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Scientific Islanders: Pacific Peoples, American Scientists, and the Desire to Understand the World, 1800-1860

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SCIENTIFIC ISLANDERS: PACIFIC PEOPLES, AMERICAN SCIENTISTS, AND THE DESIRE TO UNDERSTAND THE WORLD, 1800-1860

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Dean of the Graduate School
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by

Roberto Jesus Diaz

2019
Dedication

To my three parents: My mother, my father, and my aunt “Chicky.”

I would not have been able to do this without you, and I will never be able to thank you enough or repay you for all that you have done for me.

I love you so much.
SCIENTIFIC ISLANDERS: PACIFIC PEOPLES, AMERICAN SCIENTISTS, AND THE DESIRE TO UNDERSTAND THE WORLD, 1800-1860

by

ROBERTO JESUS DIAZ, B.A.

THESIS

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Introduction

Ben Finney had something to prove. He wanted to demonstrate through experimentation and collaboration with Indigenous Hawaiians that for nearly a millennium Polynesians had constructed massive canoes and sailed throughout the South Pacific without the use of navigational instruments like compasses and sextants. In his obituary, the University of Hawaii professor was credited with “show[ing] that ancient Polynesians sailing thousands of miles were capable of finding the Hawaiian Islands through non-instrumentation navigation.” Indeed, Polynesian Voyaging Society president Nainoa Thompson stated in response to Finney’s death, “The voyage [that Finney organized] changed the whole identity of the Hawaiian people. We went from being castaways…to being children of the world’s greatest navigators.” The praise was warranted. As a PhD student in anthropology, Finney wanted to settle the debate as to whether ancient Polynesians had been able to build such marvels of sailing ingenuity without knowledge of European maritime accomplishments. In the 1970s, Finney raised money to build a canoe based on Polynesian designs and drawings. Thanks to a group of Americans and Native Hawaiian Islanders also interested in confirming Finney’s assumptions, the construction of the vessel came to fruition. In his memoir of the building and sailing of the canoe—which the team dubbed Hokule’a, or Star of Joy—Finney wrote “…The voyage was designed to be more than an experiment…We hoped that our effort to reconstruct a voyaging canoe, and then sail it over a traditional route celebrated in chant and legend, would also serve the cause of Polynesian revival—

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2 Kubota, “Ben Finney Dies at 83.”
would make Hawaiians, and other Polynesians whose cultural identity became blurred in modern times...know the great maritime achievements of their...ancestors."

Finney’s explorations and collaborations highlight the circulation of scientific knowledge characteristic of South Pacific encounters with the West beginning in the sixteenth century. In this case, professional American scientists desired to prove that Pacific Islanders sailed thousands of miles across the globe without utilizing Western technology. To reach their conclusions, the scientists collaborated with the offspring of Polynesian maritime pioneers, using designs and technology created with Indigenous systems of knowledge. Furthermore, the team utilized the modern Western scientific method--experimenting and offering hypotheses, testing assumptions, and drawing conclusions from the results--to meet their needs. Though Finney also desired to reattribute the achievements of Polynesians to their rightful practitioners, he quickly discovered that achieving both goals would not be simple. Finney explained that his efforts became contentious, “tapp[ing] into a reservoir of jealously and long-repressed resentments that would threaten to keep [the group] from ever sailing to Tahiti.” Thus, the voyage of Hokule’a underscored the wonders and unpleasantness that can emerge when knowledge from disparate cultural systems—especially ones affected by centuries of colonization—engage with each other and attempt to disseminate information broadly.

Moreover, the voyage of Hokule’a demonstrated the impact that systems of knowledge created by Indigenous Pacific Islanders had on Westerners and vice-versa. Since the sixteenth century, when Portugal launched Ferdinand Magellan on a quest around the world; to the eighteenth century, when Captain James Cook and his crew began concerted scientific explorations of the Pacific Ocean and its islands; to the nineteenth century, when Americans entered the

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4 Finney, Hokule’a, 6.
scientific fray to distinguish themselves from their European brethren, the Pacific has served as a contact zone of global cultural practices and the societal systems in which they are formed.⁵ In this thesis, I seek to deconstruct one of these cultural practices—science—by analyzing how it functioned in the United States and the islands of the South Pacific between 1800 and 1860, and how these systems of thought engaged and transformed in the contact zones. My aim is to understand how science develops as a product of its environment and whether there is a fundamental definition of science, despite location.

