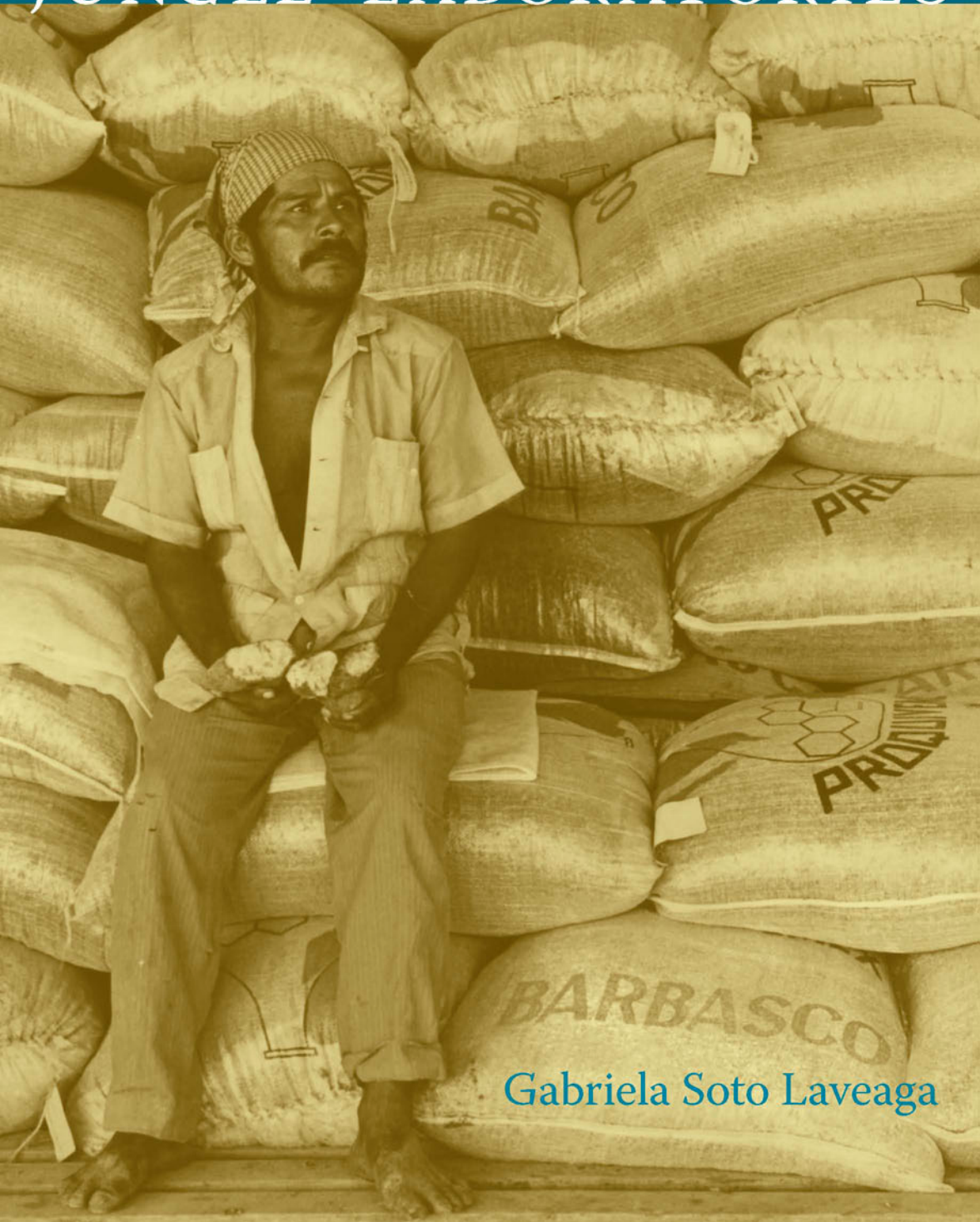


*Mexican Peasants, National Projects,
and the Making of the Pill*

JUNGLE LABORATORIES



Gabriela Soto Laveaga

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To the memory of my father,
Professor Hector Soto-Pérez,

and to the Mexican men
and women who for decades
gathered barbasco

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PREFACE

In the summer of 1997 I participated as a graduate-student researcher on a binational research team which was documenting the medicinal plants of the Mixteca of Oaxaca. I never, however, made it to the Mixteca. Instead I stumbled onto a project that would lead me in the opposite geographic direction, in search of giant yams in southern Mexico.

The team was funded in part by the National Institutes of Health, the Instituto de Química at UNAM (Universidad Nacional Autónoma de México), and the Museum of Man in San Diego. As the sole historian on the team, my role in documenting medicinal plants was not entirely clear to the American researchers and their Mexican counterparts. This confusion proved fortuitous, since I was assigned to spend a month in Mexico City's National Herbarium while the team's chemists and biologists pondered why I had been hired. Housed in the basement of the Siglo XXI hospital, Mexico's high-tech public health institution and symbol of medical progress, the National Herbarium became for nearly a month a calming alternate world hidden away beneath Mexico City's chaotic traffic. It is there that I learned to press and catalogue medicinal plants, marvel at their uses, and tolerate the oppressive mothball stench which stays in your clothing and skin but acts as an undisputed bug repellent. And there was where I first heard of barbasco.

As part of my herbarium training, I was expected to participate in a two-week seminar for medical doctors hailing from various backgrounds and regions of Mexico. The goal of the program was to educate physicians trained in Western institutions about alterna-

tive approaches to health and medications. Specifically, participants were to consider the role of plants in a state-sanctioned project to offer alternative healing methods to Mexican people. The objective was to revive and legitimate this knowledge and slowly begin a medical revolution of sorts by training those who prescribe medications to accept alternative forms of conceiving illness and healing. During one of these presentations, the director of the former Mexican Institute for the Study of Medicinal Plants offhandedly mentioned that few people knew that the oral contraceptives were derived from a wild Mexican yam. I was intrigued. Could this be true? If so, why was this not common knowledge? Why did some historical narratives persist while others languished forgotten? This book is a result of those initial questions.

ACKNOWLEDGMENTS

As this project expanded in scope, the debts I accrued also increased. Although I cannot acknowledge here everyone who helped, inspired, or questioned this book, I wish to express my gratitude to those who most influenced my thought process.

