H-Environment

H-Environment Roundtable Reviews

Volume 12, No. 5 (2022)
https://networks.h-net.org/h-environment

Publication date: December 6, 2022
Roundtable Review Editor:
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Cameron B. Strang, *Frontiers of Science: Imperialism and Natural Knowledge in the Gulf South Borderlands, 1500-1850* (Chapel Hill: University of North Carolina Press, 2018).

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Introduction by Melanie A. Kiechle, Virginia Tech

In ***Frontiers of Science: Imperialism and Natural Knowledge in the Gulf South Borderlands, 1500-1850***, **Cameron B. Strang** tackles large expanses of space and time to explain how the edges of imperialism generated both knowledge and violence, often hand in hand. To document the process of knowledge production in places often considered peripheral, Strang introduces readers to a new cast of characters who exchanged ideas with and influenced the European men of science who have traditionally dominated histories of science in this period. Among these are indigenous shamans, West African herbalists, witch doctors, priests, and many enslaved persons who shared what they knew not out of a democratic desire to expand mankind's knowledge but under duress and coercion.

As a fellow scholar of the Gulf South, **Elaine LaFay** deeply appreciates the "stunning array of epistemologies and cosmologies" that Strang identifies and explains to readers. Because she has worked with similar sources, LaFay knows firsthand about the challenges involved. This familiarity informs LaFay's questions about how Strang decided to define natural knowledge as "a catchall term." While LaFay is compelled by this approach and sees its utility for exposing other modes of knowledge practiced and exchanged in this tumultuous place, she presses Strang to explain if his broader definition of knowledge is "sufficient to make sense of non-Western and Indigenous ways of thinking."

Eleonora Rohland joins LaFay both in praising Strang's work for debunking white and Anglo-centric narratives of this period and in questioning Strang's capacious definition of natural knowledge. Rohland refers readers to the debate between the history of science and the history of knowledge to explain what is at stake in defining this category. Although Rohland acknowledges that this debate of terminology may be sharper within the German-speaking academy, she makes a compelling case for thinking carefully about what pithy phrases mean in and beyond specific projects.

Daniel Rood brings his knowledge of both the early United States and slavery into the conversation as he probes the edges of the pursuit of natural knowledge. Rood emphasizes that many of the individuals involved in this pursuit were opportunists who also engaged in conspiracies and intrigue (I loved reading the phrase "pirate scientists"), which helps to explain the central role of violence in knowledge production. Rood notes that the violence Strang documents is a direct counter to the idea that increasing democratization defines scientific work in the late colonial and early national period.

Christopher Willoughby also appreciates Strang's attention to the deployment of violence in obtaining information, compelling labor, and creating material objects for analysis. Picking up on Rood's point that this period's science was not democratic, Willoughby situates Strang's account of skull and scalp collecting in the larger history of racial science and phrenology. As Willoughby notes, global science is gut-

wrenching at the local level. Willoughby wonders if that violence travelled with the objects it obtained to the metropolitan centers that have been the heart of so many studies of science in this period—and which continue to hold these materials.

Cameron Strang takes up all these issues in his generous and engaging response. To explain the choices he made as author, he takes us back in time to a previous and quite different version of this book, explaining how broadening his time frame by a few hundred years helped him to see continuity where, in a shorter time span, he had previously identified changes. In addition to this fascinating peek at an alternative book, Strang takes up a question that I took the liberty, as editor, of adding to his list—what does the history of natural knowledge offer to environmental history? His answer, as someone who did not intend to write an environmental history, should be welcome to everyone who has worked to widen the field and assert the environment's importance to all history.

Before turning to the first set of comments, I would like to pause here and thank all the roundtable participants for taking part. This roundtable's timeline was disrupted, as were many other things, by the Covid-19 pandemic. I'm grateful to all of the participants for their volunteer labor and good cheer in this trying situation. Finally, I would like to remind readers that as an open-access forum, *H-Environment Roundtable Reviews* is available to scholars and non-scholars alike, around the world, free of charge. Please circulate.

Comments by Elaine LaFay, Rutgers University

Life in the early American Gulf South was constituted by the structures of colonialism and racial capitalism. As Cameron Strang argues in his remarkable first book, *Frontiers of Science: Imperialism and Natural Knowledge in the Gulf South Borderlands, 1500-1850*, these hegemonies shaped the contours and consequences of knowledge production in ways both deeply local as well as national and hemispheric in scope. Situating local encounters within broader demographic and social change across the Gulf South, Strang makes the case that American imperialism and the violent removal of Indigenous peoples was at the center of how those living, working, and traveling throughout the region engaged with the natural world. Notions of 'nature' and 'human' were not neutral or given; they were made and remade in the dynamics of imperialism and capitalism. Strang focuses on three forms of encounter: between colonizers, enslaved people, and Indigenous peoples, specifically around knowledge; between colonizers and the natural world; and among colonizers of the many nations vying for a piece of the New World. By placing these interactions "based on violence and geopolitical competition" at the center of his story, Strang challenges historians to rethink knowledge production about the natural world in early America (p. 11).

Strang's account places American science at the interstices of clashing epistemologies. As he tells it, he began his research with a seemingly straightforward question: how might knowledge-making practices of the Spanish colonial empire have influenced those of Anglos? But the stories he encountered in the archives—the myths and monsters, poisons and magics, rumors and lies that existed amid familiar evidence of colonial extraction and classification—did not lend themselves to the frameworks of early American intellectual history and the history of science. These frameworks, which have largely privileged the voices of Anglo or British individuals, have traditionally assumed a singular trajectory of knowledge from continental Europe to the New World. Strang argues that the histories of these "odd" things or, put another way, things that at first glance "seemed too weird to matter" are not fringe episodes but are in fact central to the practices of knowledge making in this time and place (p. 6). It is this impetus that makes his contribution to the literature so compelling. It reveals the ways knowledge was produced and circulated amid the unequal encounters of imperialism. This key aspect of knowledge production has not been appreciated in the existing literature, which by focusing more on Euro-American strands of inquiry has failed to account for the entangled cosmologies of natural knowledge in the region.

The book is organized roughly chronologically around a series of case studies, each of which highlights encounters in the making of natural knowledge. These case studies introduce readers to an array of characters unfamiliar to environmental histories of the region and histories of American science writ large, including Indigenous shamans, West African herbalists, witch doctors, priests, and many others. Strang moves deftly between geographic framing devices, claiming that the context of

knowledge production in the Gulf South requires thinking across "regional, continental, hemispheric, and Atlantic" frames (p. 12). He does this by drawing from an impressive cache of sources that include works of natural history, cartography, surveys, travelogues, military documents, court records, and archival research that spans France, the UK, Spain, and the United States.

