into the market. In 1920, the *Boletín* shared information about the use of gobernadora as an effective de-scaler for industrial boilers to be published by the daily newspapers and offered to share information with the general public on how to do it: “The public is invited, and he who is interested will be welcomed at 44 Balderas to receive the pertinent information.”¹⁶⁴ It further stated that the laboratory had machinery and apparatuses at the public’s disposal, which they could learn to use and perform experiments with, provided they brought their own necessary raw materials and substances for their investigations.¹⁶⁵ A couple of years later, in 1922, the same publication described the plant as “a richness that can be exploited at an easy cost” both as a simple, as well as a better quality, varnish in addition to its already mentioned use as a very effective de-scaler for boilers. About the gobernadora plant, the article in question noted,

“a new field for industrial activities has opened with these discoveries about the plant, which has been despised in the past. It is enough that any interested person get themselves a grinder to pulverize the plant and necessary filters, in order to

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¹⁶³ “Próxima Inauguración Del Laboratorio Industrial Será…,” *El Universal*, December 20, 1919, 12.
establish a small, or large-scale, business that can bring about complete economic independence…”

These governmental sources from the Carranza and Álvaro Obregón administrations illustrate the ways that the gobernadora plant gained value and was inculcated in the larger nation-building efforts, at the same time that Mexico’s working-classes and rural populations were being invited to make use of the government’s resources.

In 1918, the Mexican newspapers Excelsior and La Prensa published curious articles about a plant that was being used in gas bomb experiments—bombas con gases asfixiantes—in a munitions lab in Mexico City. The newspapers described enthusiastically how this previously undervalued plant had already been proven deadly in experiments with small animals and could soon be manufactured, used, and sold as a chemical weapon. “Una Nueva Riqueza en México,” read one section—“A New Source of Wealth in Mexico”—and the story beneath it touted the wide and easy availability of the common desert plant, abundant in the northern Mexican desert: “there is, in almost all of the Northern Mexican States, a plant that has hitherto been viewed with contempt and considered a nuisance. It grows wild and there is…such abundance of it, that property owners where it grows consider it detrimental…But it is no longer seen with contempt.”

The gobernadora was a formerly degraded plant that had suddenly gained valuable status, like a botanical Cinderella story.

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The newspapers reported on the bomb experiments conducted at the Fábrica y Laboratorio de Municiones de Belem in Mexico City within the context of revolutionary fighting. “‘La Gobernadora’ will be used for war purposes,” La Prensa noted, claiming that the plant possessed “potent and expansive explosive properties and is called to play an important role in the war industry.”\textsuperscript{168} The same article further stated that the U.S. government was “currently using or were planning to use” the same plant for bombs in their war industry. Several small animals, including rabbits and squirrels, Excelsior reported, had been placed in a closed room and gassed with the gobernadora bomb; “a few moments later, when they opened the room, the animals enclosed within had died.”\textsuperscript{169}

The newspaper articles became more curious when they mentioned that, in addition to its potential uses as a deadly bomb, the same plant could further be utilized in the sanitation and medical spheres of war. Apparently, it was widely used by Mexican soldiers in revolutionary battlefields along the U.S.-Mexico border and was very effective in healing their wounds and infections. “In this way,” read the article, “‘la gobernadora’ is not only useful for the creation of bombs, but it could also be used by the sanitation brigades to heal wounds commonly suffered by

\textsuperscript{168} Ibid, 8.
\textsuperscript{169} “Bombas Con Gas Asfixiante Van a Ser Fabricadas,” Excelsior, August 18, 1918, 1. accessed April 20, 2018, http://0-infoweb.newsbank.com.lib.utep.edu/apps/readex/doc?p=ARDX&sort=_rank_%3AD&fld-base-0=alltext&val-base-0=Bombas%20Con%20Gas%20Asfixiante%20Van%20a%20Ser%20Fabricadas&val-database-0=EAIX%7CEANX%7CWHNPX&fld-database-0=database&docref=image/v2%3A126508E729B456E4%40EANX-144D854CF72BFE30%402422189-144D854D08337CC0%40-144D854D72B83EC0%40&firsthit=yes
soldiers.” The newspapers thus framed the gobernadora as a plant that could potentially kill and heal on the same battlefield. References to the experiments with the plant in the munitions lab are scarce and somewhat cryptic, but they open a whole new facet of the politicization of the plant that is salient to the broader discussion of plants and governments, and how this particular plant was ‘brought into the nation’ in profoundly differing ways.

That the Carranza government was carrying out experiments with chemical gases and explosives is documented by historian Fernando Pinedo as well as the Mexican National Institute for Historical Studies of the Revolutions of Mexico. The Carranza government made the domestic production of their weapons of war a priority. Before 1918, Mexico had exported the materials used in the production of explosives, like sulfur and electrolytic copper, and had imported the finished products from other countries like the U.S. After 1918, the government acquired the ‘modern’ machinery needed to produce explosives in house and busied itself with the production of all manner of munitions in its various labs, like the Belem munitions lab and the Fábrica de Pólvora de Santa Fe. Francisco Pineda has further documented the same government’s experiments with asphyxiant gases in this period, and their possible use in the extermination campaign against the Zapatistas fighters.

The early revolutionary governments were bringing plants like gobernadora into the nation in ‘modern,’ developmentalist ways. On the one hand, the plant was a partner in its efforts

170 Ibid, 1,8.
to grow the nation through engaging working-class and rural populations in the project. On the other hand, the plant represented violent ways in which Mexico looked to its own natural resources to build a self-sufficient war economy. Both perceptions included the plant in new approaches to the development of the nation.

Whether or not the United States was also performing studies on the creosote bush as a chemical weapon during WWI, as the newspaper article stated, is yet to be confirmed by this study, but the possibility is certainly likely. The U.S. was at that time developing the infrastructure for chemical weapons, beginning in 1917, first through the Bureau of Mines and later folding it into the War Department’s Chemical Warfare Service in 1918. They were tasked with finding new chemical agents for war, as well as designing the U.S. version of the now-iconic gas mask used in WWI.

What we do know is that the look ‘inward’ to find new and novel uses for plants had been a priority for the U.S. government as well, namely through the Department of Agriculture since its establishment and expansion from the mid-nineteenth century and into the twentieth. The same period saw the advancement of chemical-pharmacological studies in the U.S., and the establishment of pharmacology departments at several universities. Shortly thereafter, the USDA began employing pharmacologists in their Bureau of Plant Industry and in the following decades would sponsor studies that looked to native desert plants for potential pharmaceutical drugs. In 1939, the University of Minnesota’s School of Pharmacy began working in conjunction with the Nevada Indian Medicine Project, a study sponsored by the Division of Plant Exploration and Introduction of the Bureau of Plant Industry, under the USDA. At the time, UMN was at the forefront of pharmaceutical studies and was also host to the Hormel Research Foundation, which was busy looking for natural antioxidants for the preservation of foods, especially needed to
extend the shelf life of animal fats like milk, butter, and lard. It was here that the two government interests would intersect with the creosote bush.

From the Boundary Survey’s beginnings in describing, naming, and documenting Native lands and their human and non-human inhabitants, the further reduction of plants into their chemical parts was put to use in building and expanding the U.S. pharmaceutical and food industries. In 1942, a PhD student at UMN’s School of Pharmacy named Coy W. Waller discovered an antioxidant unique to the plant, which is part of the resinous substance present on the leaves and small branches, called nordihydroguaiaretic acid, or NDGA for short.173 The plant matter he used had been provided from the Nevada Indian Medicine Project (NIMP.) NIMP developed out of demand for USDA appropriations for the Indian Botanical Institute Committee of Nevada, which had been funded by New Deal Works Progress Administration monies in the 1930s. The Botanical Committee was composed of trained botanists as well as students at the University of Nevada whose belief was that “additional data [from desert plants of Nevada] can be secured that will be a benefit to science and medicine.”174

“Indian Medicine Leads to Discovery of Nordihydroguaiaretic acid,” read a paper presented to the American Oil Chemist’s Society in 1945.175 Although NDGA was first found in a pharmacological context, it was quickly recognized by the Hormel Institute as a potential food preservative and numerous studies followed in the next couple of years to maximize its production for mass use. The question of the plant’s availability was addressed in the above

paper, which touted that the plant “grows abundantly right in our own country.” The “tedious chore” of harvesting by hand was being done “mostly by Mexicans” in the Chihuahuan Desert of Texas “but we are trying to secure the assistance of the Indians on various reservations.”

From 1943 to 1970, the crystalline substance extracted from the creosote bush’s leaves in lab was widely used as an antioxidant agent to prevent the spoiling of milk, butter, and other fats. The practice was banned, and the plant deemed unsafe for consumption, by the Food and Drug Administration in 1970, due to a study that induced liver toxicity in rats with NDGA the same year. Thus ended the chemical’s history with food products. But studies in the plant’s most notable identity—that of its medicinal potential especially that of its extract NDGA as a pharmacological drug—would be abundant throughout the twentieth century and into the present.

The history of nation-building with plants has plentiful material to work with. This chapter has shown some of the ways the ‘lowly’ creosote bush showed up in the historical contexts of science, war, and industry in the U.S. and Mexico. Beginning with the Spanish Royal Botanical Expedition and the plant’s initial collection and naming, both subsequent governments would find ways to exploit the plant’s chemical-rich composition as they looked inward to the nature and plants within their borders, natures which were often the same across nation-state boundaries.

This chapter has shown the trajectory of the creosote bush within state-sponsored projects aimed at discovering, cataloguing, and exploiting natural resources of the respective nations. In this context, nature was often understood far from its environmental contexts and emplaced connections. States seemingly came to know ‘themselves’ only through processes of abstraction

\[176\] Ibid, 76.
and reduction. Thus, the creosote bush went from “worthless” to valuable by way of science, by outsiders in labs, separated from its very nature and the people who lived with it and understood it in more embodied environmental forms. The consequences of that disconnection would impact the land and people of the deserts in diverse ways that the coming chapters will explore.
Scientific knowledge production about the lands of the western U.S. through the nineteenth century was created largely by people from the eastern U.S. or Europe who did not have very much experience with the arid lands which develop and become gradually more marked moving west of the Mississippi River. Lack of lived knowledge about aridity, combined with a science which was disconnected in its reductionist efforts to simplify and catalogue the arid natural world, led to misunderstandings that would become marked on western landscapes in the twentieth century. The Dust Bowl comes immediately to mind as one result, but the changes would also be seen in uncultivated lands—the rangelands of the West, where our shrub appears again in sources about ranching.

This chapter explores the political ecology of the creosote bush in the context of ranching and grasslands preservation. The rhetoric from federal agents and ranchers is juxtaposed with perspectives of the plant as a medicinal ally by diverse people in the same period. The late nineteenth and twentieth centuries witnessed shifting and sometimes disappearing grasslands. In west Texas, woody shrubs, particularly mesquite and creosote bush, were framed by range experts and ranchers as active, harmful agents on the landscape, moving into spaces previously used for forage by cattle, and thereby became politicized as vegetal enemies in a specific time and place. The fact that in the same period, the creosote bush was also seen as a distinctly beneficial medicine and used as such by mestizo, Indigenous, and Anglo borderlands peoples, helps illustrate how people-plant relationships are diverse as well as political, and how these
relations become reflected in people as well as in the landscape. In this sense, the creosote bush helps bridge cultural and ecological history in the U.S.-Mexico borderlands.

Textual analysis reveals the politics of the creosote bush—mid-twentieth century ranching culture’s profound anxiety over the specter of profit loss due to the spread of the unwanted creosote bush, the need to control space, and the surprising amount of agency which was attributed the “useless” plant. The interaction is inherently political. Patricia Vieira elucidates the political relationship between people and plants, writing “the classification of plants as dangerous or useful...testifies to the political nature of our engagement with flora...humans behave politically toward vegetal life by identifying certain of its elements—poisonous plants, for instance—as enemies to be destroyed, while others are warmly accepted within the fold of friendship.”¹⁷⁷ The creosote bush was turned into an enemy at a specific time in history, and for specific reasons. What factors influenced whether the creosote bush was seen as good or worthless? The meanings that people have attached to the creosote bush have been part of a dynamic cultural, environmental, eco-sensorial, and political process that has changed over time. They reveal much about diverse borderlands cultures and perhaps much less about the creosote bush itself.

As she walked through the desert of her new home after a light rain in 1940s Mexicali, Baja California, Lucrecia de la Vara worried about her infant daughter and how she would treat the rash that had developed on her baby’s head after healing from the chicken pox. The landscape was new to her—her hometown of Opodepe, Sonora, was a different ecosystem and the plants she had grown up using for medicine mostly did not grow there. She did not know the

creosote bush until she first smelled its distinct scent on the breeze that day. She said that at that moment she just knew that the plant was “buena” and that it would heal her child’s rash. She picked some branches from the nearby dark green shrub and took them home to prepare into a compress and a powder. Lucrecia recognized the plant as medicinally beneficial through its smell, and said to herself in Spanish, “this is a good plant.”

The creosote bush had another identity in the twentieth century, one that was far more contentious, and which was assigned to it largely by livestock ranchers and range scientists. In 1973, a Texas newspaper article referred to the shrub as a “worthless range plant which has invaded 30 to 50 percent of the rangeland.” Much scientific research about rangelands of the mid to late twentieth century U.S. focused on the spread and extermination of the plant. Invasion and control were the overwhelming narratives within rangelands research and rhetoric. In ranching culture, the creosote bush became a veritable enemy, an intruder in its own land—a ‘native invader.

Sources in the first decades of the twentieth century describe our plant in generally neutral terms and find it outside of rangelands. Norwegian explorer and ethnographer Carl Lumholtz described the creosote bush while in the Sonoran Desert in 1909. He had travelled to the area to study the ways that the desert could be made useful, that is, cultivated for agriculture. His appreciation for the creosote bush, what he called greasewood, as the O’odham people do:

To me the greasewood is a symbol for health and an example of cheerful existence under adverse circumstances. It gives out an odor which it would be

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178 This ‘origin’ story was told to me by my mother, who was told it by her mother, Lucrecia Robles de la Vara, about how she came to know the gobernadora.
impossible to count among the perfumes of the world...Though, strictly speaking, nothing in nature is ugly, the greasewood could not be called beautiful, except, perhaps, when covered in the spring with its small yellow, jolly flowers. It may be compared to a person radiant with health and good cheer, for which he is liked, though he may not be handsome.”

Then, in 1914, geographer and climate determinist Ellsworth Huntington briefly mentioned the plant, referring to it as “the useless creosote bush” in his book about climate. Even newspapers in the early twentieth century generally mentioned the plant in neutral, even beneficial terms, for the most part. In 1900, a patent for a “Composition for Removing Boiler-scale” made from the creosote plant was submitted to the United States Patent Office. A year later, it was promoted as an ornamental shrub and hedge plant in the Doña Ana County Republican. In 1925, it was advertised as a cough remedy called Emulsio in the San Antonio Spanish language newspaper, La Prensa.