In particular, for their intellectual guidance and mentorship, I thank Warwick Anderson, Eric Van Young, Dain Borges, Charles Briggs, and Carlos Vélez-Ibáñez.

I can never sufficiently thank the dozens of rural Mexicans who set their work aside to respond to my questions about barbasco, but I can state here that the stories they shared, which were crucial for this book, are what allowed me to obtain fellowships, grants, and my current job. While I cannot name them all, the most important interviews are listed at the beginning of the bibliography. I am particularly thankful to Isidro Apolinar of Chiltepec, Oaxaca, and his family who welcomed me, often for several hours at a time over the span of five years. Indeed, this book would be a very different one if it weren't for the time that dozens of individuals, such as Don Isidro, gave to me at different stages of this book's production.

I am extremely grateful to the Mexican scientists who patiently explained chemistry, botany, and biology in terms that a historian could grasp. While I cannot list them all here, I am indebted to Dr. Ricardo Reyes Chilpa and his graduate students at the Institute of Chemistry at UNAM, Maestra Abigail Aguilar and her incredible research team at the Herbario IMSS (Instituto Mexicano del Seguro Social) in Mexico City, Dr. Alfredo Pérez Jiménez of the Institute of Biology at UNAM, Ing. Carlos Huerta at Universidad Autónoma de Chapingo,

Ing. Luis Ernesto Miramontes in Mexico City, Dr. George Rosencranz in Palo Alto, California, and Dr. Arturo Gómez-Pompa of UC Riverside. Any errors in explaining their fields of expertise are entirely my own.

This book followed me through many academic institutions as I pursued a doctoral degree and took up a tenure-track appointment and a postdoctoral fellowship. At each stage I have been fortunate to engage in conversations—private and in seminars—which have furthered my initial musings. At UC, San Diego, I thank my graduate cohort and Professors Eric Van Young, Christine Hunefeldt, and Cristena Turner. At UC, San Francisco I thank the faculty at the Department of Anthropology, History and Social Medicine, and the Bay Area Med Heads for raising questions about molecules and race, in particular Adele Clarke, Vincanne Adams, Phillippe Bourgois, Dorothy Porter, Nick King, and Brian Dolan. At the Center for U.S.-Mexican Studies, where I was a researcher in residence from 1999 to 2001, I thank a lively and engaging cohort of scholars of Mexico.

This project would have taken much longer to complete without the generous financial assistance of a Fulbright–García Robles Fellowship; a Ford Foundation Dissertation and Postdoctoral Fellowship; a UC President's Postdoctoral Fellowship; a UC-MEXUS grant; a Center for U.S.-Mexican Studies fellowship; a UCSB (University of California, Santa Barbara), Career Development Grant; and various UC Academic Senate travel grants.

Although writing is a solitary endeavor, a great group of friends never allowed me to feel lonely. I especially thank Eunice Stephens, Natalie Ring, Marcela Guadiana, Emily Edmonds, Delia Cosentino, Courtney Gilbert, Adriana Zavala, Jon Yohannan, J. Fernando Corredor, Adam Warren, Karla Ibarra, Josh Dunsby, Elena Songster, and Angela Vergara.

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I also appreciate the dedication of three anonymous Duke University Press reviewers. Their lengthy and frank assessment of an earlier draft made this, I am certain, a much more complete and, hopefully, better book. I am grateful to Duke University Press editor, Valerie Milholland, for believing that one day this book would get done, to Miriam Angress for her help at each step of this process, and to Leigh Barnwell for her tireless assistance with images. I also thank Mark Mastromarino for understanding and generously giving me more time and Sonya Manes for copyediting. I also thank Patricia Rosas for her ten-hour plus days with the manuscript. They all worked to make this a better book.

Though my intellectual debts are many, it is the emotional support I have received from my parents, Consuelo and Hector Soto, and my sisters—Ana and Carmina—which I can most definitely never repay. Finally, I can never fully express my gratitude to my partner on the dance floor and in life, Stephan Krämer. Without Stephan's daily support and understanding, this project would have taken much longer to complete. *Du bist mein Alles*.

My father, Professor Hector Soto-Perez, arrived in the United States in 1965 and set about to learn his first words of English. Eight years later he received his Ph.D. at USC and for nearly twenty-five years taught at Cal State, Los Angeles. Though he longed to return to Mexico, he instead made it his life's work to teach about the land he had left behind and to demand rights for Mexicans in this country. He unexpectedly passed away as this manuscript's first complete draft was being written. From my father's intense nostalgia, I learned, as a young girl, to love Mexico, initially mimicking, and later making my own, the sentiments that only an immigrant can have. This book is dedicated to him.



MAP 1 Map of Mexico with the main barbasco towns of Oaxaca.

INTRODUCTION

It was early August, and the campesinos shifted uncomfortably on the rows of wooden benches.¹ The sounds and smells of the humid jungles of the Chinantla region in eastern Oaxaca surrounded the tiny meeting hall and blended with those produced by sweaty, restless bodies. Attending official meetings was something new for most of these struggling peasants. Some nervously picked at the dirt beneath chipped nails while others tightly clasped hands callused and swollen from coaxing coffee from tired lands. They were there to learn about the uses of a root, a wild yam called barbasco, which the majority harvested and sold for cash to buy food for their families. These campesinos wrested the root from the ground, hauled it over rough terrain, and sold it miles from their homes on the same day they picked it. As the speaker began, they listened in what seemed uncomfortable disbelief. Certainly he could not be serious. They laughed nervously, jostled one another, and waited impatiently for the meeting to end. But the speaker, Melquíades Santiago, also a campesino and the president of their local union, persisted. He earnestly explained that the tiny blue pills that he was passing out to attendees had once been barbasco. Through what he called a “chemical process,” a substance in the gnarled tuber had been transformed into potent medications. Moreover, he insisted that the little round pill could cure aches, pains, and the “worms in their stomach” that caused cramps and gave them diarrhea.

The year was 1983, but in a 1999 interview, Santiago would recall that when he left the meeting hall the ground outside was strewn with tiny colored pills. Most of the campesinos at the meeting had not believed him.

It is not, however, the pill-throwing actions of these peasants which make this particular meeting remarkable. Instead it is the carefree use of chemical terms such as diosgenin and progesterone which Santiago, a campesino with no formal education, used when recalling the event. That this educational meeting even took place is noteworthy since a mere decade earlier, men similar to those at the meeting had used slivers of chemical knowledge to contest local social hierarchies and produce their own interpretation of science in the Mexican countryside.