Strang begins by tracing the networks of patronage that shaped interimperial commerce and competition in the region from 1500 to the mid-1700s. He reveals that, despite significant efforts to erase it, Indigenous knowledge and meaning-making were integral to colonial networks of exchange and alliance. This was especially true of Indigenous cartographic knowledge, by which colonists gained important information about navigating an unfamiliar landscape. It is in this context that we learn about Lamhatty, an enslaved Tawasa man from the Gulf South whose Virginian enslavers forced him in 1708 to draw a map of the landscape that would be of use to the Virginia governor. The map, which was based off of Lamhatty's journey from capture in his town on the Gulf Coast via slave-trading routes up to Virginia, was "a portrait of weakness and suffering," which stood in stark contrast to maps that sought to communicate sovereignty and power over a territory (p. 57). The point, in this instance, is not to merely demonstrate that American imperialists appropriated Indigenous knowledge to serve their own ends, but rather to underscore the centrality of violence to the natural knowledge produced by these "encounters." Lamhatty probably would not have made such a map without being forced, nor would he have had the requisite knowledge were it not for his own travel through enslavement. Strang uses this example and others like it to illustrate how narratives of pain, violence, and the Indigenous slave trade infused both the production and consumption of geopolitical knowledge.

Strang further explores how storytelling and myths shaped power relations and knowledge production in the region. For example, in the late eighteenth century, a Creek Indian named Yaolaychi recounted tales of a monster lizard that shaped the experience and consequences of a Spanish mineralogical expedition. Indigenous narrative was not, in this context, something that European explorers stripped bare and repackaged in Western ideology; rather, the stories that Yaolaychi told instilled fear in the explorers. This in turn shaped the observations, findings, and interpretative frameworks that they reported back to their governor. The explorers' fear of the monster lizard also influenced where they dared and dared not venture (p. 124). Strang argues that the fluidity by which narrative moved between Indigenous and European individuals reveals that "[p]ower relations, place, and narrative—not any set difference between Indian and European epistemologies—shaped the pursuit, circulation, and validation of natural knowledge in the Gulf South" (p. 127).

Though Strang does not draw widely on labor history, his study reveals much about the labor of knowledge making in the Gulf South. Much of this labor was performed by non-whites, many of whom were enslaved. We can see this most clearly in the chapters that examine astronomy and geology in the region. In addition to Lamhatty and Yaolaychi, Strang shows in chapter three that the practitioners of astronomy in

the Gulf South relied on Indigenous guides and enslaved people to conduct borderland surveys. Inter-imperial rivalries were also at play during these survey expeditions, and fostered individual alliance and intellectual exchange between Spanish and Anglo astronomers. Labor was in this way central to the encounters and geopolitical competition that shaped imperial astronomy and, as Strang illustrates in chapter six, geology. In his study of the latter, Strang examines the ways that Anglo planters in the deep South deployed the land they owned and the people they enslaved for the pursuit of geological knowledge. Gulf South naturalists like Charles Tait and Rush Nutt navigated networks of patronage and expertise that cut across the Mason-Dixon line, and subsequently used geological discoveries to amplify scientific justifications for slavery. Thus not only was the brutality of racial capitalism at the heart of the labor of scientific practice, it was a critical site where scientific knowledge was being put to use.

The story of the Gulf South is in many ways similar to knowledge production in other imperial worlds, and Strang's point that "efforts to acquire and apply natural knowledge often revealed the limits of an individual's or empire's power" will resonate for scholars beyond this time and place (pp. 76-77). Amidst the ever-changing flow of power relations in the early Gulf South, European "men of science," to use both Strang's and his actors' category, were far from masters of natural knowledge. They were incredibly dependent on those they enslaved, and in fact approached their environment with trepidation, uncertainty, and confusion.

One of Strang's most innovative contributions is his examination of violence, which shows us how the practice of science was co-constitutive of brutality in a fraught and tempestuous region. Violence, in this optic, is not merely broader context, rather it is embedded in the very practice of knowledge production. This theme is most cogently explored in Strang's final chapter, in which he examines violence against the dead during the Second US-Seminole War in Florida. Anglo-Americans disinterred native skeletons and used the bones, especially skulls, to bolster claims of Seminole racial inferiority and innate predisposition for violence. Anglos also used evidence of pre-Seminole Indigenous remains to cast doubt on Seminole claims to the land through ancestral ties. Among Seminoles, an emerging ethnic identity began to cohere in part around the collection and circulation of white scalps. Knowledge production was thus inextricable from violence and warfare.

But it was not only knowledge by or about Indigenous peoples that was made inextricably with violence against them. Strang's larger point is that all natural knowledge in this time and place had violence and enslaved labor entangled with it. Taken together, Strang's case studies allow us to see that the "enlightenment" epistemologies that so celebrated reason, rationality, and the disembodied mind were, in practice, bound up with messy and deeply embodied realities. In the southeastern borderlands, these theories of knowledge were not only confronted with the violence of slavery and colonialism, but were co-constituted by it.

Strang makes an important intervention in the historiography of American science, which, as he rightly points out, has thus far been predominantly characterized by a northeastern, Anglo-centric focus in the United States. More than that, Strang reminds us that the Gulf South has been regarded as an intellectual backwater, and this work is an indisputable corrective to that assumption (p. 7). Furthermore, by focusing on what Strang refers to as the southeastern borderlands, *Frontiers of Science* joins a growing cadre of works that take the Gulf South as a central analytic. Scholars like Laurel Clark Shire, Urmi Engineer Willoughby, Michele Navakas, David Narrett, and Maria Angela Diaz have similarly shown how the southeastern borderlands is a critical site for the development and refinement of American imperialism.[1] Strang defines the region as the coastal land from Florida to Alabama, which in the time period under his consideration, 1500-1850, underwent profound transformations. Areas within what we call the Gulf South were subject to competing claims by, at various points, the Spanish, French, British, and American empires; Indigenous Gulf South nations and confederacies including, among others, Timacua, Chickasaw, Choctaw, Seminole, and Creek; and groups including pirates, maroon communities, and escaped slaves. Further, the region's shared ecology and climate, its proximity to the Caribbean, and its centrality to transatlantic modes of exchange made it a critical site of engagement.

Strang's work invites us to reconsider categories: what do we mean when we speak of science, knowledge production, natural knowledge, and how do we consider the spaces and environments of their creation? Strang argues that Indigenous labor, the suffering of enslaved people, and colonial violence are inextricable from European knowledge production. This approach ties his work to other histories of science that draw on unconventional material to understand cosmologies that exist outside a traditional western frame. In particular, *Frontiers of Science* raises questions that are active in the field about the meaning of natural knowledge, and would benefit from thinking through these questions more explicitly.

