Introduction
Geology and West African History

On a cloudless afternoon in June 2017, three Senegalese geologists visit the edge of the exploration permit of their employer, the small Australian gold-mining firm Bassari Resources.[1] The permit sits in the region of Kédougou, in southeastern Senegal, bordering Guinea and Mali. More than three-quarters of the region's surface area, which stands at over 16,000 square kilometers, is covered by gold-exploration permits and mining concessions. These geologists spent nearly a decade modeling the scope and concentration of gold within a dense basalt rock gold deposit known as Makabingui. Formerly a Maninka place name for a small stream, Makabingui now names a roughly one-million-ounce gold deposit lying directly underfoot. The geologists oversee the work of a Canadian firm subcontracted to diamond-drill core samples to reveal the mineral profile of soils hundreds of feet underground. The field is ochre red from iron-laden soils oxidizing in the savanna heat. Stripped of all foliage, the earth looks exposed and moonlike.

The muddy field is all that remained of the "battle for Makabingui," a conflict that waxed and waned between the Australian firm and so-called artisanal miners—known as *orpailleurs* in Francophone West Africa—for several years.[2] The battle reached a crescendo in 2011 as the firm intensified its exploration of Makabingui. At the time, orpaillage was expanding to unprecedented scales in Kédougou. The region has a history of seasonal gold mining, excavating shallow pits with iron picks, dating to the medieval period. In the 2000s, orpaillage in Senegal was becoming more capitalized and mechanized. Emigrants from Senegal living in Spain and France sent gold detectors and hydraulic drills to brothers back home. With mortar pickers and dynamite, multiethnic teams of orpailleurs excavated deposits, such as Makabingui, that were impervious to hand tools. Bassari Resources lobbied the Senegalese state to expel the orpailleurs from their permit, claiming

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Figure I.1 A portion of Makabingui after it was bulldozed. Sambaranbugu, Senegal, 2014. Photograph by the author.

that "illegal miners" were "eating away" at its mining prospect. In late 2012, the Senegalese army bulldozed Makabingui (figure I.1). Months later, orpailleurs reoccupied the deposit. In 2014, the state directed a second fleet of bulldozers to Makabingui and installed a gendarme post in a shipping container to guard the field.[3] As of this writing, the Senegalese state has approved a concession to exploit Makabingui as an open-pit mine, the third of its kind in Senegal. Meanwhile, orpailleurs have turned to other deposits in Kédougou.

The Australian firm won the battle for Makabingui, but the war for the future of hundreds of goldfields in West Africa is ongoing. Senegal sits on the western edge of a geological formation known as the Birimian Greenstone Belt. Created between 2.2 billion and 2.1 billion years ago, Birimian rocks contain many of the region's gold, iron, and diamond deposits. Since the late 1990s, a gold-mining boom has been gaining speed across West Africa's Birimian rocks. It was born of a conjuncture of rising gold prices, the widespread adoption of pro-market mining codes, and new mining technologies that reduced reliance on local labor and infrastructure. Mining firms based in former British settler colonies—the United States, Canada, Australia, and

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South Africa—sought new outlets for their skills and capital in Africa. By the early 2000s, Guinea and Mali were among Africa's top gold producers, with Burkina Faso close behind. Senegal opened its first open-pit mine in 2008.

In promotional films targeted to investors, exploration firms and mining companies promote savanna West Africa as an "emergent" and "virtually underexplored" gold belt. Such phrases are paired with descriptions of the region as "sparsely populated," suggesting the possibility of extraction with minimal human interference. This is an aspiration to removal from the social world in which these gold deposits are embedded.[4] But talk of undiscovered riches lying in wait maps poorly onto a region where men and women have been mining, processing, and trading gold for more than a millennium. Kédougou occupies a Birimian formation that geologists call the Kédougou-Kéniéba Inlier (KKI).[5] The KKI aligns with an ancient gold-producing province known in medieval Arabic chronicles as Bambuk (map I.1). By the ninth century, gold from Bambuk was sold to camel caravans across the Sahara Desert, fueling the rise of West African empires and furnishing the mints of Mediterranean city-states until the European encounter with the Americas in the fifteenth century.

Gold is also integral to the histories of lineages and clans that settled Bambuk in search of fresh gold deposits of their own. When famine and war depleted granaries, gold was bartered for grain. In the fifteenth century, hope of accessing the fabled goldfields of Bambuk enticed Portuguese sailors to navigate down the West African coast. Decades later, this seaborn encounter set the transatlantic slave trade in motion. In the nineteenth century, the French empire united the goldfields of the West African savanna under a new foreign power. French ambitions to transform Bambuk into the "Californie" of France motivated conquest campaigns and shaped imperial mining policies. This is not a new mining frontier. It is a very old one, carved open by generations of West Africans.

A Ritual Geology situates what economists have coined the "twenty-first century scramble for Africa's resources" within two intertwined histories.[6] The first thread documents how the French colonial state, and its postcolonial successors, regulated orpaillage while also profiting from the gold discoveries of West African miners. African mining economies, I argue, were central to the emergence of modern exploration geology in West Africa. This claim inserts struggles over mineral discovery into the history of mining capitalism in Africa, a field that has studied African miners as laborers and victims of land alienation, but rarely as intellectual actors. The second thread of this book concerns how West African societies have cultivated

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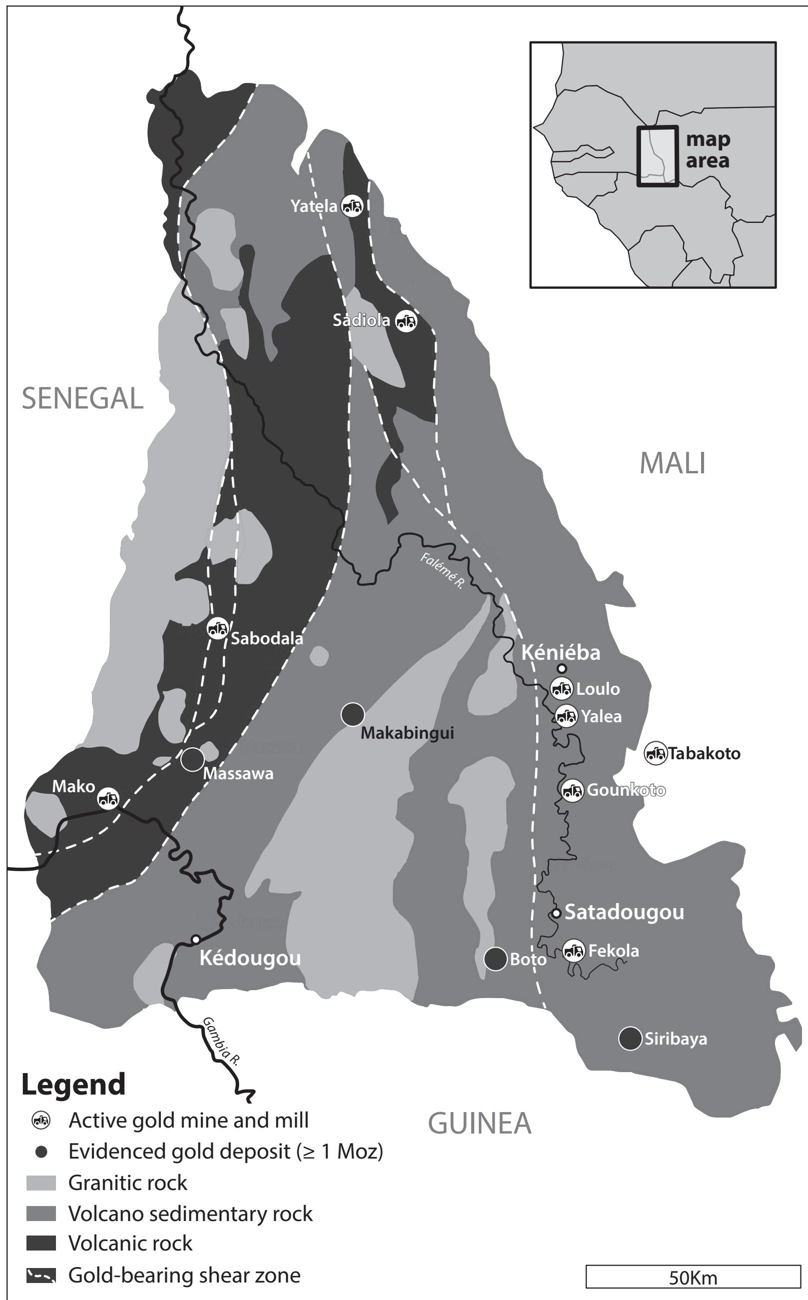