I argue that in the nineteenth century, Americans and Indigenous Islanders sought answers to questions about the mechanics of the universe, the origins of humanity, and other bewildering natural phenomena that have perplexed humanity for millennia. To this end, American scientists, working in a Western cultural tradition entrenched in Enlightenment Era philosophies, created a professional system to produce discoveries. Pacific Islanders, conversely, searched for knowledge in their everyday lives, but they, too, integrated their quest in cultural practices stemming back thousands of years. But the frameworks created by Pacific Peoples to provide answers to questions about the workings of the universe normally were not considered pursuits of “natural history/philosophy” or “scientific” by Westerners.⁶ Even if Americans believed that Islanders engaged in science, they still considered them savage or barbaric. Indigenous Islanders, nevertheless, along with Americans, created extensive traditions to systematically perceive, organize, understand, and explain natural phenomena, ascribing causality to various wonders.

⁵ Mary Louise Pratt defines “contact zone” as a “space of colonial encounters, the space in which peoples geographically and historically separated come into contact with each other and establish ongoing relations, usually involving conditions of coercion, racial inequality, and intractable conflict.” See Mary Louise Pratt, Imperial Eyes: Travel Writing and Transculturation (Abingdon: Routledge, 1992), 6.

⁶ In the first half of the nineteenth century, the term “science” was not used as frequently as it is today to describe fields of research or pursuits made within those fields. Instead, the term “natural history” typically encompassed a broad range of studies including ethnography, zoology, botany, and geology. “Natural philosophy” generally denoted physics and other related branches of science.
These methods were rooted in religious principles, social dynamics, and connections with nature, and they manifested themselves in the transmission of knowledge, artwork, explorations of the seas, and processes—like agriculture, botany, and navigation—that yielded technologies for the benefit of their societies. As American scientists and Islanders encountered each other in the South Pacific—in a centuries long practice of Western interactions with Pacific Peoples—information stemming from these exchanges eventually circulated throughout the globe.

Americans and Indigenous Islanders also connected their scientific investigations to the communities in which they developed. In the nineteenth century, American scientists attempted to root their work in objectivity, empiricism, and data gathering. But their efforts were significantly influenced by the Enlightenment, Christianity, and other cultural norms. Similarly, Indigenous Islanders did not seek to understand the world independently of their social customs. Instead, they imbued their discoveries and explorations with cosmological meaning that connected them to the greater role of family and communal life, harmony with nature, and the realities of the sea surrounding them. Thus, the practice of science should not be viewed in a vacuum, or as a cold and detached system of knowledge-gathering intent on establishing objective results. Rather, it should be understood as a component of the greater intellectual traditions in which it develops. This study is influenced by the scholarship of historians like David Livingstone, who argue that science is a product of the environment in which it is carried out. As such, I posit that science cannot be considered merely a Western phenomenon.

A geographical challenge arises in developing an analysis of this sort. It is important to remember that the Pacific Ocean encompasses one-third of the earth’s surface. Thousands of

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islands are dispersed throughout this vast region—from the west coast of North and South America, to the eastern coast of Asia and the Pacific Rim, and traverses the expanse of the International Date Line. This study focuses on the islands of the South Pacific, utilizing the tripartite categories established by French Explorer Jules Sebastian Dumont D’Urville in 1832: Polynesia, Micronesia, and Melanesia. Hawaii, though technically located in the North Pacific, is considered part of Polynesia, and therefore will be the subject of analysis as well. Myriad cultures existed throughout these locales in the nineteenth century. In short, there was no monolithic Indigenous Islander culture when American scientists arrived, nor does one exist today. Anthropologists even debate the usefulness of the tripartite categories. While these terms might be useful for the purposes of geographical description, they offer little with regards to defining any true zones of cultural, linguistic, or ethnic similarities, except for Polynesia.\footnote{Patrick V. Kirch, “Peopling the Pacific: A Holistic Anthropological Perspective,” \textit{Annual Review of Anthropology}, Vol. 39 (2010): 133, \url{http://www.jstor.org/stable/25735104}.} For the sake of coherence in this work, D’Urville’s categories will be used to provide geographical orientation, and the islands of the South Pacific visited by the United States Exploring Expedition (Ex Ex) to the South Seas between 1838 and 1842 will serve as the primary focus of this study.\footnote{The region discussed in this thesis will be referred to interchangeably as the South Pacific, South Seas, and Pacific, if specific islands are not named. Moreover, I will often use “Islanders,” “Pacific Islanders,” “Indigenous Islanders,” and “Natives” interchangeably.}