Strang's work coheres around the idea of 'natural knowledge,' which he defines broadly as "knowledge that humans develop about nature, a category that encompasses things like animals, plants, planets, minerals, lands, waters, and peoples" (p. 8). Natural knowledge is made, Strang argues, in four ways: "observation, experimentation, circulation, and inspiration" (p. 10). This is rightly distinguished

[1] Laurel Clark Shire, *The Threshold of Manifest Destiny: Gender and National Expansion in Florida* (Philadelphia: University of Pennsylvania Press, 2016); Michele Navakas, *Liquid Landscape: Geography and Settlement at the Edge of Early America* (Philadelphia: University of Pennsylvania Press, 2017); David Narrett, *Adventurism and Empire: The Struggle for Mastery in the Louisiana-Florida Borderlands, 1762-1803* (Chapel Hill: University of North Carolina Press, 2015); and Maria Angela Diaz, "To Conquer the Coast: Pensacola, the Gulf of Mexico, and the Construction of American Imperialism," *Florida Historical Quarterly* 95 (November 2016): 1-25. Historians of medicine have paid more attention to this region, especially concerning tropical diseases in the Mississippi Delta; for two recent publications, see Urmi Engineer Willoughby *Yellow Fever, Race, and Ecology in Nineteenth-Century New Orleans* (Baton Rouge: LSU Press, 2017) and Kathryn Olivarius, *Necropolis: Disease, Power, and Capitalism in the Cotton Kingdom* (Cambridge, Mass.: Harvard University Press, 2022).

from 'science,' though as Strang points out, there was in practice a great deal of overlap. Historians of pre-modern eras as well as scholars of non-western thought have long urged historians of science to broaden the scope of 'science' to include a diverse array of humans thinking about the world; the subsequent historiographic turn to 'knowledge' was in part a welcome response to this call. But broadening the scope of 'natural knowledge' carries risks of flattening difference and assimilating all forms of engagement with nature into something recognizable in western epistemology.[2] This is especially the case in Strang's taxonomy of four things that constitute knowledge-making — a very western epistemological move.

Strang argues for natural knowledge as "a catchall term," and adds that "all forms of natural knowledge in the southeast borderlands need to be viewed through the same analytical lens" (p. 8). This is a compelling position, but it leaves some questions unanswered. Who, for example, is applying the term 'natural knowledge' to whom? In cases when the actors did not themselves invoke 'natural knowledge,' what work is the term doing for historians? Who determines what falls into which of the four ways of making natural knowledge, and what work does it do to think systemically in this way about knowledge production? In other words, broadening the scope of natural knowledge may not be sufficient to make sense of non-Western and Indigenous ways of thinking.[3] This approach potentially reproduces knowledge hierarchies, even in spite of its clear intention otherwise. Despite Strang's excellent treatment of the porous boundaries between Indigenous and settler world views, there remains incongruence between vastly different moral and epistemological frameworks. Ultimately Strang's book presents a tension that is challenging for many of us in the field: between widening the umbrella of what constitutes natural knowledge, but still holding the category itself accountable to a reductive, ordered taxonomy.

Strang's book also invites important questions about other modes of knowledge practiced, exchanged, and produced in the turbulent context of the early modern Gulf South that do not make it into his work: imagined natures and their material counterparts; knowledge of the waterways that shaped the landscape; theories of climate that framed imperial interest and racial anxieties; practices of environmental management and control; or the ways ecology shaped or constrained human action.

One of the axioms of the history of science is that knowledge production is entangled with prevailing social, political, economic, and cultural context. In environmental

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[2] Linda Tuhiwai Smith has explored this tension in a different context; her work on colonial research methods in New Zealand nevertheless casts a wide net and her broader critique of the 'turn to knowledge' is relevant here. See Linda Tuhiwai Smith, *Decolonizing Methodologies: Research and Indigenous Peoples* (London: Zed Books, 1999; 2012).

[3] Recent works in Indigenous STS have shaped my own thinking on this; in addition to Tuhiwai Smith (2012), see also Kim TallBear, "Beyond the Life/Not-Life Binary: A Feminist-Indigenous Reading of Cryopreservation, Interspecies Thinking, and the New Materialisms," in Joanna Radin and Emma Kowal, eds. *Cryopolitics: Frozen Politics in a Melting World* (Cambridge, Mass.: The MIT Press, 2017); and Kim TallBear and Jenny Reardon, "Your DNA is Our History": Genomics, Anthropology, and the Construction of Whiteness as Property," *Current Anthropology* 53 (April 2012): 233-245.

history, we have long understood that ideas about nature are similarly specific to time and place. But by situating encounters between colonial and Indigenous people at the center of how we understand these broad concepts of knowledge-making, Strang offers a new and innovative approach, attending to a plurality of voices, centering violence, and focusing on labor in knowledge production about the natural world. It is, as he puts it, "capacious," meaning that it can accommodate a stunning array of epistemologies and cosmologies that, taken together, limn the intellectual vibrancy of the early Gulf South.

Comments by Eleanora Rohland, Bielefeld University

The time has never been more appropriate for a history book to debunk smooth, national narratives of early American history that favor a white, Anglo-centric perspective. By tracing the close entanglement of natural knowledge and Spanish, British, French and U.S. imperialism in the Gulf South Borderlands, Cameron Strang's book does just that. For, rather than following the well-trod paths of learned white men, their transatlantic scientific networks and instruments, as one might expect at first reading the title, Strang focuses on the "messiness of the Gulf South's international and interethnic relationships" (131), relationships that were constitutive for the creation of natural knowledge of the different imperial powers that converged in the Gulf South. By concentrating on those "messy" encounters and their outcomes, Strang intends to reveal the connectedness of what are otherwise studied as discreet histories of different colonial empires, and the persistence of these entanglements into the history of the early United States.

Strang thus abandons the typical, mental East-West gaze between the British Isles and the North American East Coast for a position that gazes from the Gulf Coast, or even the Caribbean, across what were to become the Southern States at the beginning of the 19th century. This shift of perceptive is crucial and one of the several ways in which Strang's book reads against the grain of more classical Early American histories and histories of science. Although there has been almost somewhat of a boom in researching French America and French Louisiana over the last decade and a half, books that straddle several colonial empires and thus also a larger geographical expanse such as *Frontiers of Science* are still relatively rare since they require the respective linguistic skills and usually rather extensive temporal and financial resources for archival research.

All seven of the book's chapters present deeply researched case studies of Gulf South Borderland encounters based on a broad variety of historical documents. The first two chapters explore the interaction and exchange of natural knowledge between Spanish and French colonials, indigenous peoples, and enslaved Africans before the American Revolution. The case studies Strang unfolds here have to be considered against the background of the tenuous holds of both the Spanish and the French along the Gulf Coast, which depended heavily on indigenous alliances. Spain and France were also the colonial powers that allowed for more interethnic mixing, creating societies in the Gulf South that were more akin to those of the French and Spanish Caribbean or the Spanish American empire. This demographic difference to the thirteen British colonies returns as a background factor for chapter five, which deals with how Anglo-American men of science perceived the intellectual abilities of the population of the newly acquired territories of the Gulf South.

By examining a court case about a poisoning conspiracy by five black men from Spanish Louisiana, Strang is able to highlight the role and agency of enslaved Africans as healers in the forcefully amalgamated communities of enslaved people on

plantations. These actors were endowed with natural knowledge that could, however, also be turned against blacks and whites alike (Chapter 2, p. 87-97). Like other historians researching the role of Africans and Native Americans in the colonial history of the Americas, Strang has to rely on records created by white Europeans. Nevertheless, he manages to uncover and underline the importance of these historical agents in the knowledge production of the different imperial endeavors in the Gulf South. The violence that was often involved in acquiring natural knowledge relevant for imperial expansion is a recurring theme in Strang's narrative. Both in the inclusion of non-white historical agents as well as in highlighting the violent background of European and U.S. knowledge about new environments, Strang's work breaks away from the traditional narratives of American intellectual history and the history of science and that motivate the book's aim of highlighting the multi-cultural, multi-ethnic and multi-lingual beginnings of what today is the United States (Epilogue, p. 343-44).