But by the 1930s it could not be ignored that grasslands were becoming depleted of grasses used for livestock, and neutral representations of the creosote bush became rare. The history of the rangelands and range science is told by Nathan Sayre in “The Politics of Scale: A History of Rangeland Science.” In the mid nineteenth century, outsiders saw primarily in the context of their potential for mineral, agricultural, and timber resources, as well as for railroad routes to the Pacific. The U.S. government’s systematic extermination of bison and the

subsequent displacement of Indigenous people to reservations left much land open to white settlement and ‘development’ that spread farther West over time. Rangelands—the vast majority of lands that did not fit into the paradigm of exploitability for timber, mineral, or agricultural markets—were considered ‘leftovers’ without much purpose. It was not until capital began to pour into livestock production in the mid nineteenth century, and sold to potential settlers as “a spontaneous, natural source of wealth, in which plants and animals grew and reproduced by themselves,” that the rangelands would begin to be seen as useful.\textsuperscript{183}

The cattle boom that followed the Civil War with the promotion of ranching increased the quantity of livestock from one that had been somewhat stable for over three hundred years since Spanish colonization to one that quickly overwhelmed the availability of forage. As Sayre tells, there was hefty investment before there was any real understanding about the variable environments which had sustained the rangelands up to then. The lands quickly became depleted and by the end of the nineteenth century, extreme freezing and the alteration of drought and heavy rain events had decimated the cattle industry.

The government responded with science. They began establishing experimental ranges in the Sonoran and Chihuahuan Deserts in the early twentieth century in order to remedy widespread degradation, beginning with the Santa Rita Experimental Range near Tucson and then in 1912 the Jornada Experimental Range in southern NM near the cities of Las Cruces, NM, and El Paso, TX. The government engaged scientists to survey the lands and create environmental models that could be applied across the board to save the range for the cattle industry. Although the science of hard numbers was not appropriate given the dynamic nature of

the range, they were attempted nonetheless, through animal “carrying capacities.” Carrying capacities were seen as a means to return the lands to their “original conditions”—which was based on a flawed paradigm called successional theory—by regulating the quantities of livestock on parcels of land depending on approximations of forage based on precipitation. This was on the assumption that grazing was the sole factor that impacted forage quantity and quality. The number of blind spots that arose within this history, which Sayre writes eloquently about, are too abundant for this study to discuss.\textsuperscript{184} Outcomes from this period are marked by government efforts to control and change the natural environment of the rangelands and led to the rise of fencing, the mass extermination of keystone species like the prairie dog and wolves, fire suppression, the introduction of non-native grasses, and chemical herbicides applied in mass quantities to kill encroaching shrubs.

There were many reasons why range science was largely a failure. But the most important for this study was range scientists’ disconnection from understandings of individual places they studied, which Sayre touches on, and which has its roots in abstraction rather than lived experience. The people who were called upon to define the rangelands did not understand them and were often not of them. Thus, they more easily abstracted, dissected, and reduced them, making scientific assessments not based in on the ground realities of a changing and often quite fragile and variable environment—especially in the arid lands and desert grasslands where our study takes place.

It was in many ways a problem of worldviews that were applied through science onto diverse lands which would not conform to the expectations imposed on them. As such, the history of the range highlights the social and cultural aspects of a presumably objective science.

\textsuperscript{184} Sayre, \textit{The Politics of Scale}. 
In Sayre’s words, range science could be legitimate for political purposes “only by erasing any signs of extra-or nonscientific influences and assumptions; it had to appear to be what it was not— an accurate, predictive understanding of grazing and rangeland ecology— and not to be what it was— a body of knowledge summoned into existence to address fundamentally political and economic problems.”\textsuperscript{185} Ironically, the science could not be accurate without the same “extra-or nonscientific influences” that it largely erased. In short, had policy been more often informed by Indigenous, Mexican, and even Anglo knowledge of livestock raising in place, the results would likely have been very different.

The rangelands of the West are characterized by low precipitation (compared to the East coast,) thus their soils tend to be low in organic matter and/or nutrients, the topography is mountainous and uneven, and the temperatures are more extreme. Within the Western rangelands there are different ecosystems that include grasslands, shrublands, woodlands and savannahs, and deserts. Within those ecosystems, there are various and dynamic ecological sites that are related to specific topographies and soils. The warm deserts of the southwest U.S. and northern Mexico— the Mojave, Sonoran, and Chihuahuan Deserts— contain both shrublands and grasslands. Because of its lack of water, and therefore its minimal potential for agriculture, the warm desert region has historically been utilized since Spanish colonization for livestock production, or mining.

It is in the context of livestock grazing in the mid twentieth century, that the creosote bush became cast more as an active agent of disappearing grasslands rather than just an unfortunate symbol of the desolateness of extreme aridity in the deserts that it had been in the Boundary Survey. It is one of the woody shrubs that was systematically attacked with heavy

\textsuperscript{185} Ibid, 24.
machinery and chemicals as part of state efforts to actively change the environment. Although mesquite was most often the main culprit that is seen in the literature, especially in the grasslands of the Sonoran Desert, the creosote bush was always a close second, and was at times central in the ‘battle,’ in the Chihuahuan Desert, as this chapter will cover.

In newspaper articles and rangelands publications of the mid-twentieth century and beyond, ranchers and range experts along the U.S.-Mexican border constructed their relationship to woody plants in binary terms—most notably as a battle between brush and grass. Studies by the Jornada Experimental Range began to focus specifically on brush control in rangelands of the northern Chihuahuan Desert of New Mexico in the 1940s. Ranchers embraced the progressive science-inspired plant succession frameworks of the time to preserve their herds and profits, and that helped bring about a boom in negative discourse about the invasion of brush plants in the mid-twentieth century.

Ranching was distinguished by its scale and its short-term, profit-driven aims as opposed to, for instance, pastoralism which sat outside of the market. Access to grass was the foremost concern to livestock ranching as grass was an essential energy source that produced profits for the market-driven cattle industry. When cattle were allowed to graze too heavily and often in the same area, the mixed desert grasslands of the region began to be altered. By the early 20th century, this type of grazing helped, in part, to bring about the disappearance of grasses altogether from some parts of the range. Shrubs like the creosote bush and mesquite, which had been held in check by native grasses like black grama grass, were able to spread into the overgrazed spaces, similar to Alfred Crosby’s weeds on disturbed ground.

But grazing was not the only factor in the availability and quality of forage. Under the paradigm of successional theory, the belief was that grazing was the only disturbance to the
range and that if lands were left unused for a period, or if the numbers of animals were reduced during especially dry years, that the grasslands would resume their former states. But this was mistaken, as range specialists would realize much later. What they did not give enough importance to at the time was the variation of precipitation and in soil composition that characterized the semi-arid and most arid lands. Although the premise of ‘equilibrial ecosystems’ may have worked in the prairies where the theory was developed by Frederic Clements. Sayre writes “it was in the desert grasslands of the Southwest that the blind spots of range science created the most conspicuous problems.”\textsuperscript{186} Once dramatically changed, arid lands seldomly returned to their former states on their own.

Climate may have ultimately been more impactful than grazing patterns in the desert grasslands, at least initially. Established in 1912, research on the Jornada Experimental Range has now spanned over a century, long enough to have seen the long-term impacts of extreme climate variations. Recent research at the Range has tracked an important correlation between the Pacific Decadal Oscillation (PDO) and grass cover from 1916 to 1979.\textsuperscript{187} The PDO can be described as a longer El Niño climatic event, reversing every twenty to thirty years, and whose cool phase is associated with dryer conditions.

Until 1979, the grass cover at the Jornada correlated almost exactly with the PDO—increasing and decreasing with the varying wet and dry variations despite grazing practices—and that history accounts for the extreme seven-year-long drought of the 1950s and the subsequent grass collapse. In the rainy season that followed the 1950s drought, transient and non-native

\textsuperscript{186} Sayre, \textit{Politics of Scale}, 7.
grasses recovered to some extent, but the core black grama grass, most valued for grazing, was never restored. Since 1979 there has been a notable shift to a higher temperature baseline, along with the abrupt end to the correlation between grass cover and the PDO, the grass never completely having recovered. The higher temperatures then corresponded with a shift from grass to creosote and other shrublands.

Long-term plant regime shifts are the result of many intersecting drivers over space and time, including fire, which is not discussed in depth here. But this case helps show that, although the Chihuahuan Desert grasslands were impacted by the extreme increase in grazing pressure that came with the cattle boom of the late nineteenth century, it was likely this in combination with the extreme climate event of the 1950s that provided the critical threshold that permanently affected the native grass species and lead to shrubland dominance. These dynamics help show the ways that shrub growth was a neutral reaction to bare ground and less an invasion and displacement of grasses.

But range experts were not aware of the complexity of factors that had created the conditions they face in the mid-nineteenth century, nor of the natural reaction of the environment to the changes it was undergoing. U.S. newspapers reveal discursive metaphors of invasions and the need to control shrubs. “Meat-producing grasses are being driven out and replaced by worthless or inferior plants like…creosotebush and the mesquites,” read a 1948 article called “Grazing: Western Problem.” 188 Plants were even viewed as thieves in a 1967 newspaper article, in which the author wrote, “brush species on New Mexico ranges are robbing livestock producers at an ever-increasing rate.” 189

188 “Grazing: Western Problem,” The Crosbyton Review 40, no. 47, Friday, November 19, 1948, 6.
The words “invader” and “control” are the most repeated words in newspaper articles pertaining to the creosote bush in this period. A speaker at Texas A&M Ranch Day in 1956, addressed the creosote plant as an invasive threat, saying “there is little doubt that much of our grassland has already been replaced by creosote bush. This invasion…will continue unless measures are taken to halt it.”\footnote{190} In 1968 a Las Cruces, NM, newspaper wrote “a systematic approach to the control of creosotebush, a major threat to rangeland in many Southwestern areas, is suggested…”\footnote{191} In the same year, an entire conference at Sul Ross State College in Alpine, TX was focused on the creosote bush, described as “one of the major brush problems of the Trans-Pecos area.”\footnote{192} A year later, in 1969, the college held workshops whose focus was the creosote bush. These conferences and workshops brought together ranchers and scientists from both sides of the U.S.-Mexico border to formulate how best to deal with the creosote “problem.”

The rhetoric of warfare was pervasive in a 1968 bulletin dedicated to our plant called “Life History Characteristics of the Creosotebush, \textit{Larrea tridentata},” published by the Agricultural Experiment Station Bulletin at New Mexico State University (NMSU). It begins, “creosotebush…aggressively invades desert grassland in Arizona, New Mexico, and western Texas. [Citing a 1951 study by J.L.] Gardner recorded invasion of grasslands along the Rio Grande Valley in southern New Mexico and pointed out that it takes the form of frontal advances along the margins of the larger creosotebush communities and of single plants and then small

\footnote{190}{\textit{A&M Ranch Day Tour Draws Large Crowd}, \textit{Lovington Daily Leader}, October 28, 1956, 7.}
\footnote{191}{“Study Shows Set Approach Is Required,” \textit{Las Cruces Sun News} 1968 November 27, 14.}
\footnote{192}{“Farm Conference Slated to Discuss Creosotebush,” \textit{Pecos Enterprise}, Sept 18th, 1968, 2.}
outlier stands at varying distances from the main bodies of the larger communities."\(^{193}\)

Responsibility for the disappearance of black grama and other grass losses was not attributed to the catastrophic drought from 1950-1957, nor to overgrazing; instead the authors pointed to the actions of the creosote bush, "damage to grassland range following invasion by creosotebush takes the form of reduced perennial grass cover and yield and increased erosion of soil."\(^{194}\) According to authors, the creosotebush “invasion” happened before the reduction of grasses instead of as a response to changing grasslands.

Despite the provocative language used in the introduction, the study outlined in the “Life History Characteristics” bulletin described a shrub which was painfully slow in producing viable new seedlings in different grasslands settings, the overall rate of establishment at the three locations calculated at .37 seedling plant per thousand viable seed planted, leaving the authors wondering at the rate of establishment, which “seems noteworthy in view of the fact that creosotebush, when mature, is so well adapted to xeric conditions.”\(^{195}\) In addition to its low rates of propagation, the shrub grows very slowly, but once established, creosote bushes can live for at least a century (many times much longer, as seen in Vasek.)

The plant was juxtaposed with pronghorn proliferation in a Clovis, NM, article from 1977 called “Here Comes the Creosotebush, There Goes the Pronghorn,” detailing a study by the Jornada Range.\(^{196}\) The article headline seemed to blame the creosote bush for chasing the animals away, despite the obvious finding that the pronghorn herds preferred to graze where

\(^{195}\) Ibid.
there was more grass instead of over areas with excessive brush. In other words, the pronghorns just preferred spaces that were not overgrazed.

Studies such as these adopted the paradigm that creosote bush *made things go away* rather than understanding it as something that moved in when other things went away. The most effective way to keep the brush from spreading would have been to focus on preserving the native grasses in particular—instead of the reactive response to poison and uproot shrubs. Nonetheless, official perspectives were that creosote bush and other brush plants were “robbing the rancher of most or all of his profits.”

Cattle ranchers may have hated the plant, but there were moments during the period where the potential commodification and exploitation of the plant gave it sudden added value. In the early 1950s, entrepreneurial ventures sought to convert the “worthless range plant” into something useful. As mentioned in the previous chapter, beginning in the 1950s, there was an industry around the creosote bush-specific antioxidant, NDGA, which was being used in commercial food preservation until its use was deemed unsafe by the FDA in 1968. Efforts to turn creosote bush into stock feed appeared in mid-century. An experimental machine made at Sul Ross University in 1969 was said to be able to extract NDGA from the plant, while turning the remainder into stock feed. The creosote bush is said to have a protein content close to that of alfalfa and efforts to turn it into feed mighty have helped commodify the plant in a new way and potentially at a greater scale, but the machine was presumably a failure because no product seemed to materialize.

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In the 1950s, a start-up company called Tempron Corporation invested in creating a high-grade compressed hardboard made from creosote bushes from the El Paso/Ciudad Juárez area. Company officials stated that they saw no difficulty in the initial harvesting of the plant, partly because “people are glad to get rid of the creosote bush. It has always been a nuisance.” Other startup companies had an interest in exploiting the creosote bush’s medicinal qualities. To entrepreneur Wayne E. Stevens, who hoped to capitalize on the creosote extract as a possible cure for cancer, the creosote bush had some twenty different uses and was “a marvelous plant.” None of the ventures seem to have been successful, but they help show the changing discursive constructions of the creosote bush when it showed potential for exploitation rather than impeding the growth of grasses on the range.

Generally, the first half of the 20th century produced research that focused on brush-control and the preservation of native grasses. After the 1940s, scientists at the range stations focused on what they called ‘improvement’ practices, which actively attempted to change the land back to the state in which they preferred it. Improvement practices for the creosote “invasion” included seeding with native and non-native grass species while removing shrubs by physical and chemical means. Removing creosote bush and other woody shrubs required intense physical and expensive mechanical labor, or excessive amounts of poisons.