Map I.1 Major gold mines and prospects on the Kédougou-Kéniéba Inlier, which aligns with the historical gold-producing region of Bambuk.

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knowledge about the underground, made claims to mineralized land, and managed gold mining and trade. By the time of French colonial conquest, orpailleurs elaborated a "ritual geology" across the Birimian rocks of savanna West Africa. I define a ritual geology as a set of practices, prohibitions, and cosmological engagements with the earth that are widely shared and cultivated across a regional geological formation. I draw my concept of "ritual" from the work of the late religious studies scholar Catherine Bell, who understood ritual as a category of practice that can be sacred or nonsacred in form. Orpaillage shares a number of attributes that Bell identified for rituals in other contexts. They include an organized set of expressions or gestures or a code of communication; the attempt to demarcate, and to make activities consistent with, preceding cultural practices; rules that are imposed on, and meant to restrict, human action and interaction; and shared symbolism that is sacred in nature.[7]

West Africa's ritual geology is neither monolithic nor static. It is similar to a language family with many varieties: some are mutually intelligible, others share only core vocabularies and grammatical forms. Languages shift over time from the innovations of their speakers, encounters with new languages and ecological change, among other factors. West Africa's ritual geology has also evolved and adapted to different corridors in response to shifts in regional markets, migration, and the arrival of tools from elsewhere on the globe.[8] In its various iterations, this ritual geology has shaped how Africans governed mineralized land and people, including miners, traders, state makers, and earth scientists. Scholars have glimpsed the edges of this ritual geology. But studies bound by region, colony, ethnic group, or nation-state have failed to capture the spatial and temporal breadth of this regional phenomenon. By placing data from my research in dialogue with historical, archeological, and ethnographic studies from across the Sahel and savanna, this book models a new regional approach to African history: one centered on geology.

I also explore how different groups in West Africa mobilize the past to make claims to gold-bearing land to the state, to one another, and to corporate capital. To demonstrate precisely how the past resonates in the present, I move across several temporal and geographic scales. My account begins and ends on the goldfields of Kédougou in the 2010s, when I carried out ethnography, oral histories, and archival research. I weave these sources together to explore the history and active life of orpaillage in southeastern Senegal, a region that is central to the history of gold in West Africa.[9] The book's middle chapters open onto the goldfields of modern Guinea, Mali,

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and Senegal from the medieval period to the Atlantic age through the French occupation of the western savanna in the late nineteenth century. I then track attempts by the French colonial state, and independent West African states, to profit from orpaillage as a source of revenue and subterranean knowledge, while excluding agrarian residents from durable rights to minerals.[10] This project is framed by the ongoing corporate enclosure of West Africa's goldfields, which threatens the future of one of the world's oldest indigenous gold-mining economies. Thus, this book is also an account of the meaning of history in an urgent present.

Making "Artisanal Miners"

For centuries, orpaillage has been an engine of trade, a famine resource, and the platform for a multiethnic, seasonal urban form in agrarian West Africa. Orpaillage was also the largest mining industry of France's West African empire until the 1950s. Yet until recently, it was the subject of only a handful of articles.[11] Orpaillage has been occluded from the historical record by enduring representations of African-controlled mining economies—by states, international agencies, and the media—as backward, primitive, and criminal. This problem has long haunted the study of technology in Africa. Two decades ago, it was possible to claim that Africa had been excluded from global histories of technology except as a victim of European technological imperialism or as a recipient of technology "transfers" from elsewhere.[12] Fortunately, this is no longer the case. Studies of uranium mining, oncology, car repair, moneylending platforms, firearms, hunting, and healing plants have placed Africa at the center of global networks of innovation.[13] This scholarship resonates with decades of archeological research documenting the sophistication of African metallurgy, plant domestication, and food processing over the past two millennia.[14] While scholars have refuted assumptions of primitivism in African technological practice, we have only begun to interrogate how "technical" categories themselves may perpetuate these characterizations. It is precisely because technical categories appear natural—and thus beyond the realm of public debate—that they are such powerful instruments for shaping the world in their image.[15] "Artisanal mining" is one such category.

What is artisanal mining? States, international agencies, and mining firms define the term according to different characteristics: techniques ("low tech"), labor requirements ("no mechanization" or "labor-intensive"), or legal status ("absence of formalization," "illegal," or "lack of adequate reg-

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ulatory framework").[16] A World Bank report released in 2009 describes it as mining that relies on "low investment, labor intensive local production, informality, as well as no or low levels of mechanization."[17] These reports are not transparent accounts of technological practice. Rather, they define the artisanal miner in relationship to an implied counterpart: the industrial miner. In colonial Africa, the industrial miner was racialized as a white European and gendered as male. This colonial binary is perpetuated in contemporary policies and descriptions of mining practices around the globe.

artisanal miner = third world, illegal, primitive, local, customary, Black/Brown

industrial miner = first world, legal, technologically advanced, global, modern, white

The precise terms attached to these categories have shifted across time, inflected by new laws and linguistic norms. In much of Africa, the category of the artisanal miner emerged from colonial-era laws regulating "customary mining," a racialized legal framework applied only to the extractive activities of African subjects.[18] In the mid-twentieth century, as African states were gaining independence, the term *artisanal* replaced *customary* in mining. Many twenty-first century media and policy reports still describe artisanal mining as "primitive" and "simple," evoking tired colonial tropes of technological backwardness and primordialism. This is not a coincidence. Artisanal mining remains concentrated in the formerly colonized world: Africa, Southeast Asia, the Eurasian Steppe, Oceania, and Latin America. While artisanal mining is certainly associated with enduring agrarian poverty in these regions, it is also the outgrowth of an unfinished struggle over mineral rights that began with the colonial enclosures of mineralized land. Similar to poaching, artisanal mining is a category of technological practice produced by property laws that sought to legitimize certain uses of nature and to criminalize others.[19]

Artisanal mining forces difficult questions onto the table. Unregulated labor-intensive mining contributes to deforestation in the Amazon; child trafficking in coltan mines in the Democratic Republic of Congo; and the methylmercury contamination of groundwater around the globe.[20] At the same time, artisanal mining offers a pathway out of poverty for many rural citizens, an alternative to soil-depleting cash cropping or migration to megacities (figure I.2).[21] Artisanal mining is unlikely to go away anytime soon, a fact recognized by the World Bank and the United Nations. After decades of

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Figure I.2 Orpaillage team in Tinkoto, Senegal, 2014. Photograph by the author.