The United States Exploring Expedition functions as a lens through which I filter much of this thesis. The Ex Ex’s circumnavigation of the globe was a watershed moment for professional American science. After nearly forty years of developing a system of discovery modeled on Western European achievements, the United States finally received governmental funding for an exploration of the South Seas, a first in the history of the nation.\footnote{The Ex Ex’s trek to the South Pacific was one facet of a much more comprehensive voyage that took the crew across the Atlantic Ocean down to South America, past Tierra Del Fuego and onto the South Seas and Pacific Rim; Antarctica; and the Pacific Northwest Coast of the United States.} The Ex Ex employed
approximately seven hundred men and a crew of seven scientists and two official artists: James Dwight Dana (geologist); Charles Pickering (naturalist and zoologist); Horatio Hale (philologist); Titian Ramsey Peale (artist-naturalist); William D. Brackenridge (botanist); William Rich (botanist); Joseph P. Couthouy (conchologist); Alfred Agate (artist); and Joseph Drayton (artist).¹² These researchers, all respected in their fields, had forged deep ties in the American scientific community and worked in branches of science popular in antebellum America. Pickering worked closely with the American Philosophical Society and Academy of Natural Sciences, along with confidant and scientific powerhouse Samuel George Morton.¹³ Morton, though primarily remembered for his prominence in the discredited field of phrenology, was greatly respected by scientists at home and abroad during his lifetime. Because of his influence, Morton advocated successfully for several appointments to the Ex Ex. Couthouy and Dana had also established a professional relationship with Morton and made names for themselves as natural philosophers.¹⁴ Peale had been raised in a family of naturalists and artists known for their museum located in the heart of Philadelphia. Then there was the captain of the Ex Ex, Charles Wilkes. Though Wilkes had not received as much training in science as the others, he represented the seafarer working in the shadow of Captain James Cook. Wilkes sought glory in the South Seas by following the path of the English naval pioneer who employed scientific crews onboard his three voyages to the South Pacific in the eighteenth century. The members of the Ex Ex helped to create or worked within the professional American scientific community before the launch of the expedition, visited dozens of islands and encountered countless peoples in the South Pacific during their four-year journey, and

returned with thousands of pages of observations and specimens. Therefore, the Ex Ex not only represents a prism through which to view American scientific achievements in the nineteenth century, it also spawned data that can be used to provide some sense into how Indigenous Islanders forged their own scientific systems.

An historian attempting to recreate Indigenous perceptions of the world faces difficulty. Unfortunately, scant records written by Indigenous Islanders prior to the mid-nineteenth century exist, and even nineteenth century sources are difficult to locate. Many of the intellectual traditions produced by Islanders were transmitted orally, and textual versions, quite often, do not exist. Furthermore, Westerners wrote much of what is known about Pacific Islanders during the period covered in this work, approximately 1800-1860. Sources produced by kanakas, or Indigenous go-betweens who voyaged with Westerners, offer unique perspectives. Many of these kanakas left their homes to travel with Americans and Europeans, learning to read, write, and speak in English, and becoming acculturated in Western society. Nevertheless, sources written by them are often scattered as well.15

Because of these challenges, I structure the sections dealing with Indigenous science similarly to Marcy Norton’s Sacred Gifts, Profane Pleasures: A History of Tobacco and Chocolate in the Atlantic World. Morton argues that, in the seventeenth century, Native Americans taught Spaniards about the physical, spiritual, and economic significance of chocolate and tobacco. The author utilizes a wealth of Spanish travel narratives, journals, official records, and codices to draw attention to Indigenous customs and behaviors, supporting her conclusions with secondary anthropological and archaeological scholarship based on fieldwork undertaken in Central and South America.16 I use similar methodology to create a representation of Indigenous intellectual traditions in the Pacific in the nineteenth century by incorporating travel narratives by Western

15 Chappell, Double Ghosts, xiv.
travelers and *kanakas*, scientific reports and raw data produced by the United States Exploring Expedition, and missionary perspectives into this work. Anthropologists, archaeologists, historians, and linguists have produced extensive literature pertaining to Indigenous tattooing, artwork, cultural traditions, seafaring and navigation, and religious beliefs, by means of items located during fieldwork and archaeological digs in the South Pacific. I use secondary literature of this nature to support my primary source analyses.