This book is about a forgotten chapter in Mexican history: the search for wild yams called barbasco. Products derived from barbasco altered modern medicine, aided advances in science, and, arguably, granted millions of women some control over reproduction. When we open our medicine cabinets today, it is likely that we find medications that in earlier versions were derived from compounds found in barbasco. From 1940 to the mid-1970s, these yams were the ideal source material for the global production of synthetic steroid hormones. Mass production of progesterone, cortisone, and, eventually, oral contraceptives was possible because of the availability of Mexican yams.

Beyond the history of a tuber, this book is an exploration of the local and social consequences of the global search for medicinal plants. Specifically: What happens in rural Mexico when global trends lead international laboratories to confer value to a local weed?² This story is significant for several reasons. It forces us to reconsider how local and national histories affect globalized science and markets. It urges us to rethink the means by which Mexican peasants attained social and political legitimacy in the late twentieth century. And it also invites us to discuss the power and the malleable meaning of science in the most unusual of spaces, the Mexican countryside, during a crucial time, the 1970–76 populist regime. Additionally, this story contests the idea that science could only be copied but not produced in Latin America, a region that for many was, at best, on the periphery of knowledge production.³

In the late 1940s barbasco became a valuable resource when it replaced *cabeza de negro*, another dioscorea, as the ideal raw material for making synthetic steroids. By the 1950s while Mexican and foreign scientists researched, experimented on, and catalogued varieties of barbasco, United States Senate

hearings were trying to determine the fate of the root in Mexico. By 1960 more than 2 million women in the United States were using the Pill, and more than 100,000 Mexican peasants were gathering the raw material used in its production. In 1975 the Mexican president, Luis Echeverría, attempted to nationalize the steroid hormone industry. The parastatal he created to manufacture steroids from barbasco would close in 1989.

Barbasco's importance to Mexican science, politics, and rural development is eclipsed only by its significance to the world. In the 1950s, for example, the search for the mass production of cortisone was seen as "an unrestrained, dramatic race involving a dozen of the largest American drug houses, several leading foreign pharmaceutical manufacturers, three governments, and more research personnel than have worked on any medical problem since penicillin."⁴ In May 1951 an article in *Fortune* magazine under the intriguing headline "Mexican Hormones" reported that "the biggest technological boom ever heard south of the border" was that synthetic cortisone could be derived from Mexican wild yams.⁵ But the surprises did not stop there. When referring to the laboratory where research on wild yams was conducted, Carl Djerassi, the co-discoverer of the Pill, wrote in his memoirs, "Syntex [the laboratory] as a company, and Mexico, as a country, deserve full credit as the institutional site for the chemical synthesis of an oral contraceptive steroid."⁶

In the 1950s the potential medicinal use of Mexican yams seemed inexhaustible, versatile, and almost miraculous. Barbasco contains a substance, diosgenin, that chemists can transform into synthetic progesterone, from which all other hormones, such as cortisone, can be easily manufactured. Chemical work on barbasco transformed Mexico from a "presumably backward" country, as it was described in press releases, into the world's premier supplier of synthetic hormones.⁷ Mexico monopolized this production until the late 1960s, when domestic politics and alternative sources of raw materials deposed Mexico from its steroid-producing throne.

Barbasco, in the form of synthetic cortisone, brought relief to millions suffering from rheumatoid arthritis. Research with diosgenin by the Mexican chemist Luis Ernesto Miramontes yielded what he initially believed to be a substance that would prevent women from experiencing miscarriages—but, ironically, it turned out to be the basis for oral contraceptives. A few months after this discovery, Gregory Pincus, with the relentless advocacy of the family-planning crusader and benefactor Margaret Sanger, used

barbasco to continue his own research on viable oral contraception in the United States. Despite this history, few today associate Mexico with steroid hormone production.

This is surprising because at the height of the barbasco trade, more than ten tons of wild yams were removed from the tropical humid areas of Oaxaca, Veracruz, Tabasco, and Chiapas on a weekly basis. Comparatively, in the 1960s approximately 3,000 kilograms (3 tons) of corn were collected per hectare during an *entire* harvest.⁸ In 1975 the price per kilo of barbasco was virtually the same as it had been when it was first collected in 1942, 10 to 60 Mexican centavos, less than one American nickel. By contrast, Synalar, an anti-inflammatory medication derived from diosgenin, sold for the equivalent of several dollars in Mexican pharmacies of the time. Although other authors have explored the intricate, often contentious relationship that developed between foreign steroid hormone laboratories and the Mexican state over control of the yam trade and the medications derived from it, they did not focus on a basic question: How did so many yams make it out of the jungles and into the hands of laboratory scientists?⁹

This book, then, answers that explicit question and explores the implication that thousands of Mexicans were needed to remove barbasco from southeastern Mexico. Despite the sheer numbers of individuals and yams involved in the barbasco trade, few within Mexico remember barbasco today. One can speculate that the end product, patented medications, was so far removed from the raw material that it was impossible to make the connection. Or, conversely, barbasco had no monetary value before the 1940s, and hence it attracted little, if any, national attention outside of rural Mexico.

Within Mexico the barbasco root and the people who harvest it might well have continued to be ignored or overlooked had it not been for the populist administration that came to power in 1970. As part of his vision of what he called a “new Mexico,” President Luis Echeverría (who held office from 1970 through 1976) insisted that a better Mexico was one that regulated its population growth. Echeverría, fully aware of the United Nations’ and the World Health Organization’s population control programs of the 1970s, intended to seize control of the highly lucrative steroid hormone industry and create a domestic pharmaceutical industry, a move that would give Mexico much-needed control of patented medications and, of course, oral contraceptives.¹⁰

In addition, controlling the barbasco trade would allow the Mexican government to organize thousands of unemployed and potentially rebellious yam pickers at a time of increased social unrest in rural Mexico. Consequently, Echeverría's solution, a state-owned company called Proquivemex, opened its doors in 1975 with the ambitious mission of producing enough domestic pharmaceuticals from Mexican medicinal plants to compete with and eventually replace transnational laboratories. But in addition, and in a novel fashion, Proquivemex promised to represent and organize Mexican peasants and educate them about the wild yam—and, by extension, about the rudiments of chemistry. If peasants could learn the true value of the wild yam, the populist argument went, then they could reap the financial profits of harvesting barbasco, a privilege until then enjoyed only by some caciques or local strongmen. Eventually, as the founding charter of Proquivemex promised, campesinos would also control the state laboratory entrusted with producing steroid hormones. Indeed, campesinos would occupy the space reserved for scientists.