funding programs designed to discourage or to create alternatives to artisanal mining, these organizations now pledge millions of dollars to formalize the sector in the global South.[22] In a sign of just how far the negative media image of artisanal mining has come, in 2017 *The Economist* published the article "In Praise of Small Miners," which celebrated artisanal mining for creating jobs in "some of the poorest places on earth" at a pace that far outstripped jobs generated by corporate mines.[23] Some scholars even suggest that artisanal mining, as a citizen-led counterpart to corporate mining, is a democratizing political force.[24]

Reassessments of artisanal mining as democratic and innovative—in contrast to the destructive forces of corporate mining—reverse the values of the artisanal-versus-industrial binary while leaving the binary itself intact. This binary is reinforced by scholars who tend to study either industrial or artisanal mining. Ethnographies of extraction in twenty-first-century Africa illustrate this point. On one hand, there is a rich stream of ethnographic literature on the technical, fiscal, and moral arrangements of corporate mining in Africa.[25] Meanwhile, a separate group of ethnographers examine forms of economic subjectivity, consumption, and masculinity in unregulated mining sites.[26] However, beyond a handful of articles on conflicts between artisanal and corporate gold miners, these studies do not address the historical rela-

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tionship between artisanal and industrial mining.[27] The result is a problem of representation, to extend a critique the historian Steven Feierman once waged against studies of capitalism and Christianity in Africa.[28] Studies of corporate and artisanal mining in one African locale or another are often aggregated only on the basis of their shared relationship to neoliberal market reforms, a rise in global consumer demand for minerals used in smartphone manufacture, or the vertical integration of multinational mining corporations. The "African" side of the equation remains local and fragmented: a case study, but not the heart, of a global story.

This book challenges the reification of industrial and artisanal mining through the work of history. It does so by situating colonial and contemporary Euro-American mining ventures within the unfolding cultural and technical practices of orpaillage, a regional mining tradition that has flourished on the West African savanna for two millennia. The term *tradition* is a contested one in African history. Colonial officials often described African traditions, more often glossed as "customs," as static practices tied to rural, ethnic spaces. I draw on a very different concept of tradition, defined by the historian Jan Vansina as "a collective body of cognitive and physical representations shared by their members."[29] Drawing on a deep time study of the "Rainforest Tradition" of Bantu-speakers in the Congo basin, Vansina argued that traditions are a dynamic constellation of practices and beliefs inherited and transmitted from one generation to the next through narratives, political institutions, rituals, and bodily praxis. Far from preserving a set of timeless or rote practices, traditions require autonomy and the capacity to change. Once born, traditions can endure for millennia. But they can also die when the fundamental principles of the tradition are abandoned by its carriers in favor of another one.[30] Vansina's formulation provides a framework to compare traditions from around the globe in a meaningful, nonhierarchical fashion. We can, for example, compare elements of the Abrahamic religious traditions to those of Congo's Rainforest Tradition, which flourished from 500 to 1900, when the cumulative effects of the Atlantic slave trade and colonialism led to its demise.

While Vansina's Rainforest Tradition incorporated many dimensions of productive and ritual communal life, my notion of a mining tradition is more constrained in scope. It refers to the collective body of cosmological engagements, epistemic orientations, and physical practices tied to prospecting, extracting, and processing minerals. A mining tradition is a scientific tradition—one that entails, as all historical scientific traditions do, distinctive ritual and cognitive engagements with the physical world.[31] I have chosen the

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French word *orpaillage* to describe this West African mining tradition despite the term's colonial origins. In the eighteenth and nineteenth centuries, French explorers and traders plying the Senegal River used the term to gloss the diverse activities relating to prospecting, excavating, and processing gold carried about by African miners in Bambuk. By the beginning of the twentieth century in metropolitan France, the term *orpailleur* referred to what is known as gold panning in English: the separation of gold flakes from soil by hand.[32] In French West Africa, however, the term was racialized. Colonial officials called Africans orpailleurs and Europeans miners (*mineurs*), even when Africans excavated underground tunnels and Europeans panned for gold. However, in recent decades in Francophone West Africa, the valence of the term has shifted as men and women have adopted it to describe their work. Today, the male-gendered term *orpailleur* is used by men (and many women) who consider orpaillage their occupation. Following their lead, I use the term *orpaillage* to refer to the dynamic West African mining histories of which these individuals are part.[33]

I have identified five broad characteristics that constitute the mining tradition of orpaillage in West Africa as it has been practiced over the past several centuries. First, orpaillage is carried out geographically on gold-bearing Birimian rocks on the savanna, a bioclimatic zone to the south of the Sahel. Much of this region came under French colonial rule in the late nineteenth century. Second, orpaillage is organized around a loose set of political and ritual organizations that are understood by its practitioners as ethnic Maninka in origin. Maninka is a language variety of Manding, a language continuum spoken by upward of thirty million people in West Africa that includes Bambara, Maninka, Mandinka, and Jula.[34] *Maninka* is also an ethnonym used by speakers of this variety, most of whom claim heritage from the thirteenth-century Malian empire. By the eighteenth century, Maninka was a lingua franca in gold-bearing regions of Senegal, Mali, and Guinea.[35] Third, gold is considered the property of underground spirits. This is a central tenet of West Africa's ritual geology, which I return to later. Fourth, orpaillage is a spatially extensive mining tradition based on seasonal mobility. Archeological evidence of alluvial gold mining confirms that contemporary spatial practices of orpaillage are of some antiquity.[36] Communities of miners have tended to mine a given deposit for several weeks, or months, before moving to a new goldfield. Orpailleurs often returned to abandoned deposits in later years after heavy rains redistributed gold flakes in the substrata. This practice mirrors the logic of shifting cultivation, an agricultural system practiced widely on the savanna, whereby

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farmers clear forest and cultivate a plot of land for several years before leaving it fallow for seven years or more.[37] The extensive character of orpaillage contrasts with capital-intensive mining, which aims to deplete gold entirely from a parcel of the earth.

Fifth, orpaillage is an incorporative institution adapted to cyclical drought. Mining sites across the savanna have long welcomed strangers, and hosting was a reciprocal expectation. Many West African societies place a high value on strangers, one ideological repercussion of the fact that labor, rather than land, was often the limiting factor to production.[38] But hospitality on the goldfields was also tied to the importance of gold as an agrarian resource during times of drought and famine.[39] Gold was an open resource, available to anyone willing to mine it. If goldfields near home became depleted, one could migrate to a distant goldfield and expect to be welcomed. While some lineages specialized in orpaillage, it was never the exclusive purview of a single craft, ethnic, or religious group.[40] This distinguishes orpaillage from iron smelting, wood carving, and leatherworking: occupations carried out exclusively by craft specialists in savanna West Africa since the medieval period. Orpaillage did attract particular segments of the population and not others. It was, and remains, physically arduous and dangerous labor performed during the hottest time of the year, when temperatures can reach 120 degrees Fahrenheit. Elites opted out of mining, and so did Muslims, for reasons elaborated later. The poor, practitioners of African religions, and the formerly enslaved dominated orpaillage because they lacked the capital to pursue other activities. The importance of orpaillage to agrarian life in West Africa has waxed and waned with shifting regional ecological circumstances and fluctuating prices for gold on global markets (figure I.3).

Neither orpaillage nor the mining techniques of visitors to West Africa's goldfields were a hermetically sealed system. For centuries, orpailleurs have incorporated efficacious techniques from other global mining traditions they encountered. These include metal balances and numismatic systems from medieval North Africa; river-damming techniques from colonial-era French prospectors; and cyanide heap leaching from chemists working for multinational mining operations in the early 2000s. West African miners have also exchanged techniques with one another across vast geographies. During the Atlantic period, mining techniques from the southern forests of modern Ghana spread into parts of Burkina Faso, just as Muslim measuring systems for gold dust and Manding-derived mining vocabulary appeared in Akan language varieties spoken in Ghana's gold-rich southern forests.