Physically mowing or digging up the creosote bush from its roots with machinery, called grubbing, was labor-intensive and could be still more damaging to the range. But research on herbicides had increased dramatically during WWII, and the development of chemicals that could kill plants gradually become available outside of military scenarios (think Agent Orange in

Vietnam). Herbicides like tebuthiuron in pellet-form, also known as Spike 20P, grew in popularity as they became more affordable in the late 1970s and 80s. Since the creosote bush often required ten times more herbicide to kill than some other brush plants, it was cost-prohibitive to use in any general way until prices went down.202

“Exciting new herbicides” represented an opportunity to get rid of the brush for good and bring the grasses back, or so thought some experts.203 Dr. Reldon Beck, a scientist at the Agricultural Experiment Station at NMSU said that the use of granular herbicides was getting him “kill rates” ranging from 30 to 80 percent, “and equally as important,” he added, “our costs are low, varying from $4 to $15 per acre.”204 Lower costs and effective killing of the useless plant promised an affordable solution to the creosote problem. Livestock ranchers believed that the only way to regrow grasses was to rid their grazing lands of the creosote and other desert shrubs. Eventually, the herbicide treatments worked to efficiently rid some creosote bush from the rangelands but, according to one study from Arizona in 2014, the much-wanted grasses never did come back. Instead, erosion sometimes increased, due to the bare ground promoted by herbicides such as Spike 20P.205 This reiterated the need for seeding, but unfortunately many of the reseeding management practices were with non-native grasses.

This 2014 study found that the use of tebuthiuron was effective, but “while brush management techniques are effective for long periods of time, the reduction of shrub cover does not directly stimulate recolonization of the site with native grasses.”

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More recent research at the Jornada Range also took up the question of whether shrub removal with tebuthiuron was beneficial to the recovery of grasses in the long run. The answer was ultimately dependent on variable factors, but often had to do with topography and climate. Grass and forb cover did recover, but only at elevations above five thousand feet where conditions are wetter and cooler and where the creosote bush is unlikely to grow. The authors of the study found that in sites at lower elevations associated with higher temperatures, where the creosote grows, it might have been better to leave the shrubs in place because the use of herbicides did not promote the growth of grass. Looking to a climatic trend toward increased aridity given the growing appreciation of climate change, these researchers posited that removing creosote bushes at those hotter lower elevations would eventually lead to worse consequences in the long term, in the form of bare ground and increased erosion.²⁰⁶

Range experts had historically been applying rational scientific approaches to a problem that was in-part social—it was directly related to the interests of the cattle industry, that is, what certain people wanted, or certain worldviews. To accomplish what they wanted, they embarked on massive landscape-shaping projects whose goals were based on an ideal of a previous state of the landscape that they mistakenly believed was the ‘natural’ state, largely because it suited their interests. This, in combination with an historic bias against aridity in general and against shrubs specifically—whose presence had represented the worst lands to European colonizers—helped create those blind spots that both Diana K. David and Nathan Sayre describe in their work.

What, then, makes a plant an enemy and why? The rhetoric of invasion and control followed broader scientific paradigms within botanical studies of the time. Beginning in the

1950s, scientific studies investigated creosote bush allelopathy, what is sometimes likened to chemical warfare between plants, but their methods were applied out of context in lab settings, which meant they were impossible to reproduce in nature. Other times creosote bush allelopathy was based on assumptions from the patterns of spacing in the field. The studies in this period cast the creosote bush as a killer of the plants and grasses around it, and it was a reputation which stuck.

Observations on the interactions of certain plants and their effects on other plants go far back into antiquity. But De Candolle, who first named our plant in Linnean form, described the process by which some plants exuded chemicals from their roots that had negative impacts on other plants.207 The biological phenomenon was formally named “allelopathy” in 1937 by Hans Molisch, taken from the Greek words allelon and pathos which translates to mean “mutual harm.” Molisch was renowned for his work on plant physiology and was vice-president of the Austrian Academy of Sciences in the 1930s, after having served as rector at the University of Vienna from 1926 until his retirement in 1928.

In its biography of Molisch, the University of Vienna website describes Molisch’s political affiliations as in-line with militant German nationalism and indicates that he was supportive of the opening of a “swastika shooting range” at the university amidst violent anti-Semitic attacks by students on campus.208 Molisch’s political ideology is relevant here for its potential bearing on the political-social roots of ideas behind allelopathy and nature in the

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context of war. Despite his choice of words, Molisch intended allelopathy to include the positive and negative effects of biochemical interactions among plants. Nonetheless, allelopathy quickly became associated with the negative effects of one plant on another and with the metaphor of chemical warfare in nature.

Allelopathy first appears in history of the creosote bush through the writings of the celebrated Dutch botanist Frits Went. Went’s early work on the plant hormone auxin ushered in the modern era of phytohormones in the 1920s, bringing about a boom in research about plant hormones that influenced the subsequent rise of the agricultural chemical industry. Went assumed an allelopathic component because of the way the creosote bushes tended to be evenly spaced across large stretches of ground in the Mojave Desert:

Another Death Valley plant endowed with a remarkable root system is the evergreen creosote bush. It has wide-reaching roots which can extract water from a large volume of soil. The creosote bush is spread with amazingly even spacing over the desert; this is especially obvious from an airplane. The spacing apparently is due to the fact that the roots of the bush excrete toxic substances which kill any seedlings that start near it. The distance of spacing is correlated with rainfall: the less rainfall, the wider the spacing. This probably means that rain leaches the poisons from the soil so that they do not contaminate as wide an area.\(^{209}\)

Although he noted that the spacing was correlated with rainfall, he went further in assuming that the plant must secrete a poison which impeded any other plants from growing near it and that the

rain then diluted the poison gradually with distance from the plant. This came in part from his observation that no plants of any species grew directly under the shrub and only sprouted at certain distances.

It is important to note that Went was not a believer in direct competition and warfare among plants, writing that plants in general did not exhibit “survival of the fittest” behavior. The creosote bush was one of the exceptions, though, when it came to allelopathic chemicals “the term competition, in the sense of strife against one another, ultimately resulting in the ouster of one, seems appropriate. It is remarkable, however, that such inhibition can be quite specific, and that in several cases, specifically among desert plants such as Larrea, the strongest inhibition is exerted on individuals of its own species.” This Went likened to “birth control,” which is interesting considering the medicinal uses of the plant described in chapter 2.\(^{210}\)

Went likely arrived at the allelopathy and creosote bush connection by way of a study published in 1948 on brittlebush, *Encelia farinosa*, by his colleagues at the California Institute of Technology. Prompted by field observations that annuals did not grow underneath the shrub, the plant hormone researchers posited that a growth inhibitor must exist on the brittlebush’s leaves. They tested their idea by using a solution from the leaves in an aqueous extract and applying it to tomato seedlings in lab, which subsequently died. Despite the fact that tomatoes do not grow along with the desert shrub in the field, and that the experiment did not attempt at any real-world scenario in terms of potential concentrations in a field setting, the study was impactful and set the stage for the investigation of toxic chemicals and desert plants.

Went’s implication of the creosote bush in allelopathy fit rather well within rangeland science paradigms of the time, and studies were subsequently performed to help explain the relationship between allelopathy and the creosote bush “invasion” of grasslands. One study, from 1966, stands out for its impact on the ways the creosote bush was (and continues to be) viewed as an aggressor. The Jornada Range study of Daune Knipe and Carlton Herbel study in 1966 found that an aqueous extract of creosote bush leaves inhibited the germination of black grama seeds and reduced the initial growth of both black grama and bush muhly seedlings in lab, concluding that the creosote bush “may possibly contribute to the degeneration of grassland areas.”\(^{211}\)

Their methods included using finely chopped creosote bush material that was soaked in tap water for 48 hours before being applied to seeds and seedlings in petri dishes. Later allelopathic studies were critical of the methods used by Knipe and Herbel because of their inability to model anything close to what happens in the field, beginning with the fact that rain in the deserts does not immerse plants but rather falls quickly through the leaves and stems to the ground beneath.\(^{212}\) The Knipe and Herbel study further found that none of the different concentrations of aqueous extracts affected the germination of creosote bush seeds in lab, bringing into question Went’s “birth control” theory.

Another study on the creosote bush by researchers in Mississippi and northern California from 1985 theorized, as did Went, that the spacing of pure stands of the plant suggested an allelopathic component. They isolated and tested the plant’s antioxidant, NDGA, in lab and


showed that this particular phenolic compound dramatically inhibited the root growth of barnyard grass, green foxtail, perennial ryegrass, annual ryegrass, red millet, lambsquarter, lettuce, and alfalfa—none of which grow in the field with creosote bush—at high concentrations. They concluded that “since NDGA is present in such high concentrations in the leaves of creosote bush, it may be the major contributor of the observed allelopathic properties.” Once again, the methods failed to recreate conditions in nature but nonetheless helped solidify the notion that creosote bush was toxic to other plants.

A 2001 dissertation, again from the Jornada Range, helped show the difference between the lab and the field in creosote bush allelopathic research. It tested the conclusions of the former allelopathic lab studies which had implicated allelopathic chemicals present in the creosote bush and thereby promoted the theory that the creosote bush was aggressively replacing grasses. The study examined the ways in which different chemicals present in the creosote bush could be distributed into the soils within an actual field setting at the Jornada Range. Its methods involved collecting rainwater from both stemflow, that is the water that collects at the root, and throughfall which falls through the leaves and branches onto the canopy beneath, and testing the samples for total concentrations of phenolics, including NDGA. It concluded “total phenolics were found in low concentrations in stemflow and throughfall…while NDGA, the focus of several studies on allelopathy in creosote bush, was not found in any precipitation samples from creosote bush… the role of NDGA as an allelopathic compound should be reassessed.”

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214 Hyder, Paul William, “Total Phenolics, Condensed Tannins, and Nordihydroguaiaretic Acid (NDGA) as Potential Allelopathic Compounds in Creosotebush [Larrea Tridentata (Sess. & Moc. Ex DC.) Cov.] and Tarbush (Flourensia Cernua DC) in the Northern Chihuahuan Desert,” PhD diss., New Mexico State University, 66, 64, respectively.
The 1966 and 1985 studies were conducted at a time when range science was actively trying to reverse shrubland expansion and influenced the way that the creosote bush was perceived as an enemy “invader” by those invested in livestock ranching. Whether or not the creosote bush has chemicals that ‘kill’ plants around it is not conclusively known, it could certainly be true in some environmental contexts. But in light of the many variables that would have to be considered in order to be certain and to explain the processes by which this could happen in the field, it is unlikely to be resolved. Nonetheless, these studies anchored the rhetoric behind the politicization of the shrub and impacted the way that it and other shrubs were systematically cast as enemies, and thus uprooted and poisoned en masse with man-made chemicals.

Perhaps allelopathy researchers were asking the wrong questions based on the notion that bare soil in-between shrubs and even spatial distribution must point to a kind of ‘chemical warfare,’ a metaphor which was overly popular at the time. The fact is that creosote bushes do not always exclusively grow evenly spaced, nor homogenously. They grow in a variety of patterns amongst other creosote bushes as well as other species of plants, both clumped together as well as dispersed, this across its entire biogeographical distribution. The arguments critical of allelopathy, for instance, point to the fact that “almost all species can, by appropriate digestion, extraction and concentration, be persuaded to yield a product that is toxic to one species or another,” this from ecologist John Harper, and that many experiments “provide no

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evidence in support of allelopathy being operative in field conditions.”

The problem in allelopathy research may lie in the desire to examine highly complex environmental processes involving a variety of components—precipitation, wind, soil composition, the influence of bacteria and fungi in soils, other plants and animals, etc.—in a reductive way, isolating one or more chemicals.

As Robert L. Zimdahl stated in the context of weed science, “it is not wrong to separate the elements of competition experimentally, but it is wrong to assume that plants do so, and it is nearly impossible to separate them in nature.” Although those forms of science could provide an avenue for the detection and use of isolated compounds in other contexts, they were ultimately less likely to provide a picture of what was happening to the grasses. It was part of the broader problem of range science that Sayre pointed out in his work, that the nature of rangelands could not be understood in small chunks, there was simply too much variation and variability to simplify it to mathematical units.

Ultimately there are far more field studies that concluded reasons other than allelopathy for the expansion of shrublands into grasslands. To begin with, due to their shallow roots, grasses cannot tap into deep groundwater reserves as shrubs like the creosote bush can, and mesquite even more so. They therefore could not tolerate drought as shrubs could, especially the seven-year drought of the 1950s. And once the native grasses like black grama had been overgrazed or dead from lack of water, it did not matter how many creosote bushes were killed, they were almost impossible to replenish to their former state, as we saw in the Jornada tebuthiuron study.

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218 Sayre, Politics of Scale.
And “what of Went's hypothesis that the regular spacing is the result of toxic exudation from the roots of Larrea?” asked a 1969 study concerning the spacing of creosote bushes in the Mojave Desert.\textsuperscript{219} It found that, instead of allelopathy, the distribution of the plants was simply correlated to precipitation—where there was more rain, plants grew closer together, and conversely, less rain meant more space in-between shrubs. Creosote bush seedlings did not survive in un-grazed black grama grasslands in the Chihuahuan Desert in one 2001 study. After two years, the only seedlings that survived were those that had been planted in overgrazed grasslands, providing further evidence that the creosote bush only moved into already disturbed bare ground.\textsuperscript{220} The analysis, it turns out, could be far more neutral than those fixated on a case of biological warfare.

The creosote bush is not the only plant that has been called an “invader” or been depicted as a threat and is part of a larger history of plants presented as enemies. This history is most notable in the discourse about weeds. Weeds flourish mostly where ground is disturbed by natural disasters or human activity like overgrazing or deforestation. Perhaps because they are so good at flourishing where the conditions are right (or disturbed), weeds have often been framed as enemies and hated by farmers and gardeners alike, who desire perfectly manicured spaces for their crops or garden plots.

Historian Taylor Spence ties the Canada thistle, formerly known as just a common thistle, to nation-making in the United States during the post-Revolutionary period. The thistle \textit{became}

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Canadian only when it began to be seen as a menace by American farmers in the early national period, who feared “‘the whole country will be overrun by these intruders.”’\textsuperscript{221} But what was missing from the discourse was that the thistle arrived with European settlers and was not native to Canada. Nor did these farmers realize that their own colonizing habits were responsible for the spread of the plant. As Alfred Crosby writes, “weeds thrive on radical change, not stability” and the changes to the landscapes of the early American Northeast were drastic and monumental—thus spurring a boom in the “pestilent” plant.\textsuperscript{222}

The thistle provides an interesting comparison to the hatred of the creosote bush by ranchers. Although shrubs are not typically considered weeds, they are often seen to behave quite similarly, exploiting disturbed space and flourishing. Both plants were framed as “invaders” by Anglo Americans. Spence argues that Anglo exceptionalism was the likely motivation behind the thistle becoming ‘Canadian.’ This early colonial period case perhaps also shows the roots of an Anglo-American politics of plants—the need to control the ‘spread’ of unwanted plant species and the invasion rhetoric attached to it.

What if the spread of the creosote bush had been viewed not within a metaphor of warfare, but instead like a medicine on the landscape, or in the context of its ecological role as a nurse plant which studies have more recently begun highlighting. In 2011, Mexican researchers from San Luis Potosí, in the southern part of the Chihuahuan Desert, used a less contentious lens to examine positive plant-plant interactions, mostly between cacti and our shrub, expanding our

\textsuperscript{221} Taylor Spence, “The Canada Thistle: The Pestilence of American Colonialisms and the Emergence of an Exceptionalist Identity, 1783-1839,” \textit{Agricultural History} 90, no. 4 (Fall 2016), 512.

view of the nurse plant potential of the creosote bush. They examined multiple previously human-disturbed sites, typically by mining and cattle grazing, where human activity had ceased from approximately 25-120 years prior. Because historical records do not exist on the age of the landscapes, they interviewed the elders from each community, whose parents and grandparents had been the last users of the fields, to gage the time since human activity had ceased.