At first glance these promises resemble other far-fetched ones made during Echeverría's populist regime, but placed within the larger context of Latin American history they appear less absurd, though no less questionable. Since the late nineteenth century Latin American governments had embraced scientific theories that promised to hold the key to explaining and transforming their racially and economically diverse societies.¹¹ Science and pseudoscientific ideas were heartily and intimately intertwined with the politics of state formation. Social Darwinism; eugenics, in its multiple manifestations; positivism and degeneracy—to name a few—were the tools used by politicians to explain why governments could regulate the actions of their “diseased” citizens, who most often suffered from poverty, illiteracy, unemployment, and racial stereotypes. Governments imported, produced, and molded scientific language and programs to reform their plebian constituencies and create healthy citizens.¹² For many governments, rural and indigenous peasants posed a particularly difficult roadblock to progress. How to integrate these sectors of society into the national fabric while distinguishing them from the *gente decente* (literally, the “decent citizens”)?

Mexican leaders before Echeverría had attempted to answer this question by various means. Some, such as President Porfirio Díaz (1876–1911) and his cabinet, aptly named the “Científicos,” were more overt in their designs than others. Given these trends, it should not be too remarkable that

Echeverría would believe that science, in this case chemistry, could, if not fix, then aid the decaying countryside. What is surprising, however, is that some barbasco pickers took science, this language of elite social control, and made it their own.

Barbasco in Mexico

The history of barbasco is partly that of a project of modernization imposed by a government that in the 1970s attempted to redefine the Mexican nation while grappling to retain political power in the countryside. Those the government chose to include as part of this modern project is what makes this story compelling. Arguably root pickers—indigenous, poor, and uneducated—were in many respects the antithesis of modernity, but in their capacity as gatherers of the root they became the essential link to finally bring a modern project to Mexico: domestic patented medications. The inherent ideological contradictions in this plan reveal much about Mexico at the end of the twentieth century. As the government promoted the continuance of a “campesino way of life,” its imposed projects illustrated how little the government understood the social and economic interactions which allowed Mexicans in the countryside to exist in the mid-twentieth century.

By incorporating Mexican peasants into the history of medical discoveries, this book challenges previous histories which place the scientist and the laboratory at the center of the tale. But by focusing on rural Mexico and Mexicans, my intent is certainly not to imply that campesinos became research scientists; rather, I seek to point out that a political moment invited yam pickers to believe that they could produce steroids. In the past few decades, historians of Latin America and, more recently, historians of science have written histories that add to or question traditional narratives by incorporating the historical perspective of workers, patients, prostitutes, and the colonized among others.¹³ With regard to the history of oral contraception, several scholars have challenged the U.S.-centric version by incorporating within a single narrative the participation of Mexico, Puerto Rico, and the Netherlands.¹⁴

This book pushes that particular narrative further by postulating that some Mexican campesinos actively engaged in the knowledge production of steroids for personal and communal gain. By 1976 a handful of men in the area surrounding Tuxtepec, Oaxaca, were making their fortunes—both

social and economic—as intermediaries between transnational pharmaceutical companies and peasant pickers. Employees for foreign laboratories learned to rely on the diosgenin-yield predictions of these campesinos to forecast manufacturing needs for the coming year. In addition, these local men could speak the language and understand the local social networks that were alien to laboratory employees but crucial for obtaining barbasco. Some men, such as Melquíades Santiago from the introductory vignette, managed to rise through the ranks of the barbasco trade by controlling the information that was disseminated. With that, social divisions were created based on chemical knowledge.

Beyond the Laboratory

Exploring the changes that occurred in rural Mexico as a result of the barbasco trade reveals the transformative and malleable social power of science once it leaves the confines of the laboratory and is linked to a populist agenda. The resourcefulness of financially and politically marginalized Mexicans who used their knowledge of barbasco to their advantage clearly emerges from the narrative. Indeed, barbasco in the 1970s became another tool for people accustomed to exploiting every available opportunity to attain social legitimacy. For example, when campesinos traveled to Mexico City to meet with the president of Mexico or with directors of transnational pharmaceutical companies to debate the price of barbasco, it altered regional social hierarchies that had been in place for centuries. By including rural Mexicans in the narrative of discovery, I press readers to accept that scientists, both domestic and foreign, were not working in a cultural vacuum: they relied heavily on rural Mexicans' knowledge of soil conditions, growth cycles, and the minute particularities between different species of yams.

Despite the distinction between elite knowledge production and routine labor—as these campesinos' actions would certainly be labeled—steroid research could not have occurred without the participation of Mexican campesinos. The American chemist Russell Marker acknowledged this when he returned in 1969 to rural Veracruz and handed a plaque to the descendants of the Mexican peasant who tracked down the first wild yams for him in 1942. In so doing, Marker recognized the presence of Mexican peasants in the act of discovery. By blurring the lines between those who

produce knowledge, in or outside the laboratory, who performs a routine job—the scientist measuring compounds or the campesino digging up specific yams—becomes more ambiguous.

When historians of science asked, “Who is capable of engaging in science?” they encouraged us to include, for example, gender in our analysis of European science production.¹⁵ Bringing campesinos and the action of the Mexican government into the narrative of steroid hormone synthesis lets us analyze how local and national events influenced global science production and how world events influenced Mexican campesinos and how they interpreted and internalized those events. Other studies have shown that when scientific centers arose as historical actors, “both science and the locality were changed by the event.”¹⁶ However, the case of barbasco in Mexico goes one step further by demonstrating how locals appropriated science to redefine themselves.