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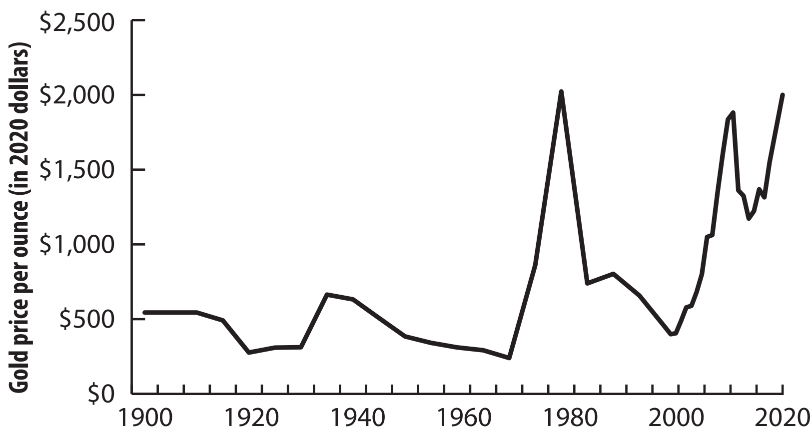

Figure I.3 Gold prices, ca. 1900–2020.

Scholars tend to frame mining corporations as transnational, operating at a more encompassing spatial scale than artisanal mining, which is described as community-based, grassroots, and local.[41] But the technological and financial networks of orpailleurs span the globe, similar to those of corporate miners. Since the ninth century, West Africa's gold has reached across the Sahara and into the Arabian Peninsula. Today, orpaillage is supported by manufacturing hubs and trading diasporas in Dubai, Delhi, and Amsterdam.

Much of the knowledge produced and transmitted by orpailleurs is embodied. This includes techniques of digging, winnowing, and smelling the earth for gold. It also entails embodied philosophies of human-spirit interactions, such as stories of the bones of suffocated miners turning to gold underground (chapter 7). Orpaillage invites comparisons with modes of knowledge embedded in African art—the subject of a rich scholarship in its attention to skill, form, and knowledge transmission.[42] Approaching orpaillage as both an economy and an art allows us to see how orpailleurs creatively combined dynamic West African techniques and ritual complexes tied to Birimian rocks with innovations from elsewhere. The result, to quote the art historian Chika Okeke-Agulu, are "messy, fraught, and inevitably distinctive" forms of extractive practice and political subjectivity.[43]

The material distribution of gold in West Africa has facilitated the emergence of widespread ritual and social institutions tied to orpaillage.[44] In Birimian rocks, gold is found in either secondary or primary deposits. In primary deposits, gold is amalgamated to other minerals in lode ore. The

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weathering of primary deposits creates secondary ones as gold flakes are dislodged from ores, transported through the water table, and redistributed as "free" particles among sands, silts, and sediments. African farmers and hunters glimpsed gold flakes in plant roots and along streams after a hard rain. For much of the past millennium, orpailleurs excavated placer deposits on riverways or desiccated paleo-channels covered by a few meters of sterile rock and sand. Mining alluvial gold requires minimal processing, making the activity accessible to men and women, the elderly, the young, and the disabled. The ubiquity of gold prevented a single sovereign or state from monopolizing this resource. Control over goldfields was decentralized, and gold was incorporated into the aesthetics and cosmologies of diverse West African societies.

My approach to orpaillage—as a regional mining tradition with considerable historical continuity—is not one-size-fits-all for studies of artisanal mining economies. In India and Mongolia, for example, most artisanal mining is recent, with few linkages to historical modes of income generation.[45] There are important distinctions within Africa, as well. In South Africa and Central Africa, where industrial-scale mines have operated for over a century, scholars have analyzed the recent growth of artisanal mining through the lens of postindustrial ruination and post-wage work.[46] By contrast, there was very little capital-intensive mining in savanna West Africa until two decades ago. Wage work has always been the exception, not the norm. African-controlled orpaillage was the dominant mode of extraction. Such divergent historical trajectories require different genres of narration. Indeed, any activity that more than one hundred million people around the globe rely on as their primary source of income has many stories to tell. This book is not a universal tale; it is a regional one grounded in West Africa's Birimian rocks.

Searching for Subterranean Knowledge

A Ritual Geology trains its focus on the decades—centuries, in some cases—of mineral exploration that precede the opening of a mine, whether corporate or artisanal in scope. This approach departs from most scholarship on mining in the global South, which examines the extractive process itself or the social life of decline "after the rush."[47] It is during exploration, I argue, that the expectations and grievances for future extractive projects take shape in the political imagination and in modes of storytelling.[48] Resource exploration is uneven and time-consuming, contingent on capricious

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market conditions and luck. Geologists can spend decades studying a zone before a mine is established, and most exploration projects never identify a mine-worthy prospect. This uncertainty, paired with the latent potential of discovery, shapes the sociology of the spaces where mineral research is concentrated.

Southeastern Senegal is a place where histories of mineral research have accumulated on the landscape, in individual biographies, and in the settlement narratives of villages. The search for gold in this region has unfolded on multiple temporal horizons. Maninka lineages have searched for gold for generations, transmitting techniques for gold prospecting to their children. Knowledge of surface and subsurface gold mineralization is recorded through bodily praxis, the deft manufacture and use of locally forged tools, and storytelling embedded in features of the landscape and family genealogies. As early as the seventeenth century, European explorers traveled to Bambuk to document the location of "native mines" and observe the techniques of African miners. During French colonialism, and after West African states gained independence, geologists hired by states and private companies continued to shadow orpailleurs to generate baseline data for geological maps (see chapters 4 and 5). Shadowing rarely produced immediate discoveries. Resource exploration was slow and cumulative. Rising metal prices attracted new generations of geologists who updated old maps with geochemical and aeromagnetic techniques. Some villages in Kédougou have hosted mineral exploration camps for six decades. While the personnel and names of firms have changed, exploration has continued, animating expectations for a future mine.

This book is one of the first sustained accounts of the central role of African mining expertise in geological exploration in colonial and postcolonial Africa (figure I.4).[49] In recent years, the history of science has expanded beyond its conventional geographic focus of Europe and North America to document the contribution of non-Western experts to scientific discoveries formerly credited to the "West." We have learned that many technical innovations passed off as European were, in fact, the hybrid product of cosmopolitan "contact zones" populated by Asian, Indigenous North American, Caribbean, and African healers, traders, farmers, and blacksmiths.[50] For colonial Africa, it is now well established that European agronomists, ethnographers, botanists, and cartographers garnered methodological and conceptual insights from African healers, assistants, hunters, and translators "in the field."[51] In a parallel vein, scholars of the Atlantic world have documented that Africans contributed not only brute labor to plantations

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Figure I.4 Moussa Diba, geologist-engineer and exploration manager of Bassari Resources, examining a rock specimen. Duuta, Senegal, 2017. Photograph by the author.

in the Americas but also expertise in pharmacotherapies, rice farming, and animal pasturage.[52] A similar consensus is emerging in studies of how African healers shaped medical practice on a global scale through their work on slave ships and in ports across the Atlantic world.[53]