Chapters three and four of Strang's book cover the beginning of U.S. expansion into the Gulf South and focus on the circulation of astronomic knowledge as a tool of imperial expansion and on three men of science who skillfully navigated the changing political regimes of the borderlands to their own advantage and who defied clear allegiance to any imperial power. Chapters five to seven, finally, explore the phase of consolidation of U.S. power in the Gulf South, again covering violent encounters. This time, these occurred between Anglo-Americans and enslaved Africans who were central in unearthing geological knowledge, and between Anglo-Americans and Florida Indians in the Second Seminole War (1835-1842), which became the driver for the ethnogenetic identification of Florida Indians as Seminoles.

This diverse range of topics is richly contextualized throughout the chapters, and the enjoyably detailed footnotes are proof of Strang's broad knowledge of the research literature of the historical fields he is touching. Surprisingly, and this would be my first point of criticism, Strang does not discuss the tension that opens up between the use of "science" in his book title and his subsequent research into "local" and "natural knowledge." The two objects of research, "science", and "knowledge," are distinct and not simply interchangeable. They form part of a long-standing and ongoing disciplinary debate in the history of science and the emerging field of history of knowledge.[4] Places such as the University of Zurich with its Center for the History of Knowledge (ZGW, founded in 2005) and the Max Planck Institute for the History of

[4] Here follows merely a small selection of titles from this debate Peter Burke, *A Social History of Knowledge* (Cambridge: Polity Press, 2000); Peter Burke, *What is the History of Knowledge?*, (What is History-Series) (Cambridge: Polity Press, 2011); Pascal Schillings and Alexander van Wickeren, "Towards a Material and Spatial History of Knowledge Production. An Introduction," *Historical Social Research / Historische Sozialforschung* 40, no. 1 (151) (2015); Simone Lässig, "The History of Knowledge and the Expansion of the Historical Research Agenda," *Bulletin of the GHI* 59, no. Fall (2016); Johan Östling, Erling Sandmo, and David Larsson Heidenblad, *Circulation of Knowledge: Explorations in the History of Knowledge*, (Lund: Nordic Academic Press, 2018); Lorraine Daston, "The History of Science and the History of Knowledge," *KNOW: A Journal on the Formation of Knowledge* 1, no. 1 (2017).

Science (MPIWG) in Berlin together with the universities of Princeton, Harvard and Chicago have been important drivers in a discourse that has continually endeavored to expand the scope of "science" away from a narrow Western/ European focus to become more inclusive.[5] Lorraine Daston, director emerita of the MPIWG, succinctly expressed the history of science's dilemma in a 2017 article: "The classical narrative of the history of science was not just *a* Eurocentric narrative; it was *the* Eurocentric narrative, the one that explained how the West had outstripped the rest by inventing science and thereby winning the modernity sweepstakes."[6] It is exactly within this disciplinary tension that Strang, in fact, places his book, since Anglo-American intellectual history followed the same pattern. While I am aware of the stylistic differences between the Anglo-American and German-speaking worlds and their respective publication traditions of academic books, I cannot help but think that pointing to this disciplinary debate and placing his own criticism (voiced on p. 6) within this context would have sharpened the argument of the book and would have highlighted its innovativeness even more.

Not least because, and this leads to my second point of criticism, the disciplinary debate between the history of science and the history of knowledge has also, and maybe obviously, engendered an intense discussion about the meaning of those two terms, "science" and "knowledge." Strang defines the term "natural knowledge" in his introduction (p. 8), to encompass "science as well as other approaches to studying nature," the latter explicitly including "science […], religion, intrigue, magic, and non-European ways of knowing." The object of this knowledge encompasses "animals, plants, planets, minerals, lands, waters, and peoples." Strang also uses the term "local knowledge," which he defines as "the ever-evolving understandings of a place's nature and inhabitants that individuals and groups elaborated within a shifting matrix of interpersonal and international relationships" (p. 9). While I entirely subscribe to the decolonial thrust of Strang's aim to treat all forms of natural knowledge in the Gulf South borderlands equally, I feel that his definitions generalize to such an extent that they flatten out the otherwise extremely variegated historical landscape that he intends to show to the reader. Through the breadth of the definition, the concepts lose their power to function as an effective red thread through the narrative.

Despite these points of criticism, Cameron Strang's book is essential for understanding the entangled history of the Gulf South borderlands and with its many exquisite case studies shows how the Anglo-American "master narrative" can be "provincialized" and decolonized.[7]

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[5] For an overview over the ZGW see https://www.zgw.ethz.ch/en/home.html (accessed July 06, 2020) and the Max-Planck-Institute for the History of Science can be found at https://www.mpiwg-berlin.mpg.de/ (accessed July 06, 2020).

[6] Daston, "The History of Science and the History of Knowledge."

[7] Dipesh Chakrabarty, *Provincializing Europe: Postcolonial Thought and Historical Difference*, Princeton studies in culture/power/history (Princeton, N.J.: Princeton University Press, 2000).

Comments by Dan Rood, University of Georgia

Frontiers of Science is an exceedingly well researched and urgently needed expansion of early America's history of science. The book fulfills the promise of #VastEarlyAmerica by bringing the multilingual, multicultural, trans-imperial, and native-controlled Gulf South into the center of the story. In stretching open the frame of this field, Strang brings a broad understanding of "natural knowledge," which sheds light on the heterodox, hybrid eclecticism of all natural knowledge. The final chapter, for instance, shows how during the First Seminole War, white soldiers collected skulls so US phrenologists could use anatomical evidence to prove Seminole unfitness for civilization, while Seminoles collected white scalps, in the process studying and affirming their own ethnic coherence. Such stories add up to a rich, fascinating, and disturbing revision of the history of science which reads with some urgency.

In spirit with other recent colonial and imperial histories of science, Strang challenges the metropole-periphery division of intellectual labor as well as the all-too-easy category of "local knowledge," which is often used as shorthand to refer to "some kind of stagnant wisdom that people possess simply by dint of sustained experience in a given place" (9). The shifting identities and constant migrations imposed by imperial competition and various overlapping slave trades make such an easy equation between particular peoples and particular places unsustainable. Instead Strang urges us to rethink local knowledge as "the ever-evolving understandings of a place's nature and inhabitants that individuals and groups elaborated within a shifting matrix of interpersonal and international relations… Encounters," he concludes, "could inspire new local knowledge among all of the places in habitants and influence how that knowledge moved" (9).