One of the key differences in the manipulation of the barbasco root’s meanings was that scientists and politicians thought of it as the precursor to steroid hormones. Their understanding and knowledge of the tuber were linked to the steroid industry, pharmaceutical laboratories, and global markets. Those who searched for and dug up barbasco, on the other hand, were working from a completely different knowledge base: rural Oaxaqueños thought it was a weed, a tool for fishing, a plant with powerful medicinal properties, and a crucial source of sorely needed cash. It would be decades before the chemical properties of barbasco would be widely understood by rural Mexicans. Nonetheless, they developed a knowledge of the plant equal in sophistication to that of the scientists. They used their knowledge of rain patterns, differing root colors, and variations in vine width to determine when and where they could dig up the best roots. That thousands of campesinos did not use microscopes to make their determinations did not invalidate their methods. In fact, to develop a systematic understanding of the root, Mexican ecologists in the 1950s imitated the barbasco-tracking techniques used by thousands of Mexican campesinos.

Twenty years later, peasants, in turn, mimicked the language of chemistry, freely using *progesterone* in letters to the Mexican president as a way to gain social legitimacy within Mexico. In his book *Peasant Intellectuals*, the historian Steven Feierman explored how peasants, rarely considered intellectuals, at crucial moments, “organized political movements of the greatest long-term significance, and in doing so elaborated new forms of discourse.”¹⁷

This was the case in the mid-1970s, when campesinos began sending handwritten letters to the president to demand roads, schoolhouses, and electricity. The letter writers stressed their knowledge of *esteroideos*. The global need for barbasco, which is found nearly exclusively in southern Mexico, and the actions of rural yam pickers forced the Mexican government to reconsider the role of campesinos. In the context of barbasco, Mexican peasants had to be recognized as producers of knowledge—quite simply, only campesinos knew where and how to obtain the raw material needed for continued steroid research.

Commodities

The history of barbasco may echo the familiar tale of Latin American commodities exploitation, but it is significantly different. While the parallels with, say, rubber are many, commercial cultivation of barbasco was never successful. Despite attempts to export seedlings and grow them in the United States and other countries, Mexican barbasco resisted transplantation. When it was grown successfully in Guatemala or Puerto Rico, the diosgenin content plummeted compared to that found in plants indigenous to Mexico. The yam, like the petroleum of southern Mexico, had to be tracked, extracted, and transported for processing elsewhere before being exported. Similar to coffee and tobacco, it had to be dried at the source, but unlike silver, another major Mexican commodity, surprisingly few myths surrounded the extraction of barbasco. Of the Latin American commodities, one may be tempted to find similarities with Andean coca, which must also undergo a chemical process before acquiring its street value as cocaine and whose demand drove the development of strong local and transnational social networks.¹⁸ Cocaine, like diosgenin, is a historically recent commodity. But unlike cocaine's illicit associations, diosgenin continued to garner praise from scientists and politicians alike. Recent histories of commodity markets have taken care to examine the social and political consequences of particular trades, and this history pushes us to think how local practices (political and social) impact the world economy.¹⁹

Bioprospecting

When I initially set out to do my research—immersed in literature on medicinal plants, bioprospecting, and the rights of a nation over its own natural resources—I believed that this would be a historical case of locals

and pharmaceutical companies battling over the patent rights to the medicinal properties of plants. I knew that there had been a movement to nationalize barbasco in the 1970s, so I assumed that it would be traditional healers and local root pickers who began the movement claiming ownership of the knowledge about barbasco. It was not a farfetched assumption, since the story had many of the key elements of today's current battles against pharmaceutical companies. But then I looked deeper. The story of barbasco in Mexico is more complex than that.

Bioprospecting is understood as the exploration of "potentially profitable biodiversity and biodiversity-related knowledge," for commercial purposes.²⁰ Several scholars have observed that the word itself is inappropriate and the concept legally flawed because its foundation is the patenting of traditional knowledge. In other words one cannot patent knowledge that has existed for generations as an invention. The expected outcome is that local communities will profit as much as well as those interested in the pharmaceutical potential of their natural resources. Biopiracy, for its part, is the blatant exploitation of traditional knowledge and chemical compounds through legal means, usually via patents. Using this terminology, the initial stages of the barbasco trade in the 1940s, 1950s, and 1960s could be labeled biopiracy. By the 1970s, under President Luis Echeverría, there were some attempts at reform. The study of barbasco contributes to the debate on bioprospecting by illustrating how the drive to obtain medicinal plants integrated science (via pharmaceutical laboratories) and indigenous knowledge.

By using the case of barbasco and, in particular, of those who picked the yam, I push the argument beyond biopiracy, benefit sharing, and the controversy over traditional knowledge, which has often dominated the discussion. Recent scholarship has elucidated the links between medicinal plants and pharmaceutical-industry or university researchers, as well as the often-lopsided relationship between the industry and local participants.²¹ Historicizing the case of barbasco lets me add to these discussions by showing that local allegiances and power structures do not remain static over time—an exploited campesino may, ten years later, be the exploiter of future yam pickers. In other words barbasco pickers were not always unified, universally exploited, or equally savvy about their relationship and agreements with industry and the State, as the Melquíades Santiagos of this history illustrate. Moreover, engaging the discipline of history in discus-

sions about bioprospecting allows for a closer examination of the long-term sociocultural effects of the ongoing search for medicinal plants. The quest for medicinal plants may be driven by the aim of transnational interests, but a successful outcome is directly intertwined with the history, politics, and social conditions of the people and the environment in which the medicinal plant is found.

The case of barbasco illuminates that argument by showing how the history of the locality influenced the relationship that the Mexican rural community would have with the steroid hormone industry. Although this conclusion seems obvious, few case studies have traced the history of a place from before the arrival of transnational laboratories, during the point of contact, and after the pharmaceutical industry's involvement has waned.²² It is at that juncture—the coming together of traditional modes of existence in the countryside and of modernity in the guise of cutting-edge steroid-hormone research—where we learn how a sector of Mexican society functioned at a time of economic crises and how the malleable meanings of science aided this endeavor. In understanding the subtle nuances of apparent contradictions—such as campesinos and steroid hormones—we can better explain the history of a country in which such contradictions can take place.

Bioprospecting in the 1940s

Although I am applying it here, the word bioprospecting was not widely used until the 1990s. Instead, for example, the Mexican campaigns against pharmaceutical laboratories during the populist regime of the 1970s used a discourse of nationalization and empire, which, given the populist regime of the time, seemed appropriate. In this case the imperial reach manifested itself in the guise of pharmaceutical laboratories that held the promise of health while taking natural resources in exchange. But this rhetoric also opens up for analysis the image that the laboratory played in Mexican national projects.