While historians have shown that Africans were always part of global scientific production, they have attended less to how laws determined the benefactors of epistemic exchange under conditions of sustained inequality.[54] An exception to this in African history are studies of the exchange and appropriation of botanical knowledge, or "bioprospecting." Patents have enabled some scientists and corporations, including African ones, to claim ownership over healing formulas to the exclusion of others.[55] Questions of discovery are rarely straightforward. For example, in tracing the journey of healing plants from Africa into pharmaceutical formulas, the historian Abena Dove Osseo-Asare contrasts the "fragmented, synchronous stories of shared creation" of plant knowledge produced through the interactions

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of African healers, scientists, and corporations with narratives of "priority" that insist with certitude that "we know the time of each discovery."[56]

The parallels with mineral discovery in Africa are remarkable. Most European mining enterprises in colonial Africa began as "takeovers" of African mines, followed by an investment in capital. This was the case for gold-mining industries in nineteenth-century South Africa and Ghana and tin mining in the early twentieth century on the Jos Plateau of Nigeria.[57] Despite the ubiquity of these practices, political struggles over mineral discovery are largely absent from histories of mining in Africa, which are focused on capitalist expansion, the exploitation of land and labor, and the emergence of collective and ethnic politics in mining towns.[58] Of course, many Africans were exploited workers in colonial-era mines. But others generated scientific knowledge on which industrial mines depended—a fact elided in the historiography. Regional divergences in mining developments and mineral laws may account for this oversight. Many southern African colonies outlawed mining by Africans and alienated land, forcing Africans to labor on European-owned mines. But not all colonial regimes criminalized mining by Africans. Colonial officials in French West Africa encouraged orpaillage, relied on African authorities to manage gold mining, and profited by taxing the gold trade and exports.

In tracking how orpaillage shaped exploration geology, this book also examines how West African societies give political form to geological processes.[59] Historians and archeologists have shown how African societies managed two-dimensional geographic space. Examples include accounts of road making by the Asante kingdom and the organization of sacred space in the stone architecture of medieval Zimbabwe.[60] Studies of cartography reveal how colonial and postcolonial African states used maps to rationalize landscapes for taxation, to segregate European settlers from Black Africans, and to fix pastoralists and mobile agriculturalists into place-bound "ethnic groups."[61] By contrast, there are few accounts of how African polities, lineages, or individuals managed three-dimensional resources, such as water, mineral reserves, and airspace. Historians of Africa could benefit from engaging with an emergent literature in critical geography on "vertical geopolitics."[62] Research on "volumetric" qualities of state territory—the management of aquifers and underground tunnels; the mapping of subterranean minerals—challenges the horizontal orientation of most theories of state and corporate power.[63] These issues are of particular interest in Africa, where the capacity of the state to conduct geological surveys was historically weak. At the same time, the continent is home to rich regional traditions of

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mining and well digging that have rendered the subsoil knowable, calculable, and subject to competing use rights. The history of how African societies have come to know the underground remains to be written.

I use the term *geology* in this book in two registers. For one, I discuss geology as a scientific discipline and geologists as trained professionals in this field. As an academic field that coalesced in Europe in the eighteenth and nineteenth centuries, geology deals with the history of the earth and its life, especially as recorded in rocks and sedimentary strata. Second, I use the terms *geology*, *geologic*, and *geological* to describe the actual physical formations and processes of the earth. Examples includes the "geology of Senegal" or the "geologic maps of West Africa." The concept of a ritual geology falls into this category. Of course, the two meanings of *geology* are interrelated. As the geographer Kathryn Yusoff argues, the nomenclature used by the discipline and practice of "White geology," as Yusoff calls it, took shape in racist imperial formations, where geology was built on the idea of the inhuman that "doubled as a notion of property." Yusoff calls on scholars to develop a "different economy of description that might give rise to a less deadly understanding of materiality."[64] I heed this call by centering how West African orpailleurs themselves named and modeled the underground. In so doing, they shaped the methods of what became known as the discipline of geology, though often not on terms of their own choosing.

Pagans, Muslims, and Birimian Rocks

Another conceptual thread of this book concerns the sacred engagement of West African societies with geological formations—in this case, Birimian rocks (map I.2). Despite a renewed interest in the role of West Africa's gold in early globalization and trade, we have few accounts of what gold and gold-bearing land meant to the region's miners.[65] The diverse communities who mined gold over the past two millennia practiced ancestral religions, Islam, and blended religious traditions. But by the eighteenth and nineteenth centuries, a set of practices, prohibitions, and cosmological notions were shared broadly by gold miners that formed a regional "ritual geology." Since the medieval period, there is evidence that orpaillage was predicated on a sacrificial exchange relationship between orpailleurs and territorial spirits, considered the guardians of this metal (see chapter 2). Another tenet of the ritual geology of West Africa's Birimian rocks is an ideological opposition between gold mining and Islam. By the eleventh century, many ruling dynasties on the Sahel had converted to Islam, strengthening bonds of trade,

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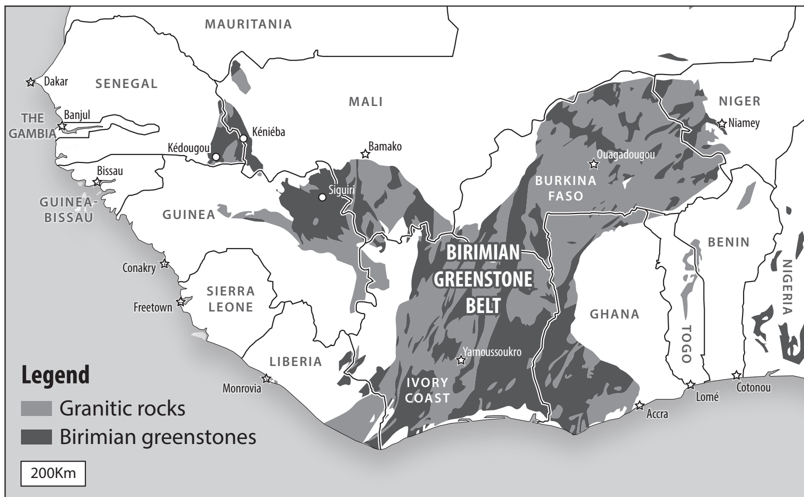

Map I.2 West Africa's Birimian Greenstone Belt.

scholarship, and law across the Sahara. However, for centuries—and well into the twentieth century in some corridors—gold miners on the savanna resisted Islam and overrule by Muslims. This earned orpailleurs a reputation as *pagans*, a term I use in this book to gloss the views of African and non-African Muslims toward practitioners of *ancestral religious traditions*.[66]

Geology played a role in the religious history of gold-producing zones. The same geological processes that injected gold veins into quartz rock generated rocky soils and rock escarpments. This land was undesirable to centralized states that relied on agricultural surplus. Birimian formations resembled what the political scientist James Scott calls "shatter zones:" isolated and hostile terrain settled by people fleeing state-making projects.[67] Goldfields became dominions of ancestral religious traditions and spaces of ritual innovation as refugees fleeing Muslim overrule settled on Birimian rocks, intermingled, and created new religious traditions.[68] Opposition to Islam on the goldfields may have been grounded in a desire for religious autonomy, a mode of resistance to becoming an economic subject of the state, or both. While the ritual cosmology of orpaillage was marked by opposition to Islam, the two deeply influenced each other.