For the sections pertaining to the development of American science and its effect on average Americans, I utilize tracts published by Enlightenment Era philosophers, correspondence produced by American researchers showcasing the system of commerce they developed to further their endeavors, artwork produced by naturalists, popular literature, and the scientific reports and journals produced by the scientists onboard the United States Exploring Expedition. I use the Ex Ex materials in two ways in this thesis. In Chapter One, these sources underscore the methods used by American researchers to understand the South Pacific in an array of scientific fields and the influences of cultural biases on the scientists’ efforts. In Chapter Two, I use the same sources to demonstrate how Indigenous Islanders practiced science.

I root this study between 1800 and 1860 for two major reasons. First, professional American science began to ripen shortly after 1800, especially after Thomas Jefferson authorized the Lewis and Clark Expedition in 1804. While Robert V. Bruce contends that American professional science commenced in 1846, I agree with George Daniels’s view that much of the infrastructure and debates about proper methodologies took place between 1815 and 1845.17 Second, the Ex Ex circumnavigated the globe between 1838 and 1842, launching a plethora of

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American scientific activity in the Pacific that continues today. Lastly, the Civil War played a role in shifting the dynamics of American science, a phenomenon which requires its own comprehensive study.

This thesis contributes to the historiography of scientific endeavors in the United States and the South Pacific in several ways. First, an abundance of scholarship focuses on the travels of European scientists and explorers in Asia, Africa, India, and the South Pacific, but do not often touch upon American inquests in depth. For example, Michael Adas, in his seminal work *Machines as the Measure of Men: Science, Technology, and Ideologies of Western Dominance*, discusses European scientific activities, primarily those of the English and French, between the sixteenth and twentieth centuries. He contends that Europeans, who believed that their scientific and technological achievements made them superior to other nations, were influenced by the impact that material culture had on scientific pursuits. He explains, “…it is superior technology…that set the European traveler and his companions off…it indicates how influential achievements in material culture had become, especially those relating to technology and science, in shaping European perceptions of non-Western peoples even before the Industrial Revolution.”\(^\text{18}\) Adas focuses his study on Africa, Asia, and India because “some [civilizations] such as Japan and Polynesia, were not at all or only marginally in contact with the Europeans during key phases of the centuries considered and thus were not consistently major objects of European intellectual inquiry.”\(^\text{19}\) This statement is inaccurate, however, as evidenced by David Chappell’s *Double Ghosts: Oceanian Voyages on Euroamerican Ships*. In his study, Chappell highlights the pervasive interactions between Europeans and South Pacific Islanders dating back to the sixteenth

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\(^{19}\) Adas, *Machines as the Measure of Men*, 11.
century. Nevertheless, Adas astutely traces the development of science in Western Europe and its influence in America, indicating that even though race became the cornerstone of devaluing non-Western peoples in Europe and America, distinctions between groups were initially based on supposed Western advances in material culture and technology.\textsuperscript{20} Building upon the work of both Adas and Chappell, I investigate American scientific exploration in the South Pacific in the nineteenth century, a time during which the United States not only competed against established European scientific institutions for prestige, but also found inspiration in and collaborated with scientists in England, France, and Germany, among other Western European nations.

I also seek to position American scientific endeavors in the Pacific along the same trajectory as David Igler’s study of encounters between Westerners and Pacific Islanders, titled \textit{The Great Ocean: Pacific Worlds from Captain Cook to the Gold Rush}. Igler argues that traditional histories of American expansionism end at the west coast of the United States, adding, “lost in this standard narrative of the nation’s expansion is the fact that American mariners had continuously plied the Pacific and increasingly dominated certain parts of it since the 1780s. To the extent that the Pacific (and its transits in Asia) figured into US continental expansion, it was a goal achieved decades earlier by private American maritime interests…”\textsuperscript{21} Neither Manifest Destiny nor American science ended along the western shores of the Pacific Ocean. As such, I intend to expand upon the work of historians of American science like William Goetzmann, George Daniels, and Robert V. Bruce, who typically only give a cursory nod to the South Pacific in their extensive surveys of antebellum American science.\textsuperscript{22}