Strang highlights the similarities and the mutual influences among Spanish, French, Creek, Choctaw, Afro–diasporic, and Anglo-American forms of natural knowledge. At the same time, however, he warns us that these ethno-national identities were emergent; many of the characteristic natural history researchers were deeply opportunistic individuals who shifted their allegiances among these different labels if it could earn them monetary support. Far from denigrating Spanish colonial scientists as backwards and ignorant, early national practitioners used Spanish colonial predecessors as models and as something to aspire to. They deeply envied the institutional support Spanish natural historians received from a Bourbon monarchy keenly interested in producing knowledge to reinforce hegemony and shore up fiscal health of its far-flung possessions.

Bringing the Gulf South into early Republican history of science challenges the very category of something like an "early republic," because so many of the important practitioners didn't view the geographic territory in which they did their work to be a United States space. Nor, even if they were getting governmental support from the US government (which was very undependable), would they have identified

themselves as lifelong citizens of a single republic. Sparse support made mixed allegiances the norm. The image of patriotic scientists with fixed national identities living out the egalitarian promise of the new nation has little place in the polyglot, violent "frontier of science" that forms the subject of this book. If Strang did nothing else in this book (and he does much) it would still be valuable for introducing us to the figure of the pirate scientist through Bartoloméy Lafon, who worked with the Lafitte brothers when he was not collaborating with more mainstream US-based scientists (204).

Opportunists, shape shifters, hustlers, and pirate scientists—characters like Thomas Power, more than Ben Franklin—characterized the pursuit of natural knowledge in the Gulf South. Men like Thomas Power raise interesting questions that I wish Strang had pursued a bit further. Natural knowledge was entangled with conspiracies and intrigue in the 1790s like that of Aaron Burr. Other scholars have worked hard to examine the practices through which credibility was established within Republican and gentlemanly circles. Very specific rituals of writing, speaking, observing, sensing, and collecting (which were of course rooted in specific subject-positions of race, gender, and class) underwrote broad truth claims in such communities, and public reputations of individuals were largely responsible for cementing the reliability of those claims. If posturing, shape shifting, and opportunism was more the rule than the exception among Gulf South intellectuals, what could have been the value of the truth claims asserted by men like these? I think Strang walks us up to the edge of this very difficult question without offering any answers for us, and I'm curious what he thinks.

These individuals didn't just don new identities to keep the patronage flowing. They also transferred their loyalties to avoid getting killed, which brings up the centrality of violent encounters to the history of science that Strang also highlights.

While history of science in the late colonial and early national North American eras has often been seen through the lens of increasing democratization, a history of science that takes seriously how much of the knowledge is being produced in the southwest, challenges this understanding as well. Racial hierarchy, legal inequality, imperial competition, and ubiquitous violence provided the framework and often the very motivation within which investigations of the natural world were undertaken. This isn't necessarily a cynical view that power and profit turned science into "a handmaiden." On the contrary, Strang tells a very complicated story about how particular objects of curiosity like certain plants, could morph between commodity, gift, object of curiosity, and element in a national security strategy. In other words, it wasn't only human contributors to natural knowledge who were hard to pin down; the objects they studied and collected also shifted shape along with the political, economic, and cultural contexts within which they were embedded. It is a complicated story.

Strang makes another major contribution by focusing on histories of geology and astronomy. These are all branches of natural knowledge that historians of pan-

American science have studied less frequently, perhaps failing to see their political character. Strang shows us how entangled they were in imperial competition and European expansion. He tells a great story of the Florida boundary survey of 1798, which was a deeply imperial process that also depended on astronomical observation as well as rivalry over which empires could wield the methods of astronomy best (130).

While astronomy has too seldom been recognized as an imperial tactic, historians of cartography have frequently equated the making and dissemination of maps as strategies used by the powerful to catalogue their territorial claims and open new lands to expropriation. Strang certainly acknowledges this aspect of cartography, but also shows us how colonial maps could at the same time express geographies of trauma. The story of the Indian mapmaker Lamhatty, who was taken captive by various groups at different times, and forced to share his geographic knowledge amidst a demographic catastrophe of his own people, reveals how "far from being an instrument of power, maps could also be windows into weakness and pain" (56). This is fascinating.

Strang is also arguing against a neat break between colonial and Republican science by showing how the legacies of failed expansion, collaboration with various native groups, and inter-imperial competition and collaboration continued to influence and constrain the way natural knowledge got produced and disseminated in 1810's and 1820s. Moreover, the nationalizing of a formerly colonial science still pivoted upon a provincial – metropolitan dynamic, and again, the engine of knowledge productivity often came from the provinces – in this case southwestern territories (189).

By dedicating himself to this historiographical contribution, however, Strang perhaps under-emphasizes that the project of making the Louisiana Purchase American involved creating a simpler, more exclusionary white and male power/knowledge dynamic out of a less rigid French and Spanish creole system of hierarchy (222). I'm wondering if emphasizing the continuity over the break was a decision he made consciously, and how/why he came to it.

The realness of the shift was of course felt most keenly by people of color, but even wealthy and powerful slaveholders, whose more complicated views on racial hierarchy made sense within the French and Spanish circum-Caribbean, came to appear anomalous to the point of ridiculous within the emergent US notion of biologically fixed race.

Strang does a really solid job of informing his readers, many of whom are presumably United States historians, of the specifics of Spanish colonial history as well as Native American history in the Gulf South. This is yeoman's work of writing a book (it is not going to win you any prizes, but is the raw material from which survey lectures can be drawn and thus as valuable as an author's original discoveries). It also, in a less obvious way, shows a sophistication in articulating stories that are not his main

quarry but provide vital context for understanding the more specific history of science stories he is exhuming from the archives.

The book also makes interventions into issues of historical memory – how this moment has been erased and forgotten among historians. He joins scholars like Kathleen Murphy and Londa Schiebinger who have shown how the botanical expertise of African-Americans in particular was incorporated into the archive in ways that elided the contributions of individual knowers and only allowed for partial incorporation of what they knew. For example, enslaved women and men who functioned primarily as healers in their communities only entered the archive as suspected poisoners since this is what the legal system cared about. Moreover, owning one's expertise could be hazardous to one's health since a racialized individual with widely respected knowledge of the medicinal or toxic power of certain plants could then become suspected of using botanical knowledge against one's owners if a white person fell ill. There were complex reasons for being reticent about what one knew. All of these factors complicated transits of knowledge among individuals. Moreover, "access to specialized knowledge did not lead these learned Africans to greater influence or status. It led to incarceration and probably death" (97). This is actually a good counterpoint to my own book which focuses on the ways in which hard-to-find craft skills in blacksmithing, for example, could put enslaved people in relatively advantageous positions in terms of exerting more control over their own lives and that of loved ones.

Strang makes clear that enslaved people gave crucial aid to astronomical observation, surveying, botanical cataloging, and ethnographic investigation. In some cases, plantation discipline could be transposed to the conditions of knowledge production. While in the northeastern cities more frequently covered by historians of US science, intellectuals found the support of governments and institutions, wealthy planters and slaveholders stepped into the vacuum of state support in the Gulf South.