Other scholars have richly examined the contradictory image of the laboratory as a pristine space that excluded “dirty and uncivilized” locals.²³ But the history of barbasco in Mexico shows us that some of the lowliest of rural locals—yam pickers—came to believe that even the restricted spaces of the laboratory would open to them if they mastered the chemical lingo. As others have shown before, laboratories are places where society and politics

are renewed and transformed, so by placing a laboratory in the jungle the Mexican government unwittingly created the venue that would further the illusion that the Revolution's promises could be kept.²⁴

Bringing the campesinos' experiences into the story enables other connections to emerge. As with field botanists who "use spatial and locational ways of knowing" and who know that they will be held to laboratory standards, barbasqueros soon learned that the yams they selected would be analyzed, weighed, and possibly rejected based on norms stipulated by outsiders.²⁵ These rules, intended to standardize yams, intertwined with each locality's specific history and social relations and so determined the impact that barbasco would have in the region. This study focuses mainly on the area surrounding Tuxtepec, Oaxaca, and it reflects that region's labor networks and ethnic history.

Barbasco and Mexican Peasants

Although scholarly works have studied the participation of U.S. and European scientists in the discovery of synthetic hormones and the collapse of the Mexican steroid industry, those works entirely omit the modern history of the barbasco-producing region.²⁶ Most recently, Myrna Santiago in her treatment of oil discovery in northern Veracruz, Christopher Boyer in his analysis of the timber industry in Michoacán, and Stuart McCook in his exploration of Caribbean crops, among others, have challenged scholars to link social transformations and land-tenure questions to the study of the environment.²⁷ Within that same vein, a study of barbasco extraction from Mexico's jungles lets us analyze pivotal changes in rural relationships, peasant organizations, and the links between the countryside and the capital at a time of diminished government subsidies for rural areas. Therefore, this analysis to some extent also questions the traditional depiction of Mexican campesinos in the second half of the twentieth century (1960–80), when, arguably, being a campesino was already anachronistic.

In exploring the actions of the Oaxacan barbasqueros in this region, I carry the process of peasantization beyond the postrevolutionary period (1917–40), beyond the post–Second World War era, and into the heart of the "Mexican Miracle" (sustained economic growth from 1940 to 1968) and beyond it (1968–89). Whereas scholars such as Florencia Mallon, Christopher Boyer, Gil Joseph, Daniel Nugent, and Alan Knight have analyzed the politicization of what they call the "rightful heirs of the Revolution," they

also demonstrated that this group identity was neither timeless, preconstituted, nor, in fact, a group.²⁸ Instead, they have shown that the idea of a Mexican peasantry arose after the Revolution, when government subsidies geared toward the countryside enticed former *vecinos*, *agraristas*, and peons to consider and cautiously embrace this new label of campesino. I argue that this active construction of a campesino identity did not stop or slow down for peasants or a mythmaking State as the century progressed; rather, as the term became too loaded, people in the countryside actively sought other, more appealing identities (for example, barbasqueros). Christopher Boyer contends that an “imagined collective heritage of this sort can be a powerful political platform on which to build a new social identity.”²⁹ Thus, the wild yam became a convenient metaphor that politicians, activists, and even painters used to illustrate what Mexico could become. But for many, barbasco was more than a metaphor; it was the means used by campesinos in southern Mexico to creatively attain legitimacy in a changing Mexican society.³⁰ This study spans 1941–89, nearly fifty years of Mexican history, and reflects how global affairs—the Second World War, industrialization, populism, and neoliberalism—through the influence of barbasco, left a particular imprint on the countryside.

Mexicans and Science

The use of barbasco did more than call into question campesino identity. For poor campesinos to be able to extract barbasco from the jungle and deliver it to waiting laboratories required a complex web of local buyers, processors, and liaisons with the pharmaceutical companies that, in some locations, relied on centuries-old networks of trade and preexisting notions of race and class. In addition, skilled Mexican technicians in urban areas were required to carry out experiments to determine the purity of the diosgenin, the chemical compound found in the yams. The grade or value of a given root was measured by its diosgenin content, which varied from 3.5 percent to almost 6.5 percent. The more diosgenin a particular yam held, the more valuable it was. Roots found in and around Tuxtepec consistently yielded an average of nearly 5 percent pure diosgenin. Further up the production chain, Mexican chemists continued experimenting in their search for new, usable products. I am aware of the presence of these hundreds of Mexican men and women in laboratories throughout Mexico, but their story is for another book.

I do allude to the participation of Mexican scientists in exploring how barbasco became the source of study and funding for modern ecology studies in Mexico. In 1959, the Mexican government pressured the pharmaceutical companies to either share private research on barbasco and pay increased taxes for its exploitation or contribute funding to a domestic research commission to study the yam; most opted for the latter. The result, the Commission for the Study of the Ecology of Dioscoreas, became one of Mexico's premier research units and served as a training ground for many of Mexico's current leaders in biology, botany, and chemistry. Although the commission's aim was the scientific documentation of all the yam's properties, the social component of the barbasco trade—the pickers—would eventually garner the interest of the nation.

Barbasco also redefined the landscape because the yams' growth patterns did not respect state borders. During Echeverría's populist administration and at the height of the nationalization campaigns of the steroid hormone industry (1975–77), Mexico's barbasco regions, which encompass several southeastern and southwestern states (Tabasco, Chiapas, Veracruz, Oaxaca, part of Puebla, and smaller regions in México and Michoacán), were divided into six zones, each of which represented a cluster of communities where locals harvested barbasco. The zones mimicked pharmaceutical companies' parcellation of the barbasco-rich lands of southern Mexico in the decades leading up to the nationalization campaign. For example, most of the barbasco harvested in Veracruz before the campaigns was fermented, dried, bundled, and shipped to Syntex in Mexico City. Locals in Oaxaca, however, sold barbasco to buyers for subsidiaries of the German corporation Schering-Plough, while root pickers in Chiapas, Tabasco, and Puebla sent their yams to other laboratories, of Dutch or American origins. In 1975, when the Mexican government intervened, it modeled its own zones on these barbasco clusters. Many of the interviews for this study were done in the compact *Región Tuxtepec* (roughly Tuxtepec to Valle Nacional). So, although political boundaries are one way to approach the study of the impact of barbasco on rural Mexico, I found that analysis centered on the created spaces of production zones and laboratory supply networks offered a stronger focus for seeing the impact of the yam.