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\textsuperscript{20} Adas, 67-68. \\
\textsuperscript{21} Igler, \textit{The Great Ocean} (Oxford: Oxford University Press, 2013), 11. \\
\textsuperscript{22} See William Goetzmann, \textit{Exploration and Empire: The Explorer and the Scientist in the Winning of the American West} (New York: Alfred A. Knopf, 1966). William Goetzmann later expanded his work to discuss the “Second Great Age of Discovery,” during which Americans traveled the high seas (including the South Pacific) for the sake of scientific inquiry. See Goetzmann, \textit{New Lands, New Men: America and the Second Great Age of}
\end{tabular}
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Furthermore, I apply two concepts integral to the historiography of science studies to the development of science in antebellum America: communication and circulation of knowledge. James A. Secord, arguing that science should be viewed as a communicative act, underscores how both phenomena are intertwined. Science, according to Secord, is not simply an activity that takes place in labs or in the field and is then dispersed to the masses. Instead, to understand the creation and spread of scientific knowledge, we must think “about every text, image, action, and object as the trace of an act of communication, with receivers, producers, and modes and conventions of transmission. It means eradicating the distinction between the making and the communication of knowledge.”

He adds, “It has been recognized that…every act of communication excludes as well as includes…We need to analyze audiences and readerships closely and accurately…Otherwise we are simply reproducing the notion that science passes from highly individualized sites of production to an undifferentiated mass public.”

This study offers several examples to support Secord’s position. American scientists received scientific training from teachers and books; Pacific Islanders worked in conjunction with family and neighbors to construct massive sailing vessels for exploration; American scientists observed Islanders and reported on their findings; Islanders imparted their views of the world to these scientists; Americans learned about science and the South Pacific from scientists and popular culture; Islanders and Americans collaborated to recreate ancient Polynesian technologies. Even the descriptions used by American scientists to study Pacific Islanders excluded their subjects from civilization and served to create subject matter that could be observed, labeled, and organized into categories. As such, this study

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demonstrates that communication was integral to scientific practices, both in the United States and the islands of the South Pacific.

Lastly, this study attempts to demonstrate that not only was science practiced outside of the West, but different types of intellectual systems have yielded understandings of the mechanics of the universe. Physicist Fritjof Capra explores the connections between contemporary physics and Eastern Mysticism in *The Tao of Physics*, stating, “Whenever the Eastern mystics express their knowledge in words…they are well aware of the limitations imposed by… ‘linear thinking.’ Modern physics has come to take exactly the same attitude with regards to its verbal models and theories. They, too, are only approximate and necessarily inaccurate.”\(^{25}\) According to Capra, physics and mysticism share the same goal—understanding the fundamentals of the universe—and in undertaking studies of atoms and subatomic particles, physicists “could no longer rely with absolute certainty on logic and common sense.”\(^{26}\) Using Capra’s central argument as a basis for my analysis, I argue that Americans and Islanders employed similar dynamics to methodically comprehend the nature of existence.

Furthermore, Linda Tuhiwai Smith, an Indigenous Maori researcher, explains the tension that exists between many Indigenous Peoples and the memory of Western researchers in their homelands. She states, “Indigenous peoples across the world have other stories to tell which not only question the assumed nature of those ideals and the practices that they generate, but also serve to tell an alternative story: the history of Western research through the eyes of the colonized.”\(^{27}\) Western research, according to Smith, often entailed aggressive acts and “creeping policies that


\(^{26}\) Capra, *The Tao of Physics*, 51.

intruded into every aspect of our lives, legitimated by research, informed more often by ideology.”

This was certainly the case in terms of Western interactions in the South Pacific. Indigenous Peoples found their cultures transformed or erased irrevocably after centuries of Western incursions. In the case of the Ex Ex, scientists sought to learn more about the natural world and its peoples, but violence also erupted at times during the expedition, leading to the capture of several islanders and the murder of others. Therefore, this thesis attempts to ground the study of American scientific practices in historical methodologies that attempt to provide agency to the Islanders who served as subject matter for so many Western observers.

I analyze science as a concept from several perspectives in this work. In Chapter One, I describe what science meant as a method to antebellum American researchers at a time when the practice of science faced an identity crisis. But I also seek to understand the underlying cultural factors that influenced results, including religion, political and economic bureaucracies, and Enlightenment Era thinking. In Chapter Two, I argue that several of these factors, though manifesting differently in the South Pacific, also affected the scientific structures developed by Islanders. Moreover, throughout this study, I draw parallels between science and technology, drawing inspiration from Michael Adas’s definition of these intertwined, but separate, actions. Adas explains, “Science may be theoretical or applied, but it is oriented toward systematic experimentation and the discovery of underlying principles. The primary objective of technology, though it may involve theory and experimentation, is design, the application of rules to human artifice.”