Overall, but not exclusively, the creosote bush was positively associated with almost 80 percent of the plants that grew in the Potosinian Plateau region. Plants growing underneath the canopy of the shrubs were healthier and had higher survival rates than those growing in open areas, and the shrubs further acted as “safe sites” for seeds, with an accumulation of more viable seeds than in open areas. The ground cover of creosote bushes increased with the age of the landscapes, as did plant species. Once human activity ceased, creosote bushes were the ‘pioneer’ species that moved into the landscapes. In doing so, they facilitated, rather than impeded, the recovery of native plant species in the area. The authors suggest that shrub expansion into degraded ecosystems “may constitute an important tool for the planning and development of conservation proposals addressed to recover and preserve plant biodiversity in harsh environments.”

Arid lands, and shrublands in particular, have been misunderstood and oversimplified historically. But a recent study from the Jornada Range is removing some of the blind spots of the past and describes a shift in the way shrub and grassland ecosystems are coming to be viewed through a more complex understanding of landscape heterogeneity called the “new” Jornada

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224 Ibid, 496.
model. It attributes transitions to “several triggers, drivers, and feedback mechanisms interacting across multiple spatial and temporal scales.”

The new Jornada model, as the authors of the 2018 article that reviews recent rangeland studies “The Grassland–Shrubland Regime Shift in the Southwestern United States: Misconceptions and Their Implications for Management” explain, acknowledges that grasslands were severely disrupted by overgrazing during drought, which then allowed the introduction of shrubs into grasslands. Over decades, wind and water then redistributed nutrients under the canopies of shrubs like the creosote bush, which developed into “islands of fertility,” as we have seen. Once that happened, they explain, control of grazing patterns stopped being an effective tool for grasslands restoration, as a feedback loop had developed that supported further shrubland expansion. The feedback loop is then further seen in climate changes associated with the increased dust emissions that come with more shrublands.

But they add that soil composition, particularly high clay and depth of caliche layer, prevents this model from being homogenous, in that it supports grass over shrub growth. Grasses can come back under certain circumstances having mostly to do with this aspect. When “societal feedback mechanisms” are taken into account—that is, the brush management strategies that include the profuse use of herbicides— it becomes clear in this new model that desert rangelands dynamics are “a mosaic of varying grass and shrub cover structured by interacting drivers, feedback processes, and constraints operating at multiple scales.” And knowledge of their

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variability must be understood and applied within management techniques insofar as they make sense historically and in particular places.227

The new Jornada model researchers are recognizing the false paradigm of desertification and degradation in favor of more complex social-ecological understandings that include the valuable ecosystem services provided by shrublands, much as the Mexican study did. The variability in shrublands is also a focus: every type of woody plant plays distinct roles and can express various traits and outcomes within an ecosystem. Perhaps shrubs will have their moment yet, within a better-informed future arid lands research.

To conclude, for ranchers and range specialists that subscribed to the old model of regime shift, the creosote was a plant with a will. The plant’s growth into overgrazed areas effectively organized human action against it, in a seemingly back and forth exchange of actions and reactions. A plant that can rob and threaten does not exactly represent a passive object waiting to be acted upon. Ranchers inadvertently attributed quite a bit of agency to the creosote bush. They worked tremendously hard and spent a lot of money toward the eradication of brush from the rangelands, in a battle for the defense of beneficial grasses against “threatening” brush plants like creosote bush which were effectively “robbing” them of their profits. Results were patchy. At the Jornada Range efforts to bring back grasses were largely unsuccessful, but “long-term grazing exclusion (40 years) in southeastern Arizona resulted in some degree of recovery in grasses and soil properties (Allington and Valone 2011). Contrasting outcomes probably reflect spatial heterogeneity. The Arizona site features wetter climates (417 millimeters mean annual rainfall) and more fertile soils (gravelly mollisol soils in broad swales) than the Jornada Basin (232 millimeters mean annual rainfall), where livestock exclusion in coppice dune shrubland

states (sandy aridisol soils on eolian plains) has often yielded no grass response.” Ultimately, as the new Joranda model recognizes, the picture of rangelands degradation was much more complicated than, and involved many more variables, that what rangeland experts of the twentieth century believed.

The antagonism against the creosote bush was born from the intersection of rational scientific responses to environmental problems of the time and the persistence of the ranching industry. Culture and economies directly inform and shape people’s perceptions about the natural world, influencing the identities we attach to plants, and literally shaping the natural environment. Ranchers commonly viewed the natural world as a resource to be exploited. In a very rational calculation, they viewed range grass as a meat-producing product that translated into market value. Any threat to ranching profits was met with defensive measures. But the plant was ultimately doing what plants do. When they accused creosote of “taking over” the range, they also revealed a lack of awareness of the ecosystems of the rangelands, which presents a contrast to the ways that other groups understood and interacted with the mixed grasslands and desert landscape where creosote bush grew.

In a very general way, the cultural filters through which everyday Indigenous and Mexican people not involved in livestock ranching viewed nature were often informed by survival rather than profit accumulation, as well as connection to family and the environment. Connection to the desert, family, tradition, and identity infused the way that many Indigenous and Mexicans perceived the creosote plant and the lands where it grew, as we saw at the beginning of the chapter with Lucrecia, the young Mexican mother, who found balm and guidance in arid lands plants.

228 Bestelmeyer, 685.
This chapter has attempted to illuminate cultural perceptions around the creosote bush and has revealed some ways in which the shrub was constructed as an enemy in the twentieth century for specific reasons rooted in specific economic, scientific, and political perceptions about the world. Ranchers’ capitalist impulse, combined with a western scientific framework for understanding of the nature of arid lands and their plant life, was a lens that converted the creosote plant into a ‘native invader’ that needed to be controlled and killed. In their need to make an enemy of plants like the creosote bush, ranchers and range specialists and scientists revealed more of themselves and their impulses to (literally) kill plants that interfered with their ideal form of landscape, than the true biological workings of the creosote bush. For other communities of people not necessarily invested in extracting maximum profits from the range, the creosote bush was often a vital, nourishing plant in the U.S.-Mexican borderlands.
“Current estimates suggest that in Mexico as in many developing countries, a large proportion of the population relies heavily on traditional practitioners and medicinal plants to meet primary health care needs. Mexican populations have been found to keep their health traditions when they move to the US. Although modern medicine may be available in the US and elsewhere, herbal medicines (phytomedicines) have often maintained popularity for historical and cultural reasons.”

With the abundance of phytochemicals held within arid lands plants, and the historical use of almost all desert plants as medicine, one could say that the deserts are medicine. Plants that have evolved to survive in extreme arid regions are said to be more ‘toxic,’ that is, they have higher concentrations of certain chemicals that serve as protection from the sun, for example, that make them more potent than plants from more temperate environments. These ‘toxic’ phytochemicals become medicine through the specific forms in which they are prepared as well as the dosage in which they are taken. As the quintessential desert plant of the borderlands, the creosote bush seems especially gifted with medicinal properties, and this is the primary applied relationship the plant has had with humans over the long term.

These deserts grow people. Indigenous peoples of the borderlands deserts have made their lives with their environment, shaped by what was around them, informed with an understanding of the intricacies and limitations of how to live with the arid lands, learned and passed down over generations. This way of living held deeply rooted spiritual and practical connections, showing how place is made between lands and people. Mexican sociologists

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Gilberto Giménez and Catherine Héau Lambert point out the relationship of hunter-gatherer cultures to space and identity in these deserts: “the appropriation of space, especially when the cultural dimension predominates, can engender a feeling of belonging that takes the form of an essentially affective, and even loving, relationship with the territory. In this case, the territory becomes a space of identity or, if preferred, identification, and can be defined as ‘a constitutive rooted unit of identity’ (Bonnemaison, 2004:130).”

In desert cultures of the hot North American deserts prior to colonization women were typically the plant gatherers, while men hunted animals. As such, women were the early mediators of the vegetal world. They created knowledge of the natural world through their relations with plants that produced food, medicine, and fiber. But European conquest represented a major material and cultural cleft in notions about the arid lands. In defining them, their value or lack thereof, and how to live in in them, outsiders largely abstracted the space as desolate or empty, and sought ways to in change the environment to suit people who were not accustomed to making their lives in the deserts, as we have seen over the previous chapters. The contact zones of New Spain brought diverse women in contact with one another and their different plants, many of which were adopted in mixed European and Native forms and applications. Over the subsequent four centuries and multiple, often violent, processes of colonization and modernization, the development of cultural hybridities, and the creation of mixed origin populations of Indigenous, European, African, and Asian peoples in the borderlands, women have remained close to the plants.

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This chapter will attempt to explain some of the “historical and cultural reasons” behind the continued use of the creosote bush. It will center ecological oral histories from desert people in the twenty-first century, listening and weaving itself around the intersecting themes that arise from the voices of people who have known the plant outside of any investment in its capitalist value. Ecological oral histories reveal worlds of meanings and connections beyond what we find in other historical documents. Spanish missionaries documented the use of the plant as medicine as early as the eighteenth century but lacked much of the sensory, affective, place-based understandings of the plant that we will see in this chapter. Nor could Linnean names, identifications, and drawings of the plant tell its whole story. Botanical expeditions likewise left out key aspects of the relationship desert people may have had with the creosote bush. As such, oral histories are uniquely positioned to highlight human-plant histories and are essential for telling the history of the creosote bush.

If we listen to what people have to say about the creosote bush over time and where it lives in their everyday lives and memories, we learn some of the distinct forms, both latent and conspicuous, in which borderlands desert peoples have and continue to live with plant nature. They are held within stories, memories, and practices with the plant, many which have endured at least since the archaic Castile culture creosote tea. Creosote medicine and healing, in this context, represent myriad connections and meanings that move beyond the ordinary act of taking a pharmaceutical for an ailment of some kind. This helps explain why connections to this shrub are bound up within the spiritual and the practical, not as two distinct spheres, but as integrated within everyday life. That is, when it comes to practices and beliefs about this plant, the practical is sacred. Most importantly, these stories help locate where the distinction between nature and culture is blurred in ways that are specific to borderlands deserts.
Women stand at the center of this history of the creosote bush. This chapter argues that women are the fulcrum at which nature and culture coalesce. If creosote medicine is at the intersection where plants meet the home, then women have been its alchemists. Women access the plant medicine through their practices with nature in the home. If the deserts hold medicine, it is largely through the women who know the plants that it became so. Phytochemicals become medicine only through cultural processes and human understandings about them (arguably also through their relations as nurse plants with non-human animals and insects) shaped by time and place. And if the deserts, through their sustenance, grew the people, then this history also shows the ways in which the people, women most markedly, grew the deserts through their cultural practices of healing with plants.

Through oral histories of the creosote bush, we can see the ways the environment impacted self-formation and identity within themes of faith, healing, intimacy, childhood, community, maternal figures, and the olfactory sense—all as distinct connections to the natural world through our desert shrub. In their direct ties to and experiences with the plant, the people interviewed provide perspectives that sit in contrast to the colonial and modern histories of the plant explored in previous chapters, most notably those based in reductive abstraction, extraction, and profit.

They speak instead of connection more closely aligned with the idea of subsistence and relations with the environment which are rooted in maintaining one’s life. In these memories, the creosote bush is a good plant which holds important meaning for the people who know it, even as they recognize and respect its potential to harm if used improperly. The distinctions between whether it harms or heals are evident in everyday people’s understandings of the often-paradoxical nature of the deserts and the creosote bush. Their stories reveal a distinct history of
the creosote bush and people. Would the plant be medicine without the people, without the women who have made the medicine with it? As a nurse plant that shelters and feeds other plants, birds, animals, and insects, who together create a small ecosystem below it with more aerated and nourished soil to live, it is arguably a type of medicine even outside of its relationship with people. But the study of a plant is also a way to study people.

The people whose oral histories provide the primary evidence for this chapter are either Mexican citizens or U.S. citizens with families from Mexico. One of the interviewees also identified as Indigenous. They come from the Chihuahuan and Sonoran Deserts in the states of Texas, Chihuahua, Coahuila, Baja California, Sonora, and Durango. All of these interviews were taken in El Paso, TX, and Ciudad Juárez, Chih., and most of them were conducted in Spanish.

This chapter is informed by a total of seventeen oral histories about the creosote bush (eight given by men and nine by women; the women’s interviews were significantly longer) taken between 2012 and 2020. Four oral histories by women are featured at length in this chapter, and several others are included to some extent. Three of the four women featured were interviewed by the author and at some point during the interview were asked to smell the plant and share what it made them feel and remember. The olfactory sense revealed a connection to the plant through memory that highlighted largely positive aspects of a time in the past accompanied by a kind of nostalgia for childhood, maternal figures, the home, and healing with the plant. All of the featured oral histories were given by women who continue the practice of using the plant as medicine.

In these histories, healing was inherently connected to a feeling of faith, sometimes in a religious sense, accompanied by prayer or song, and sometimes in a familial sense, connected to memories of trust and love. “Milagrosa” and “poderosa” are common descriptors used by desert
people to describe the creosote bush. People often said they had faith in the plant, both because it was an effective medicine, but also because of its association with a mother or a maternal figure who they trusted. People who expressed faith in the plant always had a direct experience of it. That is, they remembered the creosote bush being used in the home during their childhood and they noted its efficacy. Then as adults, most often mothers themselves, they continued the tradition with their own families. The practice, then, over generations, became imbued with additional cultural meanings.

Healing with the plant was also commonly associated with necessity. The creosote bush improved people’s lives, it enhanced their survival. Healing with it could be easily accessed outside of modern medicine, to which many of the interviewees had no access, based on the idea of utilizing what was around, something mentioned often in these histories.

People learned about plants like the creosote bush from other people, simply put. Every single person interviewed mentioned casually hearing about the creosote bush medicine from someone at some point. As the carriers of traditional knowledge about the shrub, it has often been women who shared information about plants within familial and community spaces over time. Family origin stories with the plant, when they are known, reveal the production and sharing of knowledge from one woman to another, women talking, as it were. Lay women healers, curanderas, are often identified as the original sources of this plant knowledge within the oral histories used here. At other times, contact with the creosote bush medicine came through informal advice from a family acquaintance—a friend, or a domestic worker in the home—shared by word of mouth.

These histories further detail how memories of a mother’s or grandmother’s care, their forms of healing with the creosote bush, are remembered as acts of love, with great affection and
reverence. On a practical level, there is a direct relationship between discomfort and relief with plant medicine. But the fact that it was most often expressed in an act of care shown by a maternal figure charged the experience with even more meaning. This speaks to the intimacy of care that often resonates within memories of the creosote bush in the home. People recall it being boiled on the stove, in a specific pot on the stove that was for boiling creosote (it was sensible to have a dedicated one, since creosote resin stains). “It was a regular little pot,” Josefina Montaño de García recalled, “one of those from before, made of pewter. I remember, I swear I remember as if I could see it now, the little pewter pot.” Memories of mothers cleaning cuts and scrapes with the creosote bush, “From her own tea…I remember she would put creosote tea on our wounds with a little cotton. And many times, she would drip tea directly onto our wounds straight from the pot.”