Strang concludes with the growing role of both the Smithsonian and the fiscal-military United States in the 1840s, a crucial story and history of science that has sorely needed telling. With the US invasion of Mexico in 1846 by the Corps of Topographical Engineers, the state comes back in with a vengeance after what some might call the long era of Jeffersonian-Republican hesitation to invest in the production of territorial knowledge. This important story does raise questions for me, however. Even though he uses the word Whig to describe this more expansive scope of governmental action, the Whig party was anti-expansionist and proposed using knowledge to improve the polity as it existed within its current boundaries as opposed to improvidently sauntering into the wilderness in search of free booty. How did this very prominent anti-expansionist counter-text of US empire continue to shape the history of science in the United States of its most fervently expansionist period until the 1890s?

Comments by Christopher D.E. Willoughby, Pitzer College

"Getting paid in the borderlands often hinged on securing multiple patrons across cultural and political boundaries," explains historian Cameron Strang in his new monograph on imperialism, science, and knowledge production in the Gulf South (43). In many ways, this quote captures much of what is important about Strang's work and how he depicts the struggle for power in the Gulf South from the Spanish Conquest to the Mexican-American War. Rather than defining the Gulf South borderlands by the empire of the moment, Strang reveals how, in service of personal economic gain, local knowledge brokers were constantly juggling the needs of the various polities of the region, each of whose influence often waxed and waned in relation to each other. Thus, since the first century of the Columbian exchange, profitably creating and trafficking in natural knowledge meant a keen awareness of the regularly shifting political tides, along with learning how to use violence to make money and prestige in a region that was so remarkably shaped by violent conquest and the exploitation of land and labor.

At its most basic, *Frontiers of Science* relates a longue durée story of how various political leaders, knowledge producers, and laborers from African, European, Native American, and multi-ethnic backgrounds turned information about the natural world into a valuable commodity in the early modern Gulf South. Rather than focus on just one branch of natural history, Strang covers the gamut, with considerable space devoted to astronomy, medicine and other Atlantic healing cosmologies, geology, cartography, and ethnography.

While most U.S. historians technically acknowledge the multinational history of the Gulf South (particularly French Louisiana), previous depictions of the region have lacked the dynamism of Strang's monograph. From the earliest days of the conquest, making knowledge and money in the Gulf South meant balancing the needs of multiple political powers or even setting one European imperial or Native American leader against one another. Even Catholic monks were not beholden to a single overlord. As well as keeping European patrons contented in turn of the seventeenth-century Florida, Franciscan monks, in their efforts to convert Florida Indians, had to supplant the power of Indian Shamans and gain the patronage of local chiefs (40-43). Far from depicting Europeans as possessing a monopoly on power and knowledge in the Gulf South, Strang often emphasizes their relative weakness and ignorance, especially in the first two centuries after the conquest.

In their efforts to mitigate their weaknesses, Europeans sought to obtain and catalog knowledge, with violence representing a powerful tool to extract information from locals. From the very beginning, conquistadors like Hernando Desoto used violence to forcefully gain knowledge, with Strang providing a gruesome example of Desoto having one native (mis)informant devoured by dogs (27).

Strang depicts these actions as precedents for Gulf South science's long history. These violent beginnings would in many ways become more systematic, cold, and calculated as systems of knowledge and cash crop production in the Gulf South evolved. While French, Spanish, and Anglo plantation systems certainly relied on spectacles of violence such as Desoto's use of dogs, violence more often was an everyday tool of the plantation system (comprising millions of forced Black and willing white residents) and later actions by the U.S. government, including the removal of southern tribes such as the Creeks, Cherokees, and Chickasaws.

Genocidal Indian removal policies and violent plantation disciplinary regimes revealed how Euro-American violence against non-whites had become more pedestrian in the nineteenth century, even if it was just as horrific. In addition to relying on enslaved workers to aid in both the physical and specialized mechanical labor of Gulf South science, white scientists in the Gulf South analyzed the living and dead bodies of Native Americans and African-descended people to create sciences that ordered racial hierarchies. Through the suppression of revolts by people of color such as enslaved rebels in Louisiana, the Creeks, and finally, the Seminoles, Anglo-Americans in the first half of the nineteenth century violently imposed control over the region that they had formally purchased from France and Spain. These violent conflicts lead to constructions of "scientific" stereotypes of Native Americans and African descendants as inherently violent, even if the most violent actors of the region were mostly white.

Unlike in other forms of science, where violence was essential to obtaining information or compelling labor from reluctant Native Americans or enslaved workers, in the case of racial science, imperial violence had a formative role in creating the material objects that racial scientists analyzed. Strang makes this direct relationship most apparent in his analysis of skull collecting by whites and scalping by Seminoles during the Second Seminole War (1835-1842). Here, Strang reveals how postmortem trophy collecting—whether skulls or scalps—represented a central means of identity formation for both Seminole and U.S. imperial troops. As Strang asserts, "The parallels [of Seminole scalping] with the exchanges and performances underlying white skull collecting are clear: fighters collected remains and presented them to leading medicine men who displayed them in centers of ceremony and calculation and gave them meaning" (319). Again then, Strang reminds us that whites in the Gulf South rarely had a monopoly on power, knowledge production, or the use of violence. Strang also reveals the existence of a partially shared culture of knowledge production in the Gulf South, where both whites and Seminoles used knowledge to fashion their enemy into the Other.

Frontiers of Science in many ways acts as a complimentary foil to James Poskett's recent monograph on the global history of Phrenology in the nineteenth century.[8] Where Poskett provides a grand image of phrenology as a global science jumping

[8] James Poskett, *Materials of the Mind: Phrenology, Race, and the Global History of Science, 1815-1920* (Chicago: University of Chicago Press, 2019).

from England to diverse locations around the world, Strang reveals in intimate and often gut-wrenching detail what a global science looked like at the local level. Strang's Gulf South in many ways typified a global space: multi-lingual, trans-imperial, and comprising people originating from various continents. Yet, succeeding in this space meant having deep knowledge of diverse locals. Predicting who would be a viable patron in two decades was fraught with speculation for Gulf South residents as the tides of power changed so regularly.

Like any provocative and field-shaping work, *Frontiers of Science* raises as many questions as it answers. One of the more glaring absences in Strang's analysis is details about the economic systems of the region. For all the nuance given to local governing bodies and the profit motives of individuals, much less consideration is allotted to the economic systems adopted by different polities and actors. Given historians of capitalism's current influence in slavery historiography, it is hard not to wonder about the influence of free-market ideologies in eighteenth- and nineteenth-century Gulf South science. This is not to say that Strang never mentions capitalism or other economic systems, but it would be interesting to know what level of influence these systems had on the way knowledge brokers engaged with patrons and other power brokers in the Gulf South. Did support of free-markets divide Gulf South and metropole scientists? Did Gulf South scientists possess economic leanings in common with metropolitan colleagues, and did this change over time along with economic systems? In general, since profits were the motive of so many of Strang's actors, it would be helpful to hear more about how economic systems shaped scientific knowledge in the Gulf South.