Basing my characterization of science on the actions of Americans and Indigenous Islanders who sought to fathom the mechanics of the universe in the nineteenth century, and on Adas’s descriptions, I define the fundamental purpose of science as an organized attempt to discern

28 Adas, *Machines as the Measure of Men*, 5-6.
the causes and effects of natural phenomena. Despite particular methods developed to reach these ends, science is inherently fueled by human curiosity and observations stemming from sensory perception, a desire to ascribe explanations to phenomena that are not readily comprehensible, experimentation, and a desire to discover truth. Technology is a byproduct of science, with applications that can be used mundanely without having to hypothesize about causation. I contend that, despite differences in methods and customs, Americans and Indigenous Islanders, practiced science and technology according to the definitions set forth above.

This thesis is divided into three chapters. In Chapter One, I attempt to discern the structure of professional science in antebellum America. This chapter will also analyze the effects professional science had on the islands of the South Pacific and their inhabitants through the lens of the United States Exploring Expedition. I argue that professional American science developed along several trajectories in the first sixty years of the nineteenth century, through which Americans created a professional field in cooperation and competition with Western Europe, established a system that commodified science, and created subject matter that was inherently othered as a result. In Chapter Two, I seek to explain how Indigenous Islanders living in the South Pacific during the first half of the nineteenth century observed and understood the world around them based on intellectual traditions stemming back thousands of years. By comparing the scientific practices of Americans and Indigenous Islanders, I deconstruct the concept of “science,” as it was defined by Americans working in the Western scientific tradition during the first half of the nineteenth century. I do this to demonstrate that science was not merely a Western phenomenon. Lastly, in Chapter Three, I examine how average Americans acquired scientific information in the antebellum United States to determine how they learned about the South Pacific and how this information influenced their view of the region and of science in general. I end my
analysis where I began, discussing how interactions between Americans and Indigenous Islanders led to collaborations and circulations of knowledge, just like the effort to resurrect ancient Polynesian technologies organized by Ben Finney and his team of Indigenous and Western researchers.

An undergraduate student recently told me that science is the way to discover truths about the natural world because science uncovers facts, and as he put it, “A fact is a fact.” But, as will be demonstrated in the following pages, scientific methods have transformed over time, and more than one way to procure knowledge about the natural world has existed. To avoid becoming mired in rigid methodologies that may blind us to the wonders of the world, it is crucial to understand how various peoples have made sense of their existence and surroundings. Moreover, in America, and the West in general, science will most likely continue to play a significant role in societal development and individual well-being. Acknowledging the efforts taken by the people who forged the initial institutional scientific paradigm in the United States and comprehending the importance of international collaborations that utilize experts not only from the West but from Indigenous cultures, should illuminate a path to improve our collective search for the marvels of the universe.
Chapter 1: The Brotherhood of Observers and Experimenters

“...It is not the superiority of our Natural faculties, whether Intellectual or Physical, that is giving our race the advantage in some parts of the World, but our system of Civilization...”

So wrote physician and naturalist Charles Pickering in his journal while a member of the scientific corps assigned to the United States Exploring Expedition to the South Seas. The Ex Ex, as the voyage was also known, circumnavigated the globe between 1838 and 1842, collecting data about the heavens, the geological makeup of the earth, flora and fauna, shells and sea life, birds and land mammals, and people. The scientists aboard the Ex Ex applied their professional scientific methods, stemming from Western intellectual notions, to gain a better understanding of how the earth and cosmos functioned and humankind’s place within them. Sailing with preconceptions that informed their expertise, these Americans were shocked by many of the discoveries they made throughout the world, leading several of them to reconsider prevailing scientific thinking.

The launch of the Ex Ex was the culmination of decades of scientific professionalization in antebellum America. Not only did a formalized vision of scientific study begin to coalesce, but a network of mostly men shaped their understanding of the mechanics of the universe, in competition and conjunction with Western European accomplishments in science. They applied their knowledge and saw their views of the world shaken during their treks throughout the globe, specifically in the South Pacific. As professional science continued to emerge and harden, so too did Americans proceed with rapid westward expansion based in Christianity, race relations, economic development, and knowledge gleaned from explorations. Science, accordingly, was an integral component of this American brand of civilization.