Attention to the dialogical relationship between geology and religious practice generates new spatial units of analysis for environmental history.[69] Oceans, archipelagos, and river basins feature prominently in the subfield.[70]

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But historians of the environment have yet to explore how geological formations shape political and religious life. Scholars of mining have long documented the saturation of mining tunnels and quarries with ritual protocols.[71] For much of recorded history, mining has been associated with risk, luck, and proximity to the underworld of the Abrahamic tradition and other "earth-beings" who occupy mineral-rich mountains.[72] But studies of mining have tended to center on a single mining site, ethnic group, or urban center. A focus on narrow spatial corridors can miss broader regional patterns. Do geological formations generate a material platform for the exchange of sacred engagements with the earth? Are some ritual practices tied to mining shared across geological belts as ideas and practices are passed from one mineral deposit to another? I address these questions by framing orpaillage as a regional institution that developed in dialogue with Birimian rock formations.

In narrating this history, I draw inspiration from Walter Rodney's work on the Upper Guinea Coast and Boubacar Barry's on Greater Senegambia. These historians pioneered regional approaches to West African history by tracing the spatial connections forged by African traders, political and religious movements, and the social sinews formed across river basin ecology.[73] The scale of their work was political. It challenged the tendency of ethnographers to study individual "tribes" in relative isolation from one another and of historians to project the borders of colonial and independent African states onto the precolonial past. Following Rodney and Barry, the geographic scope of this book emerges from tracking the movements of orpailleurs, their rituals, and their techniques across the savanna.

West Africa's ritual geology challenges the common historiographical framing of ancestral religious practices in West Africa as more localized than their implicit counterparts: Islam and Christianity.[74] Over the past decade, scholars of Islam in West Africa have adopted broader regional and temporal scales to demonstrate how West African Muslim clerics, Qur'anic schoolteachers, and empire builders shaped the broader Islamic world and created expansive Islamic-based religious movements and forms of embodied knowledge.[75] But Islam was not the only religious tradition that traveled in medieval or Atlantic-era West Africa. By the Atlantic age, and likely earlier, ritual institutions tied to orpaillage were spread along goldfields from Senegal in the east to Burkina Faso in the west. These ritual complexes were not "local," even though local conditions shaped dimensions of their practice. Jean Allman and John Parker argue a similar point in their history of Tongnaab, an ancestor-deity of Tallensi origin. In the early twentieth century, Tongnaab spread southward from the savanna to the Akan forest

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and trading towns of the Gold Coast, where it became a powerful witch-finding deity. As Allman and Parker argue, indigenous African gods and their congregations, far from being a "localized phenomenon rooted in a fixed ritual landscape," evolved across "great distances and transcended a variety of political, cultural, and ecological frontiers," as did Christianity and Islam.[76] A similar dynamic of "trans-regional ritual dialogue" was at play on the goldfields. However, in contrast to Tongnaab's spread over several decades, this ritual geology spread piecemeal across centuries and left sparse records. West Africa's ritual geology fell short of constituting a "religion" in its own right, as it was never united by a single prophet, medium, shrine, or liturgical tradition. Orpailleurs, blacksmiths, and traders participated in it, but they did not identify with gold mining as a religious category of belonging. The ritual geology of the savanna was eclectic, adapted to different gods and social circumstances.

Kédougou, Senegal

The goldfields of Kédougou, Senegal, are the vantage point from which I narrate this regional history of struggles over mineralized land.[77] Situated in the country's southeastern corner, Kédougou is a geological and cultural anomaly within modern Senegal. Much of Senegal sits less than three hundred feet above sea level. Senegal's landscape is sparse and flat, covered in young sedimentary depositions of silty gray soils spread from the Atlantic coast across the middle belt of the country, known as the peanut basins. These silts supported the peanut export economy of colonial Senegal and make up the cultural heartland of Wolof-speakers and the Muslim Sufi order of the Muridiyya, or "Mourides."[78] By contrast, Kédougou occupies ancient gold-bearing Birimian rocks and is bordered to the south by the foothills of the Fouta Djallon mountains. It also occupies the headwaters of the river basins of the Gambia and the Falémé, a tributary of the Senegal River that marks Senegal's border with Mali (map I.3).

Though Kédougou is Senegal's most sparsely populated region, its population is as diverse as the most vibrant multiethnic neighborhoods of the cosmopolitan capital of Dakar. It is home to speakers of Pular, Jakhanke, Soninke, and Maninka and to several of the country's smallest ethnic groups, including the Beliyan-Bassari, Bedik, and Jallonke.[79] This diversity is a legacy of Kédougou's position as a crossroads between Guinea and Mali and its Atlantic-era history as a refuge for ethnic and religious minorities who sought cover from slave raiders in the region's rock escarpments, thick bam-

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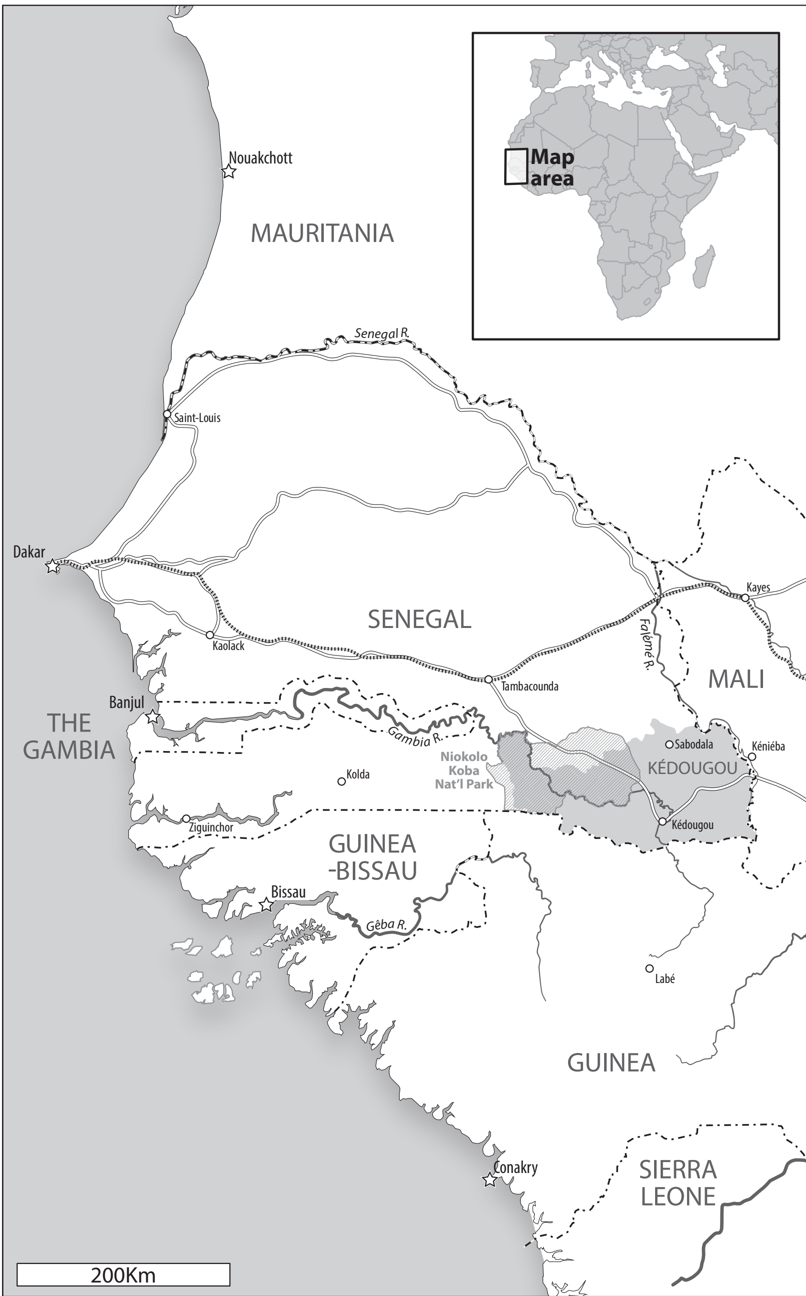

Map I.3 Senegal and Kédougou region, ca. 2020.