On a separate note, I was curious as to how the violence of Gulf South science travelled, especially as it relates to skull collecting. While Strang clearly illustrates how metropolitan skull collectors like Samuel George Morton purchased and traded for the human remains created through imperial conflict, I wondered how collectors like Morton thought about the violent conflicts that created his collections. Were stories of war circulated with the skulls? Did those like Morton consciously view murder as generative to science? What connection, if any, did those like Morton see between their collections and the violent conflicts and scientific methodologies utilized in the Gulf South? Moreover, to what extent, did metropolitan collectors create their own imaginaries of the Gulf South and the violence that created their collections? Or, on the other hand, did metropolitan scientists turn a blind-eye, leaving violence out of their monographs, museums, and collection catalogs?

Rather than evidence of *Frontiers of Science*'s failings, these questions reveal how generative, complex, and insightful this monograph is, and I expect Strang's work will profoundly shape future histories of the Gulf South, natural knowledge, and racial science.

Response by Cameron B. Strang, University of Nevada, Reno

Elaine LaFay, Eleonora Rohland, Dan Rood, and Christopher Willoughby have all engaged with *Frontiers of Science* in ways that help me appreciate its successes and ponder its shortcomings. And since it has been nearly three years since the book hit the shelves of university libraries, the opportunity to have a thorough exchange on some of the issues it raises is especially welcome.

Each of the readers made my week by capturing (and praising) the main thrust of the book, that imperialism-engendered encounters, especially violence, were central to knowledge production in the Gulf South and early America on the whole. For me, the ways that violence was, as LaFay put it, "embedded in the very practice of knowledge production" has proven to be the book's most consistently interesting insight. Perhaps surprisingly (or maybe not?), none of the reviewers seemed interested in defending the long-established paradigm that democratization—rather than imperialism—made the pursuit of knowledge in the early United States what it was. In this sense, I like to think that *Frontiers of Science* tapped into, and maybe even spurred, a shifting consensus in the history of science.

Or do I mean the history of knowledge? Rohland and LaFay question the ways the book distinguishes between science, knowledge, and "natural knowledge," my phrase of choice. I settled on "natural knowledge" because it seemed like a broad enough term to encompass investigative practices that largely correspond with modern science as well as those that might seem beyond the pale of science and, thus, fall under the more general rubric of "knowledge." While "science" signals the triumphalist narrative of why the West seemed to best the rest, "knowledge," as Lorraine Daston notes, is a "capacious and usefully vague term [that] has the advantage of nipping in the bud sterile, inconclusive discussions about whether Hellenistic alchemy or indigenous Peruvian botany…is really science." Knowledge might be a fuzzy term, but the Gulf South was also a fuzzy place, and if pushed to choose between capaciousness (knowledge) or exceptionalism (science), focusing on borderlands very much suggests the usefulness of the former. Indeed, I stand by my framing of "natural knowledge" because it can encompass modern science and not, as Daston suggests for "knowledge," merely serve as shorthand for "everything that is not modern science."[9] This is not a perfect definition, and I doubt we'll ever hit on one, but I think "natural knowledge" works for telling histories that embrace instead of efface the messiness of nature study in zones of encounter.

Rohland's and LaFay's more specific critique of "natural knowledge" is that it risks "flattening" (both reviewers used this word) the differences among the epistemologies that collided and partially mixed in colonial spaces. This is indeed a risk, yet I believe that, at least based on the sources I read from the Gulf South, Indigenous and European experts overlapped considerably in how they went about

[9] Lorraine Daston, "The History of Science and the History of Knowledge," *KNOW: A Journal on the Formation of Knowledge* 1, no. 1 (March 2017): 142, 150.

investigating nature and attempting to benefit from it. Indigenous patronage networks, for instance, seem to have functioned on some of the same bases of mutually augmented prestige as European ones, a convergence that made competitions for chiefly support between Franciscan missionaries and Timucuan shamans comprehensible to everyone involved. At least by the eighteenth century, moreover, Indigenous networks of exchanging plants, animals, and minerals involved many of the same sorts of practices and motives as those of European naturalists, including profit, bolstering prestige by demonstrating access to exotic goods, and building connections with political and intellectual leaders. As much as possible, I tried to approach topics common in the history of science—the collection and exchange of specimens, for instance—through lenses familiar to Indigenous historiography. Thus instead of seeing networks of specimen exchange as growing out of the desires of colonial and European naturalists, I present them as part of the broader world of material exchange that were central to Native American societies before and after European contact.[10]

Even more important than similarities in networks were similarities in practices. While both early modern Europeans and Indigenous peoples probably understood their methods and reasons for studying nature in ways that little resemble those of twenty-first-century scientists, focusing on what they did makes their intellectual pursuits seem far from epistemologically incompatible. LaFay argues that "despite Strang's excellent treatment of the porous boundaries between Indigenous and settler worldviews, there remains incongruence between vastly different moral and epistemological frameworks." She is particularly skeptical of my "taxonomy of four things that constitute knowledge-making"—observation, experimentation, circulation, and inspiration—as "a very western epistemological move," one that "potentially reproduces knowledge hierarchies, even in spite of its clear intention otherwise." This point about taxonomizing is very well taken, and I suspect that this critique will stick with me and, hopefully, urge more caution in my future research. That said, I'm not ready to reject my categories of knowledge-generating practices even as I come to doubt the rectitude of creating them, and one way to consider whether they work across cultural boundaries is through examining Indigenous languages. Doing linguistic analysis as a non-expert has many risks, yet bilingual dictionaries can offer potential glimpses of how various groups approached knowledge-making. According to a dictionary from 1915, for example, the Choctaw language includes terms that at least approximate each of the four categories I spell out in *Frontiers of Science*: "to observe" (and "observation," "observer," and "to study"); "experiment" (and "to make an experiment" and "test"); "circulate" (and "to exchange," "to interchange," "to share," and "one who instructs or imparts knowledge"); and "inspiration" (and "to divine," "to invent," and "to lie"). However,

[10] Neal Salisbury, "The Indians' Old World: Native Americans and the Coming of Europeans," *The William and Mary Quarterly* 53, no. 3 (1996): 435–58; Joseph M. Hall, *Zamumo's Gifts: Indian-European Exchange in the Colonial Southeast* (Philadelphia: University of Pennsylvania Press, 2009); Daniel K. Richter, *Before the Revolution: America's Ancient Pasts* (Cambridge, Mass: Belknap Press of Harvard University Press, 2011), esp. 11-36, 121-142.

other Choctaw words suggest that these categories were (as I also argue in the book) not entirely distinct from each other: *pisa*, for example, could be a verb meaning "to see; to find; … to study; to detect; to discover; … to examine; to explore; … to reconnoiter; [and] to observe" as well as a noun meaning "a view; a vision; … an examination; … an investigation" or "one who sees; … an examiner; an explorer; [and] an investigator."[11] All of which is to suggest that we can cautiously posit that the four knowledge-producing practices I identified in hopes of demystifying science existed in some form among at least some of the Gulf South's Native people, though the categorical boundaries distinguishing these practices from each other may have been quite different than among Europeans.