29 Charles Pickering, Journal, September 17, 1839.
But exactly what comprised the kind of civilization that Pickering ascribed to the successes of Americans? To what extent and in what ways did science affect this system? What factors affected the practice of science? And lastly, how did scientists themselves mold a professional paradigm per their personal religious, political, and intellectual views? The following chapter seeks to answer these questions and link them to the emergence of professional science in antebellum America. In addition, this chapter analyzes the effects that specialized science had on the islands of the South Pacific and their inhabitants, and the impact those regions and peoples had on American science and scientists. I argue that professional American science developed along several trajectories in the first sixty years of the nineteenth century. First, American scientists worked in collaboration and competition with Western European scientists, particularly those who lived in Britain, France, Scotland, and Germany. Researchers on both sides of the Atlantic engaged in lengthy correspondence with one another, comparing or relating observations and debating new findings. But Americans also sought to place their own stamp on discovery, especially after the Louisiana Purchase opened vast territory in the western U.S. to explore and the end of the War of 1812 gave Americans more of an opportunity to forge an identity independent of Britain. Second, despite their desires to develop structured institutions based on objective analysis, many scientists were inevitably molded by preconceived notions about methodology, race, the value of civilization, and religious doctrine—a fusion of Enlightenment Era views and antebellum American culture. Third, scientists began to modify their methods, but these approaches still served to create subject matter out of almost anything scientists wanted to study. This process revolved around observation, data collection, labeling, artwork, death, and categorization. Fourth, these tracks, emerging at the turn of the nineteenth century, converged during the United States
The Professional Scientific Paradigm in America

On August 25, 1860, The New York Times reported on the “progress and prospects of science in America.” Though the Times reporter did not believe he could give an adequate overview of this progress given the materials available to him, he noted:

Amid all that wearisome enumeration of details…one fact may have made itself clear…that all over the land is a strange new guild, the brotherhood of the observers and experimenters—restless questioners with chemic test and geologic hammer and sounding plummet and stupendous mathematic analysis—extorting Promethean secrets from earth and air and sky and ocean, and whose ceaseless activity is silently transforming the entire surface and substance of our modern life, and building up a new heaven and a new earth around us! \(^{30}\)

By 1860, this assessment was accurate. While the author may not have been able to completely fathom the progress of science in America at this time, he provided an astute report of its growth. Over sixty years, American scientists had worked tirelessly to create a professional sphere, engaging in fields such as chemistry, botany, zoology, conchology, ethnology, philology, and phrenology. Most of the scientists who engaged in these pursuits were men—at least until the latter half of the century—and traveled throughout the mainland United States and the high seas collecting data and offering analyses explaining the workings of the universe. \(^{31}\) Their risky


\(^{31}\) Generally speaking, antebellum gender norms precluded American women from entering professional science. Nina Baym explains, “The most reactionary thinkers claimed outright that women were not intelligent enough to understand it. More subtle critics proposed on the one hand that women’s immersion in detail made them uncapable of rigorous scientific abstraction…They claimed on the other hand that women were too physically delicate…” Nina Baym, American Women of Letters and the Nineteenth-Century Sciences (New Brunswick: Rutgers University Press, 2002), 4. Nevertheless, some women, like Lucy Way Say, wife of naturalist Thomas Say, worked alongside her husband and provided much of the artwork for his book American Conchology. She also corresponded with prominent scientists like Samuel George Morton. As the century progressed, more women received training in the sciences. By the second half of the century, the number of women engaged in various fields
ventures, to both their health and their pocketbooks, consumed them, even while the American public was slower to accept the benefits of science to society.\textsuperscript{32}

A major shift in the study of science occurred between the eighteenth and nineteenth centuries in America. In the colonial and early republican eras, scientific studies could be pursued by almost anyone—trained or untrained—with enough money and interest to propel inquiries. Publications of results were few and universities rarely offered concentrated training in the sciences. During the early nineteenth century, however, the study of science became professionalized as more branches of discovery emerged. Robert V. Bruce explains, “The proliferation of its branches meant that individual scientists had to become more specialized. The growing complexity of science demanded formal scientific education and full-time professional work, not the casual, intermittent attention of self-taught amateurs.”\textsuperscript{33} Accordingly, society began to see scientists as professionals working within a vocational structure, and this hindered the degree to which average Americans could partake in amateur experimentation and observation.\textsuperscript{34} The technical language used by professionalized scientists also limited how much Americans-at-large could understand the findings yielded by this new group of investigators.