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boo forests, and maze of rainy season rivers. Senegal's population is overwhelmingly Muslim, with some estimates running as high as 95 percent. While Muslims have lived and traded in Kédougou for centuries, Islam did not become widely adopted in the region until the second half of the twentieth century, late compared with the rest of Senegal. In the 1960s and 1970s, a number of Beliyan-Bassari, Bedik, and Maninka converted to Christianity through a Catholic mission based in the region. Since the 1970s, conversion to Islam has expanded, even among former Christian converts. Today, most residents of Kédougou are Muslim, but outsiders still associate the region with ancestral religious traditions (see chapter 7).

Rooting this book within the histories of interethnic settlement that characterize Kédougou's agrarian landscape generates an alternative to what Mamadou Diouf calls the "Islamo-Wolof" model of Senegalese civilization.[80] This model refers to the long-term cultural and economic processes that have privileged the coast and the peanut basin. These areas are dominated by ethnic Wolof and the Muridiyya, who are over-represented in the national media and in scholarship on Senegal. As Diouf argues, the Islamo-Wolof model was built, in part, on the exclusion and marginalization of non-Muslim and non-Wolof groups from national narratives. Kédougou is one such exclusion. During French rule, Kédougou was weakly tethered to the economy and infrastructure of colonial Senegal. Young men from Kédougou engaged in annual rainy season migrations, known by French officials as the navètane, to cultivate peanuts in central-western Senegal. The navètane helped to spread the Wolof language to Kédougou, but Pular and Maninka remained the region's lingua francas. It was not until the late 1990s that Wolof became the preferred language of a younger generation in Kédougou, one expression of "Wolofization," the spread of Wolof language and cultural hegemony across regions of Senegal where Wolof was not historically dominant.[81]

Situated at the edge of Senegal and West Africa's gold-bearing rocks, Kédougou offers a critical, peripheral view of the region's ritual geology and of Senegal's history. It is also my personal entry into writing this history. I first moved to Kédougou in 2006 as a US Peace Corps volunteer. For one year, I lived in a small Pular village near the Guinea border. The next year I moved to Kédougou town, where I worked at a women's technical school and with urban gardeners. During this time, Senegal's budding mining industry was confined to a string of rudimentary exploration camps and a single mining concession, known as Sabodala, which was then under construction. Kédougou was a sleepy town, known for its relaxed and multiethnic

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sensibility. The Gambia River wove through the heart of town, flanked by verdant green market gardens sprouting okra, cherry tomatoes, cabbage, and banana trees. Fishermen plied the Gambia in small dugout canoes that doubled as local ferries. Soaring dry season temperatures pushed people outside. Young men gathered under mango trees to drink sweet green tea over charcoal. At nightfall, families hauled foam mattresses outdoors, falling asleep to Argentinian soap operas dubbed in Wolof or Pular. Women sat in plastic chairs along the exterior walls of homes, selling fried balls of pounded river fish.

Kédougou's social energy gathered around the central market. Concrete stalls spilled their wares—aluminum marmites and cooking utensils, imported soap and lotions, and a spread of bright plastic basins—onto packed dirt walkways. A row of Guinean men sat under beach umbrellas, selling fresh kola nuts from rice sacks lined with banana leaves. Traveling Wolof merchants sold sunglasses displayed on cardboard planks. Across from the market sat a cluster of aging administrative buildings, a public radio station, and a crumbling colonial-era park. Kédougou's two oldest neighborhoods fanned outward from the marketplace, one dominated by ethnic Maninka and the other by ethnic Pular. Brick fences encircled single-story concrete buildings. Hand-dug wells supplement piped water from the municipal grid. The outskirts of town were dotted with piles of brick that demarcated the claims of their owners, awaiting funds to build exterior walls. Car ownership was rare. Bicycles and motorcycles were the primary mode of transit.

Toward the end of my stay in Kédougou in 2008, an Australian company completed construction of the Sabodala gold mine and mill. For several months I worked with an organization of Senegalese farmers who were trying to sell vegetables to Sabodala and several other gold exploration camps. I served as an interpreter with the catering managers of these camps, many of whom spoke only English, and farmers from Kédougou, who spoke French, Wolof, Pular, or Maninka. Companies were eager to purchase local produce, but they followed international food safety standards that regional farmers could not meet. The fragile supply chain fell apart, my first glimpse at how difficult it was, even when goodwill was ample, for residents to capture opportunities around the formal mining economy.

For several years after leaving the Peace Corps I returned annually to Kédougou for short visits. Each year, the impacts of Senegal's growing mining industry became more evident in Kédougou town and in the countryside. Truck traffic intensified along Kédougou's main roads, churning up clouds of dust that covered air-dried laundry and bowls of shared rice.

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Men from across Senegal moved to Sabodala to seek work in the mine. Subcontracting services for the mining industry—chemical warehouses and diamond-drilling camps—multiplied in dusty workshops on the road linking Kédougou town to the Malian border. Local entrepreneurs began leasing secondhand dump trucks and bulldozers to exploration firms. Rates of HIV/AIDS rose as a result of increased trucking. The sharp influx of foreign capital led to inflation in prices for meat, vegetables, fish, and housing. Faced with growing costs, families who had once reserved rooms for relatives from remote villages to visit the hospital began leasing out spare bedrooms to strangers.

Meanwhile, the effects of Kédougou's growing orpaillage economy appeared in intimate realms among Senegalese friends and colleagues. Rural households expanded seemingly overnight with migrant orpailleurs from Mali and Guinea.[82] Motorcycles multiplied in rural villages, purchased by young men who had struck it lucky in the mines, flush with cash to pay bridewealth, a goal that took their peers years of savings from modest bumper crops of peanuts. Others were less fortunate. A sixteen-year-old I knew from a Pular village joined an orpaillage team as a rope-pulley operator near the border with Mali. He returned home three months later severely ill with a bacterial infection, carried home on a lorry truck by a friend. His cousin returned from the mines having lost the use of three fingers, the nerves severed by the misplaced blow of an iron pick in a poorly lit mining shaft. The expansion of orpaillage also inspired concerns about the moral status of money produced by gold. Rumors circulated that successful orpailleurs conducted human sacrifices and trafficked with the devil to earn the favor of the territorial spirits who haunted underground mining shafts and the gold placers of riverbanks. Muslim clerics opined that orpaillage pulled the young from the path of Islam and Qur'anic school.

Many of the worries about gold mining relayed to me in household foyers resonated with those of mining frontiers around the globe. Other grievances were regional in scope. While corporate mining was new to Kédougou, geological exploration and gold prospecting had been ongoing in the region for decades. Some elderly men I knew worked as guides and laborers for Soviet and French geologists in the 1960s and 1970s (chapter 5). Time and again I was told by residents of Kédougou that they and their ancestors—not geologists—had discovered gold deposits slated to become open-pit mines. As I learned, competing historical claims to gold discovery generated expectations in rural communities for the returns they, and their children, should receive from corporate gold mines.