There is always an environmental context for the creosote bush, that is, people identified how to collect it and what it smells like. They mentioned its ubiquity, that it could be procured very easily in the desert, just outside the urban space. It was all around. Ties to the environment or ‘natural world’ through the creosote bush were rarely romanticized or even altogether conscious. Rather, the connections were often tied to ordinary acts, somehow transformed in the remembering. The memory, and the verbalization of it, could effectively change everyday actions into meaningful cultural traditions. People often began to think about the meanings or connections to nature that the use of the plant represented during the interviews.

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232 Josefina Montaño de García, interviewed by Alejandra Zavala, November 14, 2012, in Ciudad Juárez, Chih., transcript, Institute of Oral History, University of Texas at El Paso, available online here:

233 Josefina Montaño de García, ibid.
The senses, particularly the olfactory sense, bridge the ecological and the cultural; they help create cultural landscapes. The plant’s “almost unendurable” smell, as Jesuit priest Nentvig wrote in the mid eighteenth century, has much more nuance here. In these histories, the plant’s smell is associated through memory with good things like rain, mothers, and home. Some people described the smell as “good,” “peculiar,” others as “not necessarily good,” and “strong—particularly when it rained.” But their opinions on its smell or taste had no bearing on the value they placed on the plant. The association with rain rarely appears in written sources. Captain Johnston from Kearney’s Army of the West alluded to it, as mentioned in chapter 3, but it becomes more notable in these ecological oral histories, partially because of the use of the olfactory sense in some of the interviews.

We can credit one young Tohono O’Odham man with contextualizing the creosote bush-rain connection in one short and eloquent phrase: “the desert smells like rain.” This subtle and sophisticated quote was given to Gary Nabhan and included in the account of his life with the Tohono O’Odham in the Sonoran Desert, The Desert Smells Like Rain. This counterintuitive phrase speaks volumes about the intimate relationship between people and place. Creosote bush is the smell of the desert when it rains—far from the Father Font’s “bad omen,” the creosote bush is the harbinger of what may be the single most essential element in the desert—water. For European explorers and settlers, descriptions of the creosote bush’s smell, as mentioned before, did not indicate a similar kind of embodied experience of the desert.

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234 María Victoria Bravo Guza de Castillo, interviewed by Alejandra Zavala, December 5, 2012, in Ciudad Juárez, Chih., transcript, Institute of Oral History, University of Texas at El Paso, available online here:

In contrast, “the desert smells like rain,” reveals the intimate associations between people, place, and the senses and is exemplary of the ways the Tohono O’odham and other Indigenous and mixed Indigenous peoples of the U.S.-Mexico borderlands have long experienced their environment through eco-sensorial pathways. We see in this study how smell connects Mexican and mixed Indigenous Mexican people of the region to the plants. Sometimes, the medicine came through memory and smell. Rosemary Martínez remembered that her grandmother would wet a creosote branch and lightly spray her with its water when she was a child and that the smell made everything better. She later recalled the memory and the smell when she was suffering a health crisis and felt she needed the smell of the creosote bush to feel better. This also helps contextualize Lucrecia’s story from the previous chapter. Her case marks the moment of paying attention—we can call it intuition—when the plant introduced itself to her through its smell, and she just knew it was a good medicine.

This helps explain the historical and cultural basis for the plant’s continued and, perhaps even increasing, use over time. The continuation of an old practice alongside modern medicine (or despite it, perhaps) is representative of cultural resiliency. Women passed on the knowledge and practice of the plant within the home, through the memory of their care, along with the plant’s utility. It exists within the everyday forms in which lives are made, holistically. Resistance, in this sense, is subtle, quiet, and practical. The history of our lowly desert shrub helps us, in many ways, to see the profound nature of the mundane and reminds us that the connections to it run much further and deeper than the individual person. The connections to the creosote bush live within a larger collective experience that is shared across time and place in the borderlands deserts, and which has made the place and the people at once.
Holding the creosote branch to her nose, Concepción Arguilez Robles (Connie) smiled and recalled “mmmm, well lots of memories from my childhood, mi niñez.” It reminds me of the desert, when it rains and how it smells so nice, and all of the good things having to do with this miraculous plant, the gobernadora. I knew that every time I got sick, my mother, right away would, the whole house would smell like the gobernadora,” she laughed, “it grew everywhere outside in the countryside [desert outskirts] where we lived, and it smelled, always, always smelled of gobernadora.” Connie was born in 1947, in a little shack next to the family’s one-room house that her father had built for her mother to give birth in, which sat on communal ejido lands called Las Abejas, just outside Mexicali, Baja California, in the Sonoran Desert. Her mother, who we know from the previous chapter, was Lucrecia Robles de la Vara. Her origin story with the creosote bush provided Connie with the plant she would turn to throughout her life, as well the impetus for this dissertation research.

Connie’s father, Jesus Robles Pesqueira, had moved from Opodepe, Sonora, to Mexicali the year before to begin farming cotton and build the small home in anticipation of his wife and children’s arrival. He also grew bok choy and other vegetables that he would sell to Mexicali’s Chinese restaurants. General Ignacio Pesqueira García, the mid-nineteenth-century caudillo of Sonora who was universally hated by the Native people of the region, was a distant relative and first cousin once-removed to Jesus’s mother, Guadalupe Pesqueira Rivera.

But it was through her mother, initially, that Connie developed an interest in plants and medicine. Lucrecia had first learned about medicinal plants from her mother, and Connie’s namesake, Concepción y Robles Matas (last names which translate to oak and bush,

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236 Concepción Arguilez Robles, interviewed by Ligia Arguilez, August 2, 2021, El Paso, TX, recording, held by author.
respectively). “My grandmother liked plants and she would cure with them. It was from her that my mother learned about those things.” From the moment Lucrecia became acquainted with the gobernadora, it occupied a very important place in their lives—“if anyone became ill, even the dogs, it was gobernadora.” But Connie remembered a nearby neighbor, Doña Pascuala, who enhanced their knowledge of how to use plants: “she knew a lot about plants, and I would always listen and watch, it interested me. That is how I really began to get to know the medicinal plants, I have always liked the ‘yerbas’ very much.” Doña Pascuala taught both Lucrecia and Connie about how to use wild oregano, a type of mallow she called malva, and field horsetail or cola de caballo, as well as the benefits of enemas.

As a young mother living in Tijuana, Baja California, Connie’s interest and education in healing with plants was broadened through the help of another neighbor, a woman from Michoacán. Doña Raquel taught Connie how to cook foods from Central Mexico, recipes for medicinal teas, and how to massage her children for stomach colic, or empacho. And that is how, she described, little by little, she went learning. Her children rarely needed to visit the doctor because, she said “I always had good results with plants.” Connie acknowledged the importance of learning from other women, how they exchanged recipes for food and plant medicines.

“You hear from people: listen, my grandfather got sick, and I gave him this or that. Or one of my children got sick and I cured him with this. And that’s how you go learning about these things—if you’re interested, say, in herbs and plant medicine well, you’re going to investigate and ask. So, that is how you become aware and grow your understanding about plants and food and stuff like that.”

She noted that not everyone was interested in plants, though, “there are many people who don’t believe in the power plants, that don’t believe that plants are good for anything,” who would
rather go to the doctor and get a prescription. But for her part, Connie was appreciative of the knowledge she learned from women “from other places in the country, other states…that’s how you come to know about so many different things.”

But it was the gobernadora that she would return to throughout her life and that she spoke about with a sense of pride. “It is one of my very favorite plants that has brought me so much, has done so much good in my life and for other people who did not know about it before and are glad to have come to know the good this plant does. And that makes me happy, and I thank God for putting me in contact with the gobernadora, especially, which has been so important in our lives.” After moving to El Paso, TX, with her family in 1978, Connie became something of a lay healer for the working-class, mostly Mexican neighborhood where they lived. She recalled helping a diabetic taxi driver save his leg, curing shingles with warm compresses, advising people on how to get rid of athlete’s foot and bad odor, all with the gobernadora——before then, “they didn’t know the plant.”

Connie, like many interviewees here, spoke about the role of plants in improving human lives as if they were a gift for people, recalling the Indigenous elders in the first chapter who spoke about healing as a situated, emplaced practice among people and plants who grow together.

“There are many good plants, so many good ones. They are here because they were put here for us to use for our health problems. And people from before, that is all they would use, there were no doctors or anything. So that’s why these plants are so important…and I have lots of medicinal herbs and plants that work for all kinds of things, my husband is used to me making him a tea with this or
that, when his stomach hurts,” she laughed, “I love being in my garden and planting things, I just love it.”

Guadalupe Concepción Hall also had an affinity for plants, inspired by her mother who she recalled used to drink tea made with the creosote bush, which they called both la guamis and gobernadora.\textsuperscript{237} Guadalupe grew up in the Chihuahuan Desert states of Durango and Chihuahua, but most of her childhood was spent in Ciudad Juárez. Her family moved from Parral, Chihuahua, to a small lot of land in the outskirts of the city, the only area they could afford to live in. Guadalupe said that her father was rarely home. He worked as a bracero, a temporary field laborer, in the U.S. and they “had to find solutions, one way or another.” The undeveloped land was in the desert and la guamis grew abundantly all around their home, “an extraordinarily exaggerated amount. You cannot walk a couple of steps without finding another one of these plants! So, then, we started to hear about its medicinal benefits… my mother came to know the plant when we moved to Ciudad Juárez, she didn’t know it before.”

“We were very poor,” she said, but Guadalupe remembered that her mother was incredibly resourceful and knew how to use the plants that grew around them: “my mother was very smart for that kind of thing.” She recalled the extreme efforts of her mother to make sure they were provided with everything they needed. Milk was hard to afford, but they always had water infused with or mixed with herbs or fruit, even alfalfa water, which she recalled was very thirst-quenching. “I didn’t find it strange because I was very used to utilizing plants as resources, for food, nourishment, and medicine…it was very normal for us.” Guadalupe remembered her mother would send them outside to find a certain plant that they made shampoo with (likely a

\textsuperscript{237} Guadalupe Concepción Hall, interviewed by Ligia A. Argüilez, El Paso, Texas, 17 July 2018, recording and transcript held by author.
type of yucca called amole in Spanish.) They also used mullein, snake herb, and always had mint on hand for many uses.

La guamis was also always on hand. Guadalupe’s memory of the plant was deeply tied to an appreciation for her mother. “Yes, I remember that my mother, she would boil it as if for tea, and she would drink it to cleanse her digestive system. And, also, if there were cuts, or any sorts of wounds, any kind of wound, we would submerge our foot or hand or whatever. She made a tea with the herb and made her cures.” Guadalupe’s mother also took creosote tea baths sometimes, “for some sort of infection.” They never doubted its efficacy, “because ultimately, we thought, well, it wasn’t going to do any harm either way …and we had a lot of trust in our mother…because she showed us so much understanding about these things. It’s not that we didn’t believe in doctors, but there was no money for doctors…my mother would do the impossible to take care of us.”

The neighborhood curandera, or lay healer, was someone who Guadalupe’s mother did turn to in times of need. La Hermana Cristina “lived a few blocks from our house, and this woman was a person who was kind of a shaman.” Hermana Cristina utilized plants and prayer to heal, based in a very strong Christian faith, which was significant for Guadalupe’s mother, who was a Christian woman.

“And, when you had a problem, you went to the Hermana…she was a very wise person. Basically, we would go to her, and she would prescribe something, or she would massage us. She made this ointment, or cream, out of gobernadora combined with some sort of carrier oil…it smelled very strong. She would bottle it and give to us and tell us to apply it to our wounds or anywhere we had a problem. Before she did anything, though, she would pray first.”
Guadalupe returned to see La Hermana later as an adult at her mother’s urging—“you, know, I was very ‘modern’ then and I would do what the doctor said. But I knew that my mother knew what was right. I had a lot of confidence in her.” Guadalupe was close to giving birth and the child had yet to move out of a breach position, so she visited the curandera. La Hermana Cristina successfully massaged the baby into place with her ointment, “she did it from the outside, she said: the baby is ready now.” And it so it was. “When it comes to maintaining our health, I think it is half faith and the other half is what we can get from medicines, right?”

But as time passed, Guadalupe lost touch with La Hermana Cristina. “She always said it was God who did the healing, not her. She was very humble and so lovely, very, um, easy.”

Guadalupe was very eloquent in how she spoke about growing in relation to the natural world. Health solutions ultimately had to do with where you were and what was around you. But the connection went beyond subsistence, and became almost literal, embodied through the olfactory sense and the “peculiar” smell of the creosote bush on the breeze. She connected the environment and the senses, “it was a part of the environment, what we breathed in—it smelled,” making the phrase ‘a sense of place’ quite literal. The smell of the creosote bush was a constant companion growing up. Its association with her mother, and the fact that they utilized it so much to good effect, made the impact greater, so that Guadalupe associated the plant with her development as a person. “We utilized it in all these ways, so, then, it was part of what was ours, of what affected our lives, of what makes up our own existence.”

But, Guadalupe said, the world had changed, “I don’t know if it [the creosote bush] continues to be part of our environment…but I think that in the past we used everything around us more, because [the environment] helped make us as people.” For Guadalupe, self-formation had a direct relation to the natural world, through the ways in which the creosote bush and other
plants facilitated her family’s survival. She brought the creosote branch close to her nose and breathed in the aroma,

“more than anything, well, it reminds me of a time in my life, right, of my niñez.”

She smelled it again, “Um, well they are memories like, well, that become beloved because I was young and innocent…it reminds me of a very lovely period in my life being, eh, without problems, right? Simple. And it also brings back, well, it seems to me so beautiful that my mother always searched for solutions for us…when we got sick, or in sharing the knowledge of plants with other women in the neighborhood: I have this problem—well, you should try this!”

Her mother, she remembered, was a caring woman who was in community with the women around her:

“my mother was the type of person and of a time when people still shared everything, their knowledge, solutions, regrets, pain, happiness. For example, when a child was born in the barrio, they would all organize to support, would take gifts, we were very united, it was beautiful, it reminds me of such agreeable things.”

“But I think that the more people ‘progress,’ the less they believe in these things—procuring their own health and having faith in these types of plants…So, well I think it’s terrible that these things are lost over time.” The old house where Guadalupe and her siblings grew up is still there, and still belongs to the family. But development removed much of the desert and creosote bushes that grew there. “You hardly see these plants anymore, because its more populated. And so, people move in, and they clean. They ‘clean’” she laughed, “and unfortunately they remove what’s good and leave the junk.”
The memories of a more collective-minded past that came to Guadalupe through the smell made her quite nostalgic, as well, and represented loss at the same time. “How times have changed…remedies for our health were something that we all benefitted from…they didn’t cost much, and we did it with care, that’s why we weren’t very sickly as kids…when we share, we also learn…and we don’t have to all be experts, the point is to help one another and share what we have…it comes from our culture.”