By the mid-1970s Mexican politicians linked the arrival of much-anticipated progress (in the form of roads, money, and employment) in the area of Tuxtepec, Oaxaca, to the control of the barbasco trade. By 1975

barbasco, more than any other tropical commodity, appeared to hold the promise of economic and social transformation. What could be more astonishing than a gnarled root containing chemical compounds that, once tweaked, could halt conception or, altered in another way, could alleviate swollen joints? Officials reasoned that if the Mexican government could control the industry, then maybe the countryside could also, like barbasco, be transformed into something more useful.

Many campesinos thought likewise. At a time when Mexico's impoverished and increasingly landless rural inhabitants were seen as proof of the government's inability to fulfill the promises of the Revolution of 1910, many campesinos began to join independent organizations that pledged to restore lands into peasant hands, through violence if needed. Because the Revolution had failed them, some reasoned, they would make their own changes. Hence, barbasco gave the government the opportunity to use the ruling party's tactic of institutional co-optation, linking yam pickers into peasant organizations in areas where the government sought control. These actions confirm that the nation's process of invention did not end with the Revolution, but continued, often in contradictory forms, well beyond the twentieth century.

For a time, barbasco equally gripped the imaginations of both those who embraced the rhetoric of imperialism and those who saw in the wild yam a chance for Mexico to compete on equal footing with nations that produced, not just consumed, science. Barbasco so engrossed the Mexican national imagination that artists and activists produced cartoons, slogans, and even ballads to the wild yam. Even the muralist David Alfaro Siqueiros would immortalize barbasco in a painting, *El tesoro de la selva* (Treasure of the Jungle) commissioned by Syntex Corporation. This painting is now housed in its former headquarters, currently Roche Pharmaceuticals in Palo Alto, California.

A Note on Sources

When framing this project about barbasco and rural Mexico, my initial intention was to use oral histories and interviews only as supporting material to information I would find in the archives, principally Mexico's National Archives (AGN). However, I encountered what many researchers working on Mexico's recent history have found: uncatalogued, misplaced, or missing archives. After several months in Galería 3 of the AGN, I was given permis-

sion to climb to the second floor and personally sift through the documents from President Luis Echeverría's administration, which were mislabeled in the archive guide.³¹ After fruitless months of sorting through several hundred of the almost 5,000 unmarked boxes, I had only a few dozen sheets that mentioned barbasco. During this time, I also interviewed botanists, chemists, and former employees of Proquivemex—following any lead and collecting any personal documents from that time that might help me understand the impact of barbasco in Mexico. I spent time looking in the archives of the Secretariat of Agrarian Reform (Secretaría de Reforma Agraria, SRA) and the National Agrarian Registry (Registro Agrario Nacional, RAN). After a few months, I decided to stop and go instead to Tuxtepec, Oaxaca.

In the information I had found up to that point, various documents mentioned that the Región Tuxtepec contained the richest barbasco in Mexico. Tuxtepec was also the location where, with much fanfare, a government processing plant for yams had been inaugurated with the promise that eventually campesinos would be running it.

A veritable laboratory in the jungle, the Proquivemex plant in Tuxtepec was one of the areas where the impact of barbasco was strong enough to shift the seemingly immobile power structures that had persisted for centuries.

Returning from Oaxaca in 1999, I was fortunate to meet the first director of Proquivemex, Alejandro Villar Borja. He had saved nearly five boxes of company documents. Among these were newspaper articles that had been meticulously cut and labeled, though many were missing page numbers or dates. Not surprisingly, most of the information pertained to the 1975–77 period, the time when Villar Borja had been active in the barbasco trade. He allowed me to photocopy most of his personal papers in exchange for my cataloguing them and creating a database of the records. Years later, in 2004, I would find copies of many of these papers in the AGN.

In addition, I interviewed more than fifty former barbasco pickers and several local *beneficio* (processing plant) owners using a basic questionnaire (see the appendix). I conducted three oral histories, one each in Chiltepec and Valle Nacional, Oaxaca, and in Catemaco, Veracruz. In 1999, 2001, and 2004 I returned to re-ask questions or clarify details with the people I had interviewed. I spent the most time with Isidro Apolinar of Chiltepec, Oaxaca. Apolinar, a former barbasquero, slowly rose up the ranks of local-level barbasco associations to become the treasurer of the national-level

association in the early 1980s. I also interviewed former and current bureaucrats of the state-owned company Proquivemex; officials of the National Peasant Confederation (CNC) in Tuxtepec, Valle Nacional, and Mexico City; environmental research groups (Red Mocaf and Conabio); employees from former and existing federal agencies (Hacienda, FIFONAFE, SAGAR, SARH, SEMARNAP); and several Mexican scientists, including Luis Ernesto Miramontes, co-discoverer of the Pill, members of SEMARNAP (Secretariat of the Environment, Natural Resources and Fishing; formerly Instituto Nacional de Investigaciones Forestales [INIF]); and former members of the Commission for the Study of Dioscoreas. In California, I interviewed George Rosenkranz in Palo Alto, and Arturo Gómez-Pompa in Riverside, and I attempted unsuccessfully to interview Carl Djerassi. Rosenkranz, together with Miramontes and Djerassi, held the patent for the first oral contraceptives; Gómez-Pompa was the first director of the Commission for the Study of the Ecology of Dioscoreas.

The issue of objectivity is a constant for any researcher. When one shares a meal or helps complete a chore so an informant can talk about barbasco, it makes objectivity more difficult. To overcome this, whenever possible, I verified informants' stories. Although my research deepened my admiration for the campesinos of Oaxaca and Veracruz, in this book, I have tried to remain true to my profession and maintain an analytical view. Whenever I discuss someone who was accused of graft or corruption in an interview or archival material, I substitute a pseudonym for that person's name. All my other interviewees gave their permission for me to use their real names.

Most of the interviewees, in both laboratories and the countryside, were male. Given that the most lucrative products derived from barbasco were oral contraceptives, the story would seem incomplete without at least a few female voices. I purposefully sought interviews with campesino women, but these efforts were often thwarted when the husband came to the door and answered my questions. The archival material I reviewed yielded only a few references to women. Clearly, women participated in the barbasco trade, but the dearth of female presence in the historical record reveals the blunt reality of the hierarchy of barbasco production and trade. Nevertheless, barbasco gathering affected the lives of rural women. The historians Francie Chassen-López and Steve Stern, among others, have shown how minor changes, such as a corn mill, altered social relations in the Mexican countryside. So, it is likely that the exploitation of a root that could be

picked equally by men, women, and children had a strong impact on the lives of women in the region. When harvesting barbasco, women would work in groups to dig up the yam, and, in areas where jobs were scarce, to obtain cash on their own. While one can speculate about the levels of independence that barbasco brought to women of the region, these changes were not immediately noticeable during my initial queries into the barbasco trade in 1999.