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Anthropology and History

In January 2013, I returned to Senegal for eighteen months as a doctoral student in anthropology and history to conduct the intensive field research on which this book relies.[83] I divided my time among Kédougou (thirteen months), Dakar (four months), and France (one month). In Kédougou town I kept a room in the concession of a large Pular family I had known since the Peace Corps. I also lived intermittently in the household of Bambo Cissokho, the chief of Tinkoto, Kédougou's most celebrated orpaillage village (see chapter 1). I met Bambo Cissokho in 2008 while distributing bed nets for an antimalaria campaign. While living in Tinkoto, I accompanied orpailleurs as they prospected for gold with detectors and excavated gold-bearing rock from mining shafts. At night, I attended an extralegal "court" convened by Cissokho to mediate disputes that emerged by day on the goldfields. I conducted interviews in eighteen other villages in Kédougou, situated within and beyond the region's central gold-mining corridor. As the opportunity arose, I visited the camps of numerous exploration and mining firms.

Ethnography and oral history were my research methods in Kédougou, and the two frequently blended together. As a Peace Corps volunteer, I spent many days leisurely assisting farmers sowing cornfields and practicing Pular phrases with women as they prepared meals. As a researcher, I was in constant motion, tacking between orpaillage sites and agricultural villages on the back of motorcycles and pickup trucks. My movements mirrored the intensely busy lives of the men and women I sought to interview. They traveled to freshly discovered gold deposits; consulted with ritual practitioners in Mali and Gambia; and recruited workers for their mining teams. Whenever possible, I worked through my networks of friends and former colleagues in Kédougou to arrange interviews. In time, I adopted an informal snowball method that relied on serendipity and the generosity of near-strangers who afforded me their time. In total, I conducted more than 150 oral histories for this project with orpailleurs, farmers, historians, imams, healers, politicians, geologists, and gendarmes. I also initiated dozens of informal interviews with state bureaucrats, police officers, lawyers, and nongovernmental organization (NGO) workers. I traveled to Dakar to conduct interviews with geologists, mining company personnel, bureaucrats, and representatives of NGOs who worked in the mining sector.

I carried out interviews in Pular, French, and Maninka or a mixture of these languages. I speak Pular and French. I studied Maninka for six years through a combination of formal training and two summers in West Africa,

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but I never gained conversational fluency in the language. In southeastern Senegal, many Maninka-speakers are also fluent in Pular or French. To bypass my halting Maninka, they would frequently switch to a language we both spoke with ease. It was to address my limitations in Maninka that I sought out a research assistant in Senegal, which led me to Falaye Danfakha. A talented teacher of Pular and Maninka, with deep personal connections to Kédougou, Falaye became a close intellectual partner and friend. We conducted dozens of interviews together, traveling by bush taxi and motorcycle to reach remote orpaillage villages. In the final month of my stay, we spent hours a day transcribing interviews from Maninka to French in a concrete room we rented as our office in Kédougou. We continued this work remotely over the course of several years. Many of the ideas in this book emerged from our conversations during a research period that cemented an ongoing transatlantic friendship and multiple visits—him to the United States and me to Senegal—as our families have grown and careers have taken new directions.

I complemented field research in Kédougou with archival research in Dakar, Conakry, and Paris, which I conducted during the summers of 2010 and 2011 and for two months in 2014. In Dakar, I consulted collections at the Archives Nationales du Sénégal, the Institut Fondamental d'Afrique Noire, and Senegal's state-sponsored *Le Soleil* newspaper. The geological maps featured in this book are drawn from the archives of Senegal's Direction des Mines et de la Géologie, which include those of the geological service of colonial Afrique-Occidentale Française (French West Africa). I took shorter research trips to the Archives Nationales de Guinée in Conakry, Guinea, and the Archives Nationales d'Outre-mer in Aix-en-Provence, France. These collections enabled me to tell a regional history of orpaillage under French colonial rule. I deepened my knowledge of the social and ritual worlds of orpaillage prior to colonialism by analyzing oral traditions; archeological reports; European travelogues; songs and chants; and published primary source materials on gold miners, traders, and dynasts who lived on the historical goldfields of Bambuk (western Mali and eastern Senegal), Buré (Guinea), Gaoua and Poura (Burkina Faso), Hiré and Yaouré (Côte d'Ivoire), and Akan (Côte d'Ivoire and Ghana).[84]

A Ritual Geology is part history and part ethnography. This structure reflects my personal entry into this project, first as an observer of Kédougou's gold-mining boom and later as a scholar who inquired about the past. It also reflects my approach to history as a material set of structures and events that create conditions of possibility for the present—and as a resource for

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contemporary claims making. Residents of the West African savanna are distinctively self-conscious about their region's historicity. Family genealogies and theories of ethnogenesis are common topics of everyday conversation. Many of my interlocutors traced their heritage to medieval empires and tested my credibility as a historian by quizzing me on the region's precolonial history. The same individuals draw on historical narratives to argue with neighbors, state officials, and mining firms over who has the right to mine regional gold deposits. For them, history is a polyvalent resource for asserting cultural belonging and ownership of natural resources.

My doctoral training in the Interdepartmental Program in Anthropology and History at the University of Michigan primed my attention to the political work of history in oral and written forms. I was immersed in a community of "anthro-historians" interested in how different societies produced history.[85] I also studied models of historical anthropology in African studies, a field that pioneered the use of oral and archeological sources as portals to the past where documents are sparse.[86] Methodologies for interpreting oral traditions, in particular, created an evidentiary base for African history, which became incorporated into the academy in the 1960s after most African states gained independence.[87] Oral sources, which could "'talk back' in a way that documents do not," inspired rich reflections on African epistemologies of history and the ways in which "the past" became filtered through the politics and projects of the present day.[88] Several threads of this scholarship inspired my historical and ethnographic practice. First, I attended to how history was relayed through rumors of spirits, ritual practice, and the embodied praxis of gold mining.[89] I often gained access to these unconventional repositories of historical consciousness when I accompanied men and women through landscapes attached to spirits and departed relatives. They included abandoned mines, rock gullies, fallow millet fields, and the entryways to sacred groves.[90] Second, I noted how my interlocutors "assembled" histories in the space of formal interviews and in casual conversations. As the historians David William Cohen and E. S. Atieno Obhiambo observed in their research in Kenya, history does not exist out there to be collected by an impartial researcher. Rather, history is produced in dialogical settings.[91] If the assemblage of history is particularly visible in the retelling of oral traditions and oral histories, this is true of all genres of historical production, anywhere in the world, in and beyond the academy.

Whenever possible, the chapters to follow weave oral and archival sources into a single narrative fabric. But this was not practical for the entire book. Some chapters rely largely on oral testimony and ethnography, while others

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are drawn from archival data. The historical chapters present new empirical material on orpaillage in West Africa. The ethnographic chapters do so as well, but they are more concerned with how different members of West African societies have debated and constructed "facts" about gold discoveries and claims to mineralized land. Thus, this book both tells a history of orpaillage and interrogates how histories of orpaillage are made in family genealogies, village settlement narratives, and state and corporate archives.

My status and privilege as a white woman from the United States shaped, at every turn, the questions I asked and my narrative choices. I am an outsider to West Africa who, through serendipity and choice, has made this part of the world central to my career and my family. While my subject position limited my access to some forms of knowledge, it facilitated my entry into other realms and sources of funding from which many of my African colleagues are excluded. At times, I found these inequities paralyzing. But they also motivated me to leverage my privilege to tell the history of a West African mining tradition that has been racialized, denigrated, and portrayed as static by powerful actors. The global hierarchies in which this subject and I are embedded were on glaring display when, at numerous times during my research, I was accused of covertly prospecting for gold. While I was not searching for minerals, I was seeking knowledge about the region's past as generations of geologists had before me. I came to see these suspicions as evidence of the political economy of knowledge on a resource frontier, a central theme of this book. They remind us that seeking and producing subterranean knowledge is never neutral.

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