Guadalupe mourned the cultural loss that she recognized had happened over time:

“Well, what I want to say is that it is a shame how we destroy so many of our things, that we have cut down and thrown away these [creosote bush] plants, and that many of us have despised them, like: meh, it’s trash, it’s just a ‘weed,’ instead of, well, making a little space for it, letting them, letting these plants grow so we can make use of them for good, and to teach those who come after us because if not, then these understandings get lost. It’s sad.”

Guadalupe spoke about how her mother had come from a rural village where, when a cow or pig was butchered, everybody received something, “chicharrones or whatever.” If wheat was harvested and milled, breads were sent out to people; someone harvested peas, and peas would be shared. Guadalupe described the communitarian aspect of rural culture in Mexico where her mother grew up as “everything was a consecration…everything was shared, everyone would have something, a little of everything…it is interesting how things have changed.”

Sharing in community—whether it was knowledge or material goods or care—was, for Guadalupe, a sacred act.
Carolina Sandoval Maynez is a native of the state of Chihuahua and at the time of her interview she was forty-seven years old and lived in Ciudad Juárez. As a child, she spent her summers at her family’s ranch in southern Chihuahua, surrounded by the desert and its medicine. She described the way of life and the people she knew there on the ranch, “we learned so many things. There were the stable hands, the curanderas, people that helped us clean, make tortillas. Well, everything in those times, as it was in rural villages…they are places of tradition, where you looked for your subsistence in what you had accessible there.”

Carolina enjoyed reminiscing about being a child there, and the ways it was different from the city,

“the river, swimming in the irrigation acequia, playing in the trees, walking in the pecan orchards. We looked for four-leaved clovers, and the little yellow flowers that we would wear like earrings, they came from the gobernadora plant…and we loved it. We loved playing and we also loved watching the birds come and rest on that plant, which we found out later was called gobernadora. When I was little, we would just take care of it, because we liked how the birds would arrive, the swallows, and nest in there. My grandmother would tell us stories of how the little birds would nest there because maybe their mother was lost or had been eaten by an animal, and the birds would be left without a nest. And that the gobernadora plant—that rather ugly plant—was very warm and provided a home for them, a nest.”

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238 Carolina Sandoval Maynez, interviewed by Alejandra Zavala, November 14, 2012, in Ciudad Juárez, Chihuahua, Mexico, Institute of Oral History, University of Texas at El Paso, recording and transcript available online here:
A curandera from the village featured prominently in Carolina’s history with the creosote bush as well. As a child, she enjoyed when the curandera came to their home. The healer would always ask for permission to forage gobernadora on their land:

“she gathered all kinds of plants there and she would give us, I don’t know, a peso or something, so that we would help her find the plants she needed…I think it was one of the best jobs I ever had!... [the shrub] grew all over the place on the ranch…it was always abundant. It was a plant that didn’t let other plants grow in its vicinity and that’s why, many times, the workers that would clean the lands wanted to remove it. Besides, it was an ugly plant, strange. It was nothing to brag about.”

It wasn’t until they found out from the curandera that it was a very useful medicine that they refrained from removing them, “after that we left a space just for her.” The day Carolina’s brother fell and hurt his knee badly, she remembered the curandera took creosote bush cuttings to the house and told them that it was very good for the pain and for the inflammation. “That plant was very, very important to her because that was what she used to heal people, we found out later.”

That was when Carolina’s grandmother, “the pillar of the family,” and the curandera developed a close relationship. “After that my grandmother started talking with the curandera, who knew just about everything...[Curanderas] have always been very correct about these things, they are very wise people, that carry their—everything they have learned, they carry as a heritage from their grandparents, from their ancestors.” And so it was that the curandera showed Carolina’s grandmother how and for what the gobernadora could be utilized. “And, as we grew, we took to getting the plant ourselves and, and we would boil it, I don’t know how long, maybe
ten or fifteen minutes, and then we would strain it, and then...” the preparation had its process. Carolina recalled the ubiquity of the plant being used in the home, that her grandmother steeped it in alcohol and used it for her arthritis and that her mother would daub it on their scrapes or wounds as children. And it remained a strong family tradition, “we always had a lot of faith in it. At the end of the day, it was something that always helped us.”

The question of the creosote bush as potentially harmful was something that almost every interviewee mentioned learning about. For Carolina, it was not unnatural that the gobernadora, a plant ally, could also be harmful if not respected and used correctly. It was a question of appropriate use, information of which was learned from the curandera, a woman who understood the intricacies of plant medicine.

“Of course, the curandera always said to be careful not to—well, like everything, to not use it excessively, right? Because that isn’t good either, because it was a very strong plant.” Over time, the curandera explained to them the ways it could be used internally in a safe way. “And we would listen, right? She would say that you couldn’t drink it every day. For example, three or four days, and then you would wait a month or so, depending on what you were treating. But, in three or four days you would already see results.”

“I’m going to tell you about something, well, I don’t know, I considered it like a miracle.” As a recently married woman, Carolina wanted to have children, but she was not able to get pregnant. The summer after her marriage, Carolina returned to the ranch as she always had, and it did not go without notice that she was not yet pregnant, “in these rural villages, they always know everyone’s business.” The curandera, who was by this time an old woman, asked
her about it, and Carolina explained that she did not know, that she had gone to doctors, and that she was trying but had had no luck. “And she told me: why don’t you try with the [gobernadora] plant, which was by this time part of the family tradition, and everyone used it for everything. But I never guessed that it could be useful for this, and believe me when I tell you, I think this plant made it possible for me to have my child.” Carolina faithfully followed the curandera’s instructions on how to drink the tea safely, and within two months she became pregnant. “And whether it was true or not true—that was the last thing I tried. And I didn’t want to mix it with other treatments or anything. And it worked for me.”

Carolina next talked about her postpartum experience with the gobernadora, which recalls the aftercare with the “woman’s plant” discussed in chapter one by Cahuilla/Serrano elder, Ruby Modesto, who said the ahtukul “felt so good.” After giving birth to her child, Carolina experienced very strong afterpains. “The truth is,” she explained, “that with the gobernadora…I don’t know but, it just worked for everything. Look, I used warm compresses of [gobernadora] tea, I would put it right here, close to my stomach, and it felt so good, and the truth is, the pains would go away for some time after that. And then I would do it again.”

She explained that her belief in the plant was related to her trust in the curandera, but also to its efficacy, which she witnesses countless times her life, “all our lives it helped us.” She saw the positive effect it had on herself, her children, and her grandmother—“I saw that she would relax and become less tense.” Carolina said she had faith in all the plants,

“but the gobernadora is the gobernadora. It is called ‘the governess’ for a reason.

And that’s how I came to know, and to this day, something happens and right

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away you call my grandmother, or my mother, or cousins will call, or my sisters: hey, do you have any gobernadora because—what have you. And, well, all these things you learn in your childhood, and that is how you grow.”

That is how you grow, or how you are grown, perhaps.

Carolina acknowledged that not everyone knew the plant or particularly liked it, showing the ways that having a history with the plant made the difference:

“Well, of course there are people who don’t believe, and more than anything, people who arrive from the city and say: gross, it smells bad. They prefer to put up with a headache, sore throat, or bone aches. I don’t know, but there are incredulous people who come from the city and don’t have faith in the [gobernadora] plant. They don’t know it. And they haven’t had the experience, nor seen how it has cured other people, like us, right?"

Using the creosote bush never had any harmful effects for her, other than its bitter taste when you drink it. Carolina said she preferred it to using pharmaceuticals “because ultimately, they can be too aggressive.” But plants, on the other hand, “plants were always a bit more generous; you know? They behave a little…less strong…as long as it is not very serious, then you have to go to the doctor. But as long as it’s something simple, we almost always try first with our plantitas. And our go-to plants are the gobernadora and aloe vera.”

Throughout the interview, Carolina was especially happy to share the forms of preparation, whether for compresses, alcohol infusion, tea for internal use, and when it was appropriate to drink it cold or hot and for what ailments the plant was good. It is interesting to note that Carolina did not identify the plant as easily accessible to forage in Ciudad Juárez where she lived; rather she said you had to get it out of the city on the way to Chihuahua City, where it
is all desert. In a pinch, she would buy it at the market from one of the many vendors who sell dried herbs and plants. “They sell it in capsules, too, but I don’t really have faith in those because you think to yourself: is it gobernadora? No, no, that is not appealing to me, it doesn’t seem safe.”

Carolina noted that later generations no longer believe in plants as much:

“Nowadays these young people get embarrassed, or they don’t share about it with others because they don’t think people will believe them, now that science is so advanced. They don’t believe so much in plants anymore, in the power they hold, they don’t have faith in them because they didn’t grow up so close, as we did.”

The conversation went back into remembering a simple past, “very natural, so, so easy to access, it didn’t cost anything, just what it cost to go to the curandera.” Carolina’s interview continued to be filled with nostalgic memories of a rural childhood and a pride in sharing knowledge about the creosote bush, telling what it was good for. Toward the end of the interview, Carolina returned to themes of identity and its ties to place, speaking of the environment she grew up in as if it were literally part of her. “Well, I changed a lot, but ultimately what you have in your blood, you have it and we, we, for example—we can’t do without our pecans, and we can’t do without our medicinal plant, the gobernadora.”

“I have a lot of faith in the gobernadora.” Rosemary Martinez identified herself as a Yaqui Mexican woman who was born in El Paso, TX and was “second generation born on this side of the manmade [U.S.-Mexico] border.” As long as she could remember, the plant had been a staple, hanging in the kitchen when she was young: “I remember my grandmother dipping

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240 Rosemary Martinez, interviewed by Ligia A. Arguilez, El Paso, Texas, 9 December 2017, recording and transcript held by author.
the branches in water and then just like blessing the area. I always thought it was a blessing because the smell calmed everything down.” Her very first memory of the plant, when she was about three or four, was that her grandmother used “the blessing” as a way to calm her when she had nightmares or anytime when she was afraid, “it just made things better. So that’s how I always associated the gobernadora. That it would get rid of the bad spirits….’cause I knew that that was gonna take care of everything.”

The significance of those early memories of her grandmother and the creosote bush would become clear later in life when Rosemary was struggling with a health crisis brought on by rheumatoid arthritis. She said that she had been taking chemotherapeutic pharmaceuticals at the time and that she could hardly move from the intense pain. “We had been taking a drive out in the country and I said: I wanna stop and get some of that bush and—’cause I remembered the smell! And I said, at least, I just wanna feel better, you know?” And she cut some creosote branches and took them home to dry.

The following week, her cousin who was Apache and knew how to heal with plants, travelled from California to help her— “he knew what had to be done.” As soon as her cousin arrived, he said he needed this certain bush, “and I go: it’s drying in the front yard! And he goes out and gets it and says: she knew that she needed gobernadora. I didn’t even know he was coming!” Rosemary described the preparation of the plant as a long and exact process of cooking it in water and drumming and singing to it the whole time. Afterwards she drank the tea— “horrible, it did not taste good at all!”— in very specific amounts over a certain period of time.

For Rosemary, the medicine she needed had come from her grandmother through her memories of childhood. She noticed the effect of the tea within a week when she began to go into remission,
“it wouldn’t have been possible without the memory of my grandmother and the medicine behind it, there would be no way. But it doesn’t work if it’s not connected to your ancestors and if it’s not honored in that way and I think that’s such an important part of that ingredient is to be respected and honored that way because that plant is an entity. To me it’s an entity of good health. It’s a knowledge, it’s so much rolled up into that little plant. And it’s attached to our history.”

Rosemary laughed remembering the things she saw her mother and grandmother do that she did not entirely understand as a child, like throwing ice on the sidewalk to bring money or spritzing her with water from a wet creosote bush after she had just put makeup on—“so we thought, what is wrong with them?!” But Rosemary acknowledged that these traditions seep into our identities and are woken up later in life, often in situations of crisis:

“When I said: I need to smell the rain and I just need to go pick this bush, I need to go bring that bush home. So now, I listen to those things where I didn’t before. And I think that just happens as we get older, as we mature, or when that little trigger gets turned on that’s like—this is who you are. So that’s what this little bush triggers, all these…memories and things that you wanna infuse into your children. And that’s the medicine. Because, when you’re incapacitated and you’re in so much pain, and you just don’t feel like life is worth living like this, something can come in and change that. I think, and believe, that that is the medicine. …that’s what that little plant does.”

Before then, she had not thought about her grandmother as a healer. But now
“I think of all the women that come from the different Indigenous tribes carry that medicine with them. And it’s part of the nurturing, it’s part of what’s in the kitchen. Always in the kitchen, ‘cause that’s where so much of the magic happens. And so, that’s how I view that medicine [creosote bush.] Because it, not only physically, but it starts mentally and spiritually. It’s concentrated in the way that you were brought up and your memories of your mother and your grandmother, you know?”

Rosemary elucidated the concept of medicine and how it had changed over time with pharmaceuticals: “there’s the human aspect that is not ever considered by these corporations and without the humanity you can’t have medicine. You just cannot have that medicine.” With modern pharmaceuticals, chemicals are extracted and recreated in labs to make medicines, rather than used where and as they grow.

“There is nothing that could be written that could possibly be comprehended by corporations…Even if you were able to successfully farm this plant, the composition of it the dirt, the growth, the water, the sun, everything will change its chemistry. So, it won’t be the medicine that was healing us anymore, it’ll be a pharmaceutical. …How can you have it for profit, the plant, mother earth gave it to us. She didn’t charge us for it. So, there’s this ocean of difference there.”

In the past, when people became ill “from working in the mines, in the copper mines, and any of these toxic places where our people worked,” they turned to curanderas and medicine people “that knew the yerbas ‘cause that’s what was given to our people, for us to recognize these things.” And the people who knew the plants were essential “because [the creosote bush] is also very toxic. So, it can’t just be a person who doesn’t know how to use it, and how to time it,
you know it is, it’s a medicine, so you have to treat with it with that respect and you have to go to
people that know it, which is not always an easy thing.” Our grandparents, she said, did not think
about healing in terms of modern medical terminology as we do today, rather, “they expressed it
in the way that they used it, the way they cared for it, the way they nurtured it and the way
they—everything was a ceremony. Everything was a ceremony. It was always prayer and water
involved.”

Memory, healing, and identity were strongly tied to the environmental context of the
desert through the creosote bush, she said, “we were lucky to have it all around us.” Rosemary
recognized the creosote bush as a nurse plant, and the sacred aspect of that relation to other
plants and to people. “You know, peyote [a cactus species from the Chihuahuan Desert
considered sacred by many Native people] grows underneath the shade of the gobernadora. It
grows under the shade, so it’s protecting other medicine. So, she’s like the mother to these other
medicines, too. And that is a very sacred medicine now, that we hold also.” For people, the
creasote bush was, she said, “a part of us, what makes us, what’s in our DNA, what is in our
memories, what—we hold our grandmothers’ memories, of course we do. How else would we
know these things?”

Rosemary spoke about the importance of her role as a grandmother and in passing on the
knowledge of the creosote bush and other plants to her grandchildren, “this isn’t something we
can hold or keep, no, it has to be shared.” When she was young, her mother and grandmother
didn’t explain much to her about the plant medicines, something she has tried to remedy through
her own learning and through sharing her knowledge with her grandchildren, who she spoke
about at length. “I’ve taken it a little bit further than my grandmother did…they didn’t explain
things to us.”
But Rosemary deliberately worked to make sure her children and grandchildren would have respect for the creosote bush as a connection to her and to the desert.