While LaFay and Rohland raise important concerns about potentially flattening differences across cultures, Rood ponders if I also flatten differences over time. Rood suggests that *Frontiers of Science* potentially "under-emphasizes that the project of making the Louisiana Purchase American involved creating a simpler, more exclusionary white and male power/knowledge dynamic out of a less rigid French and Spanish creole system of hierarchy," and he wonders how I came to emphasize "continuity over the break." Answering this question requires revisiting the first version of the book manuscript I submitted to the series editor in 2014 (a terrifying and humbling prospect). In that draft, I began the story in the late 1700s and emphasized change far more than continuity, arguing something like U.S. expansion into the Gulf South initially depended on the local knowledge of Spanish, French, and Indigenous inhabitants but, by the 1810s, had brought about a new context of epistemological dominance in which the encounters and intellectual messiness of earlier decades was replaced by an increasingly rigid intellectual hierarchy in which folks who were not Anglo men lost credibility. In short, it was a borderlands to borders story.[12] After the first round of reader reviews, the editor suggested that I go back in time three hundred years and start the book with the first Spanish entradas. You can imagine how this made me feel at the time, but I now consider this advice to be the turning point in how I conceived the book's arc. For the further I went back in time, the less change I actually saw across time. The same sorts of encounters—violence, geopolitical competitions, political and intellectual exchanges, and engagements with nature and history—conditioned knowledge-production throughout the 350 years covered in the final version of the book. So while I agree that, in at least some ways, a more "exclusionary white and male power/knowledge dynamic" did emerge in the Gulf South from the 1810s to the 1840s, I came to believe that emphasizing the endurance of colonial contexts—especially racialized violence—into the era of U.S. rule revealed more about how knowledge production operated in the early United States than a neat narrative of hardening borders.

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[11] Cyrus Byington, *A Dictionary of the Choctaw Language*, ed. John Reed Swanton and Henry S. Halbert, Bureau of American Ethnology, Bulletin 46 (Washington: Government Printing Office, 1915), 78, 159, 191, 209, 282, 316, 350, 410, 480, 482, 509, 553, 573, 580-581.

[12] An oft-cited example of this approach to borderlands history is Jeremy Adelman and Stephen Aron, "From Borderlands to Borders: Empires, Nation-States, and the Peoples in between in North American History," *The American Historical Review* 104, no. 3 (June 1999), 814–41.

The reviewers also suggest two other contexts that clearly mattered to intellectual life in the Gulf South: economics and the environment. As Willoughby notes, "one of the more glaring absences…is details about the economic systems of the region." He is correct that I focus more on the economic motives of individuals than broader economic systems, and some of these profit-seekers roundly condemned capitalism. The planter/geologist Rush Nutt saw environmental engineering as a way to spread the domain of plantation agriculture and, thus, stave off the corrupting influences of "banks, rail-roads, and gold mines," all of which he associated with industrial capitalism and the "Priests of America" (284). Nutt, however, also engaged in some of the master class's most blatantly capitalistic pursuits: he invested in new agricultural innovations and personally led coffles of enslaved people from Virginia to New Orleans slave markets. Like many antebellum slavers, Nutt invested a lot of capital into fashioning an anti-capitalist identity.[13] But Willoughby's broader point remains fair. If I were to go back and more deliberately position economics in *Frontiers of Science*, it seems that capitalism—which, significantly, consistently motivated violence—could count among the continuities stretching from the 1500s to the mid-1800s. The Spanish adelantados who invaded and investigated La Florida in the sixteenth century risked their own fortunes and those of their creditors in hopes of discovering precious minerals, conquering Inca-esque Indigenous empires, or, in the case of Pedro Menéndez de Áviles, scheming to force enslaved Africans to work sugar plantations. A century later, an influx of capital from English colonists in late seventeenth-century Carolina spurred the shattering violence of the Southeast's Indigenous slave trade. And, a century after that, the influx of U.S. citizens and their capital fueled both the rapid expansion of plantation slavery and the expulsion of Native nations.[14] In sum, capitalism and violence often went hand in hand throughout the colonial and early national eras, and these very much marked how, where, and why various peoples generated knowledge about the natural world.

As for the environment, *Frontiers of Science* was never primarily an environmental history. Unlike the people I discuss in the book, I did not attempt the sorts of close research on the Gulf South's landscapes, climates, plants, creatures, dirt, germs, or waters that, in my mind, ground the most sophisticated works in the field. It would, I supposed, have required an immense amount of work in disciplines like ecology, climatology, and hydrography to pin down the region's unruly environment enough to analyze its role in intellectual life. Yet, with the reviewers' help, I'm coming to think that the idea of trying to pin nature down is wrongheaded and, indeed, that it may be the very slipperiness of colonial environments that make them so relevant to the book's broader points. LaFay suggests that one of the book's underlying arguments is that "notions of 'nature' and 'human' were not neutral or given; they were made and remade in the dynamics of imperialism and capitalism." And Rood observes that

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[13] Walter Johnson, *Soul by Soul: Life Inside the Antebellum Slave Market* (Cambridge, Mass: Harvard University Press, 1999); Daina Ramey Berry, *The Price for Their Pound of Flesh: The Value of the Enslaved from Womb to Grave in the Building of a Nation* (Boston: Beacon Press, 2017).

[14] On capitalism and Indigenous dispossession, see Claudio Saunt, *Unworthy Republic: The Dispossession of Native Americans and the Road to Indian Territory* (New York: W. W. Norton & Company, 2020).

"Strang tells a very complicated story about how particular objects of curiosity like certain plants, could morph between commodity, gift, object of curiosity, and element in a national security strategy." "In other words," he concludes, "it wasn't only human contributors to natural knowledge who were hard to pin down; the objects they studied and collected also shifted shape along with the political, economic, and cultural contexts within which they were embedded." I think the instability of nature that LaFay and Rood identify emerges in the book because it examines human engagements with the environment as just one of a swirling set of relationships that shaped knowledge about the natural world. In hindsight, then, *Frontiers of Science* may work as a subtle kind of environmental history because engagements with nature were thoroughly interconnected with the other encounters (especially violence, geopolitical competition, and exchanges) that made knowledge in America's borderlands. If I were to be generous to myself (as we should all be from time to time), I'd suggest that *Frontiers of Science* might represent the sort of mainstreaming of environmental history that specialists have been promoting for decades, a study in which the environment is present and influential throughout the story even if it is not always front and center in determining the course of events.

There is, of course, much more to be said about the role of the environment in knowledge production in the Gulf South and beyond. LaFay, for instance, wonders about "imagined natures and their material counterparts; knowledge of the waterways that shaped the landscape; theories of climate that framed imperial interest and racial anxieties; practices of environmental management and control; or the ways ecology shaped or constrained human action." If *Frontiers of Science* can help scholars develop—and maybe even answer!—the sorts of important questions about knowledge and nature that all four reviewers have raised, then I will be one proud author. Even if not, these reviews have helped reignite my own curiosity about many of the issues, large and small, I explored in *Frontiers of Science*, and I'm delighted to end by thanking Melanie Kiechle for organizing this roundtable and LaFay, Rohland, Rood, and Willoughby for their generous and insightful comments.

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