I did not have a predetermined method for selecting my interviewees for two reasons: First, as a visitor, I did not live in the communities that would potentially give me access to family networks. Second, the sheer quantity of barbasco removed from this region almost guaranteed that everyone of a certain age had at some point gathered, bought, or sold barbasco. Daily, I rode the bus that connects Tuxtepec to Valle Nacional and debarked at various stops, taking footpaths that led to milpas, ranches, or settlements. I would approach everyone I saw, male and female, to ask about barbasco. When I reached communities of a few dozen homes, such as Cerro Concha, I went door to door. Also, in Jacatepec, where I spent much of my time, an owner of a *tiendita* (shop) gave me permission to sit outside his store, and a local resident let me sit on her porch. From those vantage points, I could ask anyone who walked past if they had had some involvement with the barbasco trade. I asked a standard set of questions that sometimes led to lengthier conversations.

Since I had very little documentation, I always ended my conversations by asking if anyone had any papers that mentioned barbasco. It was interesting to see what had been saved: barbasco IOUs from 1975 and the early 1990s,³² as well as a 1976 peasant organization manual and 1967 PRI identity card,³³ handwritten notes on the tons of processed barbasco,³⁴ a roster of barbasco transports (by foot, *chalupa* [raft], or “beast,”)³⁵ and the most intriguing item—photocopies of Proquivemex stocks.³⁶

On two occasions—once in Catemaco, Veracruz, and another time near Jacatepec, Oaxaca—people showed me how to track down and gather barbasco. In Valle Nacional, at the area’s lone surviving facility for processing barbasco, I was allowed to watch men prepare to ferment the root and later rake it on concrete slabs. I filmed nearly fourteen hours of interviews with some of these men and women and reduced it to a thirteen-minute documentary that is available at Geisel Library at the University of California, San Diego.

In addition to the AGN and Villar Borja's personal papers, I used Oaxaca's municipal and state archives and archival material in Mexico City and the Estado de México. In the United States, I relied mainly on archives at the Chemical Heritage Foundation in Philadelphia and in chemist Russell Marker's personal papers in the Paterno Library at Pennsylvania State University.

Given my intent to write this history from the perspective of what happened in Mexico, some readers may find it curious that I spend nearly three-quarters of chapter 2 discussing a chemist from the United States, Russell Marker. I knowingly chose to do so for several reasons. First, Marker was the leading scientist to initiate contact with and rely on campesinos for harvesting the root. Second, his participation in the history of steroid hormone discovery has often been overshadowed by his eccentric nature without acknowledging the impact of his actions in the Mexican countryside. Third, I wished to examine the myth that Russell Marker saw campesinos fling barbasco into a river and was able to grasp its chemical powers from the suds it produced. This falsehood is treated as fact in various books. I argue that Marker, more than many of his contemporaries, understood that a scientist needed to leave the laboratory to develop the field of steroid hormones. Hence Marker, like Mexicans, has not been accurately represented in the history of barbasco.

I must add a note on sources and serendipity. In late 2004 Nora Amanda Crespo, a student I had hired to photocopy items in the AGN, mentioned that she had seen the Proquivemex archives. Having spent months searching for them, I was doubtful. In February 2007, while beginning research on a new project, I asked someone in the AGN Reference Section. He assured me that the AGN did not house that archive. A few days before departing, a young Reference Section employee, Srita. Erika Mosqueda, asked about my previous research project. When I mentioned barbasco she gave me a blank stare, but when I mentioned Proquivemex, she told me that I could find the company archives in Galería 2. She explained that the Proquivemex catalogue (*guía*) did not circulate, but as an AGN employee, she could bring it to me. So, in February 2007, after years of searching, I discovered that several hundred boxes containing the financial and administrative minutiae of the parastatal company had been in the AGN all along. After my initial disheartened shock, I realized that had this information been found earlier, I might never have gone to Oaxaca. I would certainly have written a vastly

different book, one centered on a company and not on campesinos who casually mentioned steroids. Although I looked at several dozen boxes, the entire collection awaits fresh eyes.

The Book's Organization

I have divided this book into nine chapters. In the first I chart the history of the Región Tuxtepec, in particular the area of the Chinantla in Oaxaca's Papaloapan region. Here harvesting barbasco would eventually become so common that even small children would dig up enough to buy their sweets.³⁷ Discussion focuses on the type of labor and crops that were common to the area before barbasco was transformed from a pesky weed into a valuable commodity.

Chapter 2 begins by examining the various pharmaceutical discoveries in Europe and the United States that drove the American scientist Russell Marker to search in southern Mexico for a more reliable source of the raw material for synthetic steroid hormones. In 1944 he helped found Syntex, one of Mexico's leading pharmaceutical companies. The extraction and payment methods Marker established in rural Mexico at that time would persist almost unchanged for more than three decades.

Chapter 3 details how the inhabitants of the Chinantla learned from outsiders that laboratories were buying wild yams by the sackfuls, and how these campesinos began to track down and process barbasco. Everyone—women, men, and children—could harvest barbasco, though it was mainly men who ventured into the jungle thickets in search of the root.

Chapter 4 addresses the role of science in Mexican politics and follows the building of the Mexico-based steroid industry with the participation of an ever-growing number of foreign companies. After the synthesis in 1951 of cortisone based on barbasco, the most prominent pharmaceutical houses in the world anchored subsidiaries in Mexico. As these companies became more powerful, the Mexican government attempted to regulate the barbasco trade. One result of these regulatory efforts was the government's creation, in 1959, of the Commission for the Study of the Ecology of Dioscoreas, which was wholly funded by multinational foreign companies but run by Mexican scientists. Mexico's scientific community was initially unaware of the importance of barbasco and its ecology. That resulted in a race between Mexicans and foreign researchers, in which Mexican scientists were spurred on and eventually surpassed foreign efforts.