“Now I tell my grandchildren where it came from and how rain washes away the negative and when you wet it, that’s what it reminds you of. And they smell it, they always smell rain. So now they carry it in their medicine area. They have their corn seeds, and they have gobernadora. It kind of molds their attitude, their perception, their senses on what is important. So, when they look at a bush it’s just not a ‘weed.’ It has some kind of a function. I educate them on the bushes and why they’re important and why we have all the medicine we need around us—we just don’t recognize it. So that’s one of my first memories and my grandchildren’s memories. I want them to know what the gobernadora is, what the name is, what you can use it for. So, I take it a little bit further as far as educating them.”

The medicine was also in the passing down of knowledge to her grandchildren, so that it would become embedded in how they saw and interacted with their environment in order “to reconnect and to not lose that connection.”

All of the women featured here made the important distinction between knowing and not knowing the plant. Their formative and continued use of the plant made their experiences distinct and set them apart from most of the other interviews. Through the oral histories of their lives with the creosote bush, Connie, Guadalupe, Carolina, and Rosemary open up worlds of layered and interconnected meanings behind how people experience and live with plant nature in the borderlands deserts.

Although they are all different, the histories of the creosote bush these women tell are tied to emotion, the senses, the desire to stay connected, and to the past. In their voices can be
heard pride and love for people and place. They depict the production of knowledge about plants in real time as well as the processes by which it was passed on and preserved from woman to woman. They are mothers remembering mothers and grandmothers of the past. They internalized the plant medicine, within their bodies and their psyches. In many ways it made them who they are. They are believers in the power of plants, as they all stated. They are culture bearers, and the medicine makers. As stated before, women have remained close to the plants, but only some of them.

Many of the other interviewees had memories of their mothers using the plant or giving it to them at some point for medicinal uses but had not continued the practice. All of the others remembered hearing about the plant from someone, often that they had used it for smelly feet and foot fungus, or a variety of other ailments on someone’s advice. One man had regularly used the plant for various ailments like cough and smelly feet since childhood and explained how to prepare the plant for use. He also mentioned that he had seen branches placed in bar urinals placed there to get rid of the smell of urine.  

Another man mentioned that his mother had administered it to other women with fertility problems, to “warm the womb,” but had no other knowledge of it. Another man said he remembered they used to burn it to keep away mosquitos and that he had heard it was good for gastritis but that it was also toxic; he had never used it himself. A woman from Torreón, Coahuila, remembered her first memory of the plant

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241 Manual Moreno Castro, interviewed by Hugo López, July 12, 2012, in either El Paso, TX, or Ciudad Juárez, Chih., transcript, Institute of Oral History, University of Texas at El Paso, available online at:

242 Juan Algárate Quiñonez, interviewed by Hugo López, July 19, 2012, in either El Paso, TX, or Ciudad Juárez, Chih., transcript, Institute of Oral History, University of Texas at El Paso, available online at:

243 Javier Herrera, interviewed by Hugo López, July 19, 2012, in either El Paso, TX, or Ciudad Juárez, Chih., transcript, Institute of Oral History, University of Texas at El Paso, available online at:
was as a decoration for nativities in the home at Christmas, “it smelled so nice...because the plant smells very good.” Decorating the nativities with fresh foraged creosote bush is a very common tradition in the Comarca Lagunera region of Durango and Coahuila, something akin to using pine in the United States, where the people brought a specific plant from their environment into Christian tradition.

The people’s history with the creosote bush, heard through these interviews, shows the persistence of Indigenous plant knowledge through colonization and conquest and into the present, often blurring the distinctions between Indigenous and ‘Mexican’ practices. Much of what we read about traditional plant medicine practices begins with Native people as if they only lived in the past and then arrives at the present with current, presumably non-Native populations of Mexican people, as though the difference were absolute. Conversely, specific and continuous uses of the creosote bush, as dynamic as they have been over time (finding a place in urinals, for example), reveal the cultural continuity between Native and mixed origin, so-called Mexican people in the borderlands. Although most of the people interviewed here were not asked how they identified and did not otherwise explicitly call themselves Indigenous, with the exception of Rosemary, we can see that many of their experiences and practices with the plant are specific Indigenous practices.

As we have seen, Native people had already been sharing their knowledge of the hediondilla with European colonists by the mid eighteenth-century. When Pfefferkorn and Nentvig described the plant for the first time in writing it was in the context of Native people and their plants. Nentvig even included the plant’s name in Ópata, cubiasisi. They described its use

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244 Leonor Rebeles Fernández, interviewed by Hugo López, July 19, 2012, in either El Paso, TX, or Ciudad Juárez, Chih., transcript, Institute of Oral History, University of Texas at El Paso, available at:
for the treatment of parasites, as an anti-inflammatory, and in a salve for massage. Here we recall Guadalupe’s grandmother’s rheumatism and La Hermana Cristina’s salve. Though Pfefforkorn did not mention how the plant was prepared for “worms,” it was likely ingested as tea.

Pfefferkorn closed the section that included his entry for the hedionda by writing that, “besides those described, there are in Sonora many other curative herbs and plants, used now and then by the more sensible Indians (who are not numerous, however) to cure themselves under circumstances, indeed, which would exhaust many a doctor’s store of knowledge.” Taking Pfefferkorn at his word that it was Spanish women, with no Native descent, who were the doctors he saw using the hedionda, we can safely assume Indigenous women taught them about it at some point. At the very least, we can see the shared cultural aspects of the borderlands contact zone and the stability of some of those practices within the material history of the creosote bush.

The plant’s uses in women’s health further provide a centuries-long connecting theme in the history of this Indigenous “woman’s plant.” What Cahuilla elder Ruby Modesto described in childbirth and postpartum care from the early twentieth century in the Mojave Desert connects to Carolina’s late twentieth-century experiences with treating her infertility and her similar postpartum care in the Chihuahuan Desert. Both recall Longino’s 1790s description of the plant as an emetic, abortive, and for postpartum use by “Indian women” in the Sonoran Desert of Baja California.

In the last century, the documented ethnobotanical and traditional uses of the creosote bush have been extensive. It has been a universal remedy of desert people, a cure-all, “our
Documented in the *Native American Ethnobotanical Database* and the *Biblioteca Digital de la Medicina Tradicional Mexicana* as used by Native Americans and Mexicans to treat more than fifty reported illnesses, it is not surprising to hear that people used it “for everything” in these oral histories. The plant has been examined in biomedical studies since 1898, when C.B. Lowe performed a chemical investigation of the plant and published it in the *American Journal of Pharmacy* (mentioned in chapter 3,) but more extensively after the 1940s and up to the present. The 1930s Nevada Indian Medicine Project, which indirectly led to the discovery of NDGA, the plant’s main focus for scientists, marked the beginnings of ‘official’ interest in Native people’s uses of the creosote bush for the development of pharmaceuticals.

The focus of pharmacological research on the creosote bush has been primarily on its “very potent antioxidant,” nordihydroguaiaretic acid, NDGA. The chemical NDGA was originally synthesized in 1918 in lab from hydroguaiaretic acid ether, but, as we already know from chapter 4, it was later found naturally occurring in the creosote bush by a UMN student in the 1940s. Since that original isolation of NDGA in nature, multitudes of studies were subsequently done over the following decades and into the present, on the antioxidant’s pharmacological potential. Biomedical publications about *Larrea tridentata* typically begin with a short history reviewing the historical uses of the plant as a traditional medicine that include the following disclaimer in some form: “it should be mentioned that most of the medicinal uses of Larrea tridentata are not supported by experimental or clinical studies.”

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The creosote bush has largely resisted efforts to be made into a successful pharmaceutical drug. Although it has shown positive results in experimental studies for diverse cancers, HIV, herpes, gallstones, kidney dysfunction, auto-immune diseases including rheumatoid arthritis, and countless other ailments and diseases, research has rarely progressed beyond the lab into clinical trials.\textsuperscript{248} Much of this has to do with inconclusive results from the use of extracted NDGA, which, unsurprisingly, was either helpful or harmful, the balance of which had to do with dosage. In typical paradoxical fashion, while the ban on NDGA as a food preservative in the 1970s was due to concerns over liver toxicity, NDGA has also been found to protect against liver disease.\textsuperscript{249} This delicate balance seems to be the reason why it has been hard to successfully move biomedical studies into clinical trials.

The use of creosote bush medicine received renewed negative attention for its reported toxicity in the 1990s. From this period came prolific warnings against the use of the plant in the U.S. as well as its inclusion in the Mexican government’s list of plants whose use was prohibited for teas, infusions, and food supplements according to the General Health Law in 1999.\textsuperscript{250} To this day, official medical advice is categorically opposed to and discourages any use of the traditional medicine due to its toxicity, especially because of its purported dangers to the liver. This due to over two dozen cases of clinically apparent liver injury reported in medical literature

\textsuperscript{248} Ibid. This article provides a very good overview of research and findings on experimental studies.
\textsuperscript{249} Manda, “Nordihydroguaiaretic Acid.”
\textsuperscript{250} From Asociación Prodefensa de la Medicinay Cultura Indígena, APROMECI, website, accessed here: https://apromeci.org.mx/plantas_prohibidas
published in the U.S., Canada, and Australia in the 1990s. For whatever reason, there were none from Mexico.\footnote{“Chaparral,” LiverTox: Clinical and Research Information on Drug-Induced Liver Injury [Internet], (Bethesda, MD: National Institute of Diabetes and Digestive and Kidney Diseases, 2012). Updated 2022 May 25. Available from: https://www.ncbi.nlm.nih.gov/books/NBK548355/}

According to a 2005 study by Arteaga et al, “the reported toxic doses of NDGA in humans and experimental animals generally exceeded the traditional use of the plant,” that is, none of the cases were associated with the uses of the plant as we have heard in oral histories here, rather they were seen to be related to amounts our interviewees may have considered obscene.\footnote{Arteaga, et al, “Larrea tridentata (Creosote bush).”, an abundant plant of Mexican and U.S.-American deserts and its metabolite nordihydroguaiaretic acid,” Journal of Ethnopharmacology 98 (2005): 237.} The problems either stopped occurring or stopped being reported, as a publication from the National Center for Biological Information states: “for unclear reasons, there have been no cases of liver injury clearly implicating chaparral published since 2005.”\footnote{Ibid.} The vast majority of the adverse effects associated with the plant were due to the use of “chaparral” pill supplements, the nineties marking a time when herbal supplements were booming in popularity (Carolina seemed to hold the correct instincts about this when she said she had no faith in the gobernadora pills).

The chaparral moniker came about sometime in the 1970s at the very beginning of the herbal supplements market. In fact, the creosote bush seems to have launched the entire herbal supplement industry. Gathered from Nature’s Way company lore published in newspaper articles and obituaries, and a history of the company published in the International Directory of Company Histories, the founder of Nature’s Way herbal supplements, George Thomas (Tom)
Murdock, was the “first to sell commercially encapsulated herbs to retail stores.” And the first herb he packaged and sold was the creosote bush, what Nature’s Way called “chaparral.” According to his obituary, Murdock was a Mormon born in 1917 on Ute reservation lands, presumably those opened to white settlement in 1905 after the passage of the Dawes Act. By the 1960s, Murdock was married to Ellora Lalovi Fish and living in Phoenix, AZ.

Ellora had been diagnosed with cancer and conventional treatments had been unsuccessful. That is when Murdock apparently met a “Navajo medicine man” who suggested he use creosote bush tea to treat Ellora’s cancer. The treatment seemed to have worked but when the cancer returned years later, Ellora refused to drink the tea again because she did not like the bad taste. So Tom ground up the dried leaves and prepared capsules for her to take instead. This purportedly worked, and Ellora’s cancer went into remission and did not return. Thus, Nature’s Way began in 1969 with Murdock selling his chaparral tablets to health food stores and alternative medicine practitioners. “Working out of their home,” one source reports, “the Murdocks sold about $50,000 worth of chaparral tablets during their first year in business.” The family and business later moved back to Utah and expanded. By the late nineties Nature’s Way was a very successful brand and was selling several different product lines and continues to do so into the present.

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255 John D. Barton, A History of Duchesne County (Salt Lake City: Utah State Historical Society Duchesne County Commission, 1998.)
Nature’s Way pulled its successful chaparral supplements in the nineties after the reports of liver toxicity associated with the plant. Their website does not mention the chaparral that gave the company its beginnings, but instead states only that “in 1968, Tom Murdock desperately searched for a way to improve his wife’s health. After relying on conventional options without success, Tom took a leap of faith by turning to traditional Native American knowledge of the healing power of plants. As a result, his wife’s health improved, and she lived another 25 years. Tom’s quest to help his wife led to an herbal renaissance in America and the creation of Nature’s Way.” There is far more history to tell of Utah Mormons and the herbal supplement industry that remains, for now, beyond the scope of this chapter.

This 1990s chaparral history reads as something of a cautionary tale, given what people previously said about the need to treat the plant with respect. It also effectively reminds us, as the Western Shoshone elder in the 1980s made clear, that plant medicine and healing was a situated practice related to place. People and plants that “grew” together had a special connection. What people needed was already all around them, as Rosemary told her grandchildren. And if the plant is not respected and utilized in a careful way “it doesn’t work.” Or worse, it could be harmful.

The creosote bush tends not to be the focus of any spiritual practice, nor venerated in the way many sacred plants are in desert Native cultures. Rather it tends to live along with people in a practical way, setting the space, holding down the land, making people “feel better.” So these oral histories stand apart in a subtle way because the people here tend toward a more sacred perception of the plant, for reasons tied to multiple factors which have been discussed. But although the same perceptions are not explicitly stated by Indigenous people who have spoken about the plant to ethnographers or anthropologists in the past, the importance of the plant is clear.
The Native people called Wixarika, or Huichol, center place and nature, through the sacred cactus called peyote, in their spiritual formations and formation as people. Their most sacred site is in the Chihuahuan Desert of San Luis Potosí, called Wirikuta. That place marks the end of their ceremonial pilgrimage, and where they ‘hunt’ the peyote cactus, in order to create the world. Although the creosote bush is not central to their spiritual culture, the plant creates the environmental setting for their most important cultural work. The peyote, as we heard Rosemary tell, most often grows under the care of the gobernadora. But the fact that the wixarika purify themselves with the plant on their way to Wirikuta, and, at other times, ask it for permission and protection while they are in the desert proper, shows that the plant is respected and acknowledged as important.258

Nor did the Western Shoshone elder in the Mojave Desert describe the yatumbi as explicitly sacred, he said the medicine man did not even use it. Instead, “anybody could go out and get it, anybody that knew the plant could then make his own medicine…It could be picked by anyone,” he said, as long as you talked to it. 259 Tohono O’odham elder Laura Kerman was already in her nineties when she was interviewed by Karen Louise Reichhardt in the 1980s. She provided a poignant story about the specific greasewood bush of the Sonoran Desert that she returned to throughout her life. She did not talk about the plant as ‘sacred’ either, but her practice with it showed that it was a very important plant ally in her life. The following is excerpted from


Reichhardt’s article, “Before We Knew the Years Had Numbers: The Memoirs of Laura Kerman, Tohono O’odham Woman.”

This passage is a conversation between the author and Laura. The italicized questions are from the author, with Laura’s answer in plain text.

*Are there any other plants that you use now?* No. Just that one [greasewood, also called creosote bush, Larrea tridentata]. Yes. My father used it all the time for everything. When he burns himself he uses it, cuts his finger he uses, has a backache he uses. Everything. *Just the water [tea]?* Yes. He sits, he goes gets ready for bed and then he sits in there and he dips his fingers in the water and then puts the water on. Yes. And in the morning he gets up and goes through the same game. He tells us, “Don’t just be going around with a pain in your foot. The medicine is right there.” Now, when my father was alive there’s a big old tree of it and he gets that and after while it was just sticks there, it had no new shoots on that. Then he went for the next there. I’ll show you where. Now it’s getting big. My father’s gone and the greasewood is—and I get it from the same bush. He breaks the branches off and it’s just sticks there. Now it has built up a thick bush and I get mine from the same. *Why is that the best bush? Why do you choose that bush?* Because it helped my father. He don’t just break it off. He talks to the bush. “Now I’m going to get this and this and this. You help my toe, you help my back.” He talks to the bush while he’s getting. So I do the same. What do you say? “You help my papa, you help me too. I know you help anybody that comes here to get your leaves to get well from, get rid of the pain from your leaves or from the juice. And you help me too.” And my father, he goes over there and gets
the greasewood and he talks to the greasewood, “Help me.” Yes. Yes, everything was like for the people in years back, that’s what they did for everything and that’s why everything comes up each year. They don’t just come out on the trees because it’s. No. It is God send everything that we live with, and so we respect it. We ask them. The plants don’t hear, but he hears.

…

Now start sorting the fresh greasewood into two piles—one with the larger branches and one with the fine leaves. Oh, you have a lot to learn yet, oh this is good medicine. Tomorrow I’ll be running around the yard. Yes, these are good. And too, maybe, you know sometimes they are full of wax. You can see the wax. And that’s the best time to get it. When the new leaves come on they’re full of wax. That’s the best kind, best time to make your juice then. Yes. This is good. I now have enough here until. See, after we break this up we even save those little sticks after I break off the leaves and put in the other pot. You’re saving the sticks and the leaf tips separately? Oh, yes. Yes, I save those sticks and boil it with the juice I’m going to store away. Oh, if people only knew, this is medicine for bad leg, arthritis. No. They don’t use it.260

Within these Indigenous stories of the creosote bush, the plant is implicitly sacred, like a dear old friend, which is, arguably, very similar to the sacred, if not a bit more approachable and intimate. But when we listen to words like miraculous, belief, faith, respect, and mother, words

heard from our featured interviewees, we see how the gobernadora became imbued with a reverent significance, depicting the tenuous separation between the sacred and the mundane of everyday life.

I once had a conversation with a desert ecologist about how people historically gained knowledge about medicinal plants. He replied assuredly that a lot of people had to have died in the process. His explanation seemed glib to me in its underestimation of people and their understandings about the natural world. I thought about Lucrecia, my grandmother, and the ways that people and plants might have had a sense of one another, a form of communication that we no longer acknowledge as valid.

Plant studies researchers have produced a multitude of studies in the recent past that point to the fact that plants are sophisticated and highly sensitive biochemical communicators with one another. They became that way out of need. Unlike animals, plants “took an evolutionary opposite direction: they remained in place, getting all the energy necessary to survive from the sun and adapting their bodies” in order to best protect themselves, as plant neurobiologist Stefano Mancuso writes, “they are the living representation of how stability and flexibility can be combined.”

The creosote bush adapted to the very hot, water-scarce environment of the deserts through a variety of chemicals which help protect its leaves from the intense heat of the sun and excessive water loss during photosynthetic activity. They are also responsible for one of the plant’s names, hediondilla. Humidity in the desert air acts as a sort of activator for some of the chemicals on the plant called volatile organic compounds, or VOCs. With exposure to water,

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these chemicals are released into the air and produce the plant’s very distinct smell, which communicates the coming of rain to people.

As an eco-cultural bridge, the smell of the creosote bush may be what alerted people to its medicinal value over time. For all animals, smell has been “one of the most important ways of interaction with the environment.”²⁶² It plays a primary role in fulfilling some of their most central needs: to identify food, mating partners, and danger. The identification and collection of medicinal material has been a widespread Indigenous practice in the arid deserts of North America, filling one of the essential needs for survival. In addition to food identification, the senses have been directly implicated in people’s ability to identify medicinal plants. Smell and the identification of medicinal plants is inherently connected. Mojave Desert Cahuilla elders, for instance, regarded smell as their primary observation when they were asked to identify plants by Lowell Bean and Katherine Saubel.²⁶³

When Lucrecia first smelled the gobernadora on the breeze that day, it was the smell alone that cued her into its good medicine. Unlike the people featured in this chapter, she did not have the intimate memories of the plant nor the practices with it. But she did have a foundational knowledge that plants were medicine and some facility with the processes in which to make them so, learned at home from her mother. She knew plants. Was her origin story with the gobernadora just an intuition that could have gone terribly wrong, a risky experiment with a plant she did not know? Likely not. Instead, perhaps Lucrecia knew how to listen.


People made their lives with the creosote bush, it always helped them, and it was all around, it smelled. The history of the creosote bush is also a history of people. It shows some of the ways borderlands peoples have and continue to be in relation to their arid environment. Place shapes people as they in turn shape their surroundings, whether through the making of medicine or through distinct forms of knowing and perceiving nature and the world around them. Here, women have most often, though not exclusively, been the interlocutors of life with the creosote bush. They expressed the importance of passing on the knowing as they lamented the ways culture has been lost or forgotten. They acknowledged the ways their history with the creosote bush made them who they are. The desert borderlands were literally embodied through the plant. Through its application as medicine, on and in the body, and through the olfactory sense, the gobernadora was internalized as an ecosenorial attachment to place. The creosote bush – deeply rooted in the landscape of the desert – somehow became rooted in the people who came to know it, facilitating a profound attachment to place, like a vegetal place-maker.264

264 Keith Basso, Wisdom Sits in Places: Landscape and Language Among the Western Apache (Albuquerque: University of New Mexico Press, 1996.)
CONCLUSION:

The creosote bush is a plant of primary importance in the hot arid lands of North America. The deserts in which it lives are those geographic locations—ubiquitously mentioned but seldom described in any detail—the wilderness, the outskirts, the uncivilized lands, wasteland, where nomadic “barbarians” roam, sandy, empty, the barren lands, sterile-lands. In these deserts, the creosote bush covers a large part of the landscapes and gives them their characteristic brown and olive-green colors and even their smell. The region includes the following large cities and metropolitan centers from west to east: Mexicali, Baja California; Las Vegas, Nevada; Phoenix and Tucson, Arizona; Hermosillo, Sonora; Ciudad Juárez, Chihuahua; El Paso, Texas; Chihuahua, Chihuahua; Torreon, Coahuila; and San Luis Potosí, San Luis Potosí. Between them are vast expanses of creosote bush mixed shrublands for miles, marked by basins and mountains whose piedmonts, or bajadas, are vegetation “borders” where the creosote bush and other shrubs give way to higher elevation plants like acacia and juniper.

The geopolitical border lines the desert in parts as well, standing as a dark marker of exclusion and violence. But the creosote bushes do not seem to pay it any mind; as a species, the shrub has been around here too long to care about governments and walls. The climate is usually very hot in summer, and winters get very cold in all but the Sonoran Desert. The little rain that falls comes mostly in the winter on the western end of the region (Mojave Desert,) spring and summer in the middle section (Sonoran Desert,) and in summer in the eastern part (Chihuahuan Desert.) When it does rain, the vegetation responds in spectacular fashion. Almost immediately the browns begin to turn to greens, flowers pop up, and the welcomed smell of creosote hangs in the air.
In this dissertation I have argued that the shrub has a special status in the borderlands deserts because of its material, political, and ideological influence on the hot deserts of North America. From northern Mexico to the southwestern U.S., it has shaped both the landscapes and the peoples of the deserts over the longue durée. And it has, in turn, been shaped by everyday people, women, colonial and nation-states, and scientists into a friend by some, a medicinal ally, a marker of worthless lands for others, a weapon, an enemy invader on the land, a nurse, a food preservative of fats, a beautiful memory, a reminder of home, a terrible smell, and a welcomed aroma of rain.

Gary Nabhan acknowledged this in Gathering the Desert: “from its elemental position in Papago [Tohono O’odham] creation stories, in traditional medicine associated with childbirth, and in burial practices, it appears that creosote has accompanied desert Indians from the beginning to the end of life.”265 This research shows that the plant has also been fundamental for Mexican, mestizo, and other mixed ethnic desert borderlands peoples as well. It argues for the place of desert medicine as indispensable to human survival and quality of life in the arid lands, and also for the primacy of the creosote bush specifically as a woman’s plant, which has had a special relationship with women’s health and women, who have carried, preserved, and continued the production of knowledge about the plant into the present. For its foundational impact on identity and memory and for its abundance on the desert landscapes, the creosote bush is a co-producer of the desert borderlands place.

It was with a previously established personal base of experience that I began formally researching this plant in 2016. In searching for the plant in newspapers, ethnographies, colonial missionary and explorer’s accounts, botany publications, and in more recent oral histories about

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265 Nabhan, Gathering the Desert, 18.
the plant, I saw the often-dualistic perceptions about the creosote bush very early on. It was as if the creosote lived in different worlds in different ways. Although they didn’t fall along strict lines of race, nationality, or ethnicity, perceptions about the plant seemed to match particular experiences of place and particular worldviews about the natural environment. So I thought about the roots of the different political and ideological perceptions about the land that informed the ways people perceived the creosote bush. It seemed ultimately that who you were, where you were, and how you made your life had a greater impact on how you perceived, interpreted, and related to the plant than the true workings of the plant itself.

As a borderlands historian who is committed to recuperating the histories and narratives of everyday people along the U.S.-Mexico border, it became clear early on that oral history methods could help provide the key to a more place-informed counternarrative to much of what people have written about the plant, as people who knew and grew with the plant. What is important about a look at this particular plant, aside from its dominance in the arid lands of the North America, is that it forces us to see outside of highly entrenched paradigms of what is of value, of what makes good land, and agricultural paradigms. It forces us to think outside of purely commodified value, even outside of food stuff (not negating the obvious primacy of food, of course) and recognize the salience of cultures of healing and tending to life; that is the medicine which comes directly from the natural environment—here, specifically in the desert—and that which is preserved and handed down through generations, material and knowledge cultures, in addition to human relationships with nature-arid nature where the creosote bush grows.

The history of the creosote bush helps us see the deserts and their lowly shrubs with different eyes. In so doing, this shrub might help prepare us confront the shifting climate and its
subsequent effects on deserts and beyond, in ways that are respectful of non-human life in this place, and thus may help us confront the challenges in less pessimistic ways that acknowledge the long-intertwined history of vegetal nature and people in the [now] borderlands region. Here, where the creosote bush grows, in the most marginal and arid of lands, where the “precarity” of worlds ending has been a historical reality for centuries, we may find lessons on the dignity and the beauty of precariousness.

In 1988, when the government-sponsored cultural resources agent interviewed the Western Shoshone elder about the yatumbi through his niece who was translating, they sat under a rock shelter in Shoshone lands near Yucca Mountain in the Mojave Desert, set in a place that had seen both the creation and ending of worlds. That part of Yucca Mountain where they talked, at Dune Wash, sits in the southern end of the larger nuclear Nevada Test Site (NTS.) In the same Mojave Desert where the ancient elder creosote bushes live, where the first peoples had become the medicine plants, and where the desert tortoise had sung the song of the yatumbi that turned the wet climate to dry and hot, the U.S. government detonated over 1,000 atomic bombs underneath and above the ground between 1951-1992.

After WWII, President Hoover and the Atomic Energy Commission (AEC) had established the Nevada Proving Grounds, later named the NTS, northwest of Las Vegas in the desert rangelands because of its marginality. It was more cost-effective to have a nuclear testing site which was in the continental U.S., but which was still remote and unpopulated. Near Yucca Flat, the AEC detonated almost one hundred atmospheric bombs and hundreds more underground. The 1963 Nuclear Test Ban Treaty put an end to the atmospheric tests after about one hundred of them had already taken place, but the underground testing continued. The NTS
now continues nuclear research and development and also hosts a complex of radioactive waste storage facilities.

In 1962, creosote bushes near two atomic test sites at NTS were monitored for effects of ionizing radiation exposure. Both the underground “Sedan” test at Yucca Flat and the aboveground “Small Boy” test at Frenchman Flat were conducted in July. Dosimeters had been attached beforehand to different populations of creosote bushes near enough to the ground zero to calculate the potential exposure but far enough that they would not be blown apart or otherwise damaged. The creosote bushes at Yucca Flat had far higher roentgen readings than those at Frenchman Flat, with an average cumulative dose of 4737 R (roentgen.) The shrubs that ended up getting covered in a dusting of fine sand particles that had been blown around by dust devils in the summer following the tests all lost their leaves and become completely defoliated by September of 1962. But after heavy rains the following year, the defoliated creosote bushes all began to sprout again, either from the basal stems at the bottom at Yucca Flat, or from the lateral branches at Frenchman Flat. The creosote bushes that had been exposed to radiation but no dust covering were seemingly fine.

Persistence and resilience are certainly characterizing traits of our lowly shrub. But I think the defining trait of the yatumbi may be better described as a healer, a salve on the arid landscapes of historical violence and precarity and a helpful medicine for the people who grow with it in the borderlands deserts.


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Ligia A. Argüílez was born in Tijuana, Baja California, and was raised in El Paso, TX. Her work highlights the stories and legacies of U.S.-Mexico fronterizx communities by centering people, place, and nature in the desert borderlands. She earned her BA and MA degrees in History from the University of Texas, El Paso, in 2015 and 2018 respectively. Ligia was a research assistant for the Institute of Oral History from 2019-2022. Her undergraduate research on barbed wire and the incarceration of Mexican nationals in the U.S. in the Mexican internment camps along the border in 1913-14 was published in 2022 in the anthology *On Surveillance and Control at Borders and Boundaries: Landscape, Infrastructures and Architecture*, edited by Alejandro González Milea and Olimpia Niglio. She also published the report “Gobernadora as a Site of Memory: Desert Plants and Ecosensorial Place-Making on the U.S.-Mexico Border” in *Studies in Oral History* in 2021. Ligia has presented her research regularly since 2018 at the Western History Association and the American Society for Environmental History annual conferences. She was Instructor of Record for History of the U.S. Since 1865 at the University of Texas, El Paso in 2019. Ligia has been a Research Fellow on the *Mellon Humanities in Place Bracero Museum and Connections Tour at Rio Vista Farm* in Socorro, Texas, since 2022. She also a 2021 Humanities Texas Fellow, Texas Covid Relief Grant, for a public history project called “Segundo Barrio, Ellis Island of the Southwest: A Walking Tour of South Oregon Street, El Paso, Texas.” She has been the graduate student representative on the Program committee for PCB-AHA Annual Conference and was an editorial board member for *Password Journal of the El Paso Historical Society* in 2021. Ligia is currently a 2022-2023 Mellon/ACLS dissertation fellow.