In effect, professional American scientists developed what Thomas Kuhn called a “paradigm” in \textit{The Structure of Scientific Revolutions}. According to Kuhn, paradigms may take

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\item \textsuperscript{32} George H. Daniels, \textit{American Science in the Age of Jackson} (New York: Columbia University Press, 1968), 41-45.
\item \textsuperscript{34} Bruce, \textit{The Launching of American Science}, 4.
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various forms. For example, a paradigm might be based on a specific phenomenon, like Newtonian mechanics, upon which scientists build a massive body of work. But paradigms can also be considered professional structures which include and exclude individuals based on certain criteria, like education.\textsuperscript{35} The professional paradigm established by Americans in the nineteenth century typically included scientists who received at least some training at a school, college, or university, though this was not always the case. Professional scientists also communicated amongst themselves, in-person and through correspondence, and with European scientists they wished to emulate. Indeed, Americans sought to create a professional system inspired by the successes of scientists in England, France, and Germany. Professional American scientists also published their findings in journals, like the revered \textit{American Journal of Science and Arts}, which often contained technical language far beyond the comprehension of average Americans. Furthermore, professional scientists sought government funding for their work, though they were often met with apprehension or disapproval in the first half of the century, as evidenced by the near decade long delay of the United States Exploring Expedition. There were also gender barriers to joining, since antebellum norms frequently prevented women from entering professionalized science. Bruce summarizes the nature of the professional scientific paradigm in America when stating, “In short, the pursuit of science had to become a collective enterprise, like those in business. Modern science needed labor, capital, and management...”\textsuperscript{36} Ultimately, professional American scientists worked in their fields full-time and attempted to increase the influence science had on their fellow citizens.

Individuals outside of the paradigm were not as quick to accept it, however. Certainly, the United States Government expressed excitement for scientific discovery after the country


\textsuperscript{36} Bruce, 4.
expanded its size by approximately one-third with the purchase of the Louisiana Territory in 1803. One year later, the expedition authorizing Captain Meriwether Lewis and Lieutenant William Clark to explore North America from the Mississippi River to the Pacific Ocean commenced. Both men were charged with locating avenues for the development of commerce on the continent, but inquiries about astronomical projections that could be used for cartography and observations of Native American tribes infused the expedition with scientific purpose. William Goetzmann writes, “It was this general approach that called for the study of any and all useful phenomena that set the pattern for much of the early American exploration in the Far West and gave it a tremendous advantage over the more specialized efforts by competing nations.”

Subsequent exploring expeditions would have difficulty securing this type of support. Some ventures, like the Long Expedition in the Rocky Mountains, received funding. But even this paled in comparison to the financial support offered by the Crown to English explorers. Professional scientists, who quickly began to rely on larger sources of revenue to propel their work, learned to adapt their modes of advocacy. George Daniels explains, “The strategy here was to link appeals both to patriotism and the Democratic assumptions of Jacksonian America with appeals to the general utilitarian spirit of the age.” Professional scientists had to demonstrate to the public and government that their vocational pursuits were valuable to society, even if this meant guilting funders into giving by comparing the amount of money English explorers received compared to Americans. Though scientific endeavors were not unpopular in the United States, professional scientists faced difficulty in justifying their institutions.

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38 Daniels, 41-42.
39 Daniels, 41.
40 Ibid, 44-45.
Proponents of the United States Exploring Expedition tackled the same obstacles as they attempted to make the voyage a reality. European scientists had received financial support from their homelands for scientific explorations for several decades. Nathaniel Philbrick notes that since Captain James Cook’s voyages in the late eighteenth century, “England sent out twenty-eight exploring expeditions…France followed with seventeen, while Spain, Russia, and Holland mounted a total of thirteen voyages among them.”\footnote{Nathaniel Philbrick, \textit{Sea of Glory: America’s Voyage of Discovery The United States Exploring Expedition 1838-1842} (New York: Viking, 2003), xvii.} The American Government funded no such effort in the Pacific until the Ex Ex in 1838, and some politicians in Washington believed that the U.S. Constitution did not authorize congressional expenditures for explorations, leaving lobbyists to frame their proposals to suit the Commerce Clause and other provisions outlined by Article I, Sections 8 and 9.\footnote{U.S. Const. art. I §§ 8 & 9.} Daniels states, “…the decision whether to support a given scientific enterprise was rarely made in terms of any judgement about science; it was made, rather, on the basis of one’s position on the Constitution or on his sectional political interests. As for ‘internal improvement,’ it was easier to show constitutional legitimacy for a project that would serve some immediate public purpose.”\footnote{Daniels, 25.} The United States Exploring Expedition was delayed for almost ten years, in part because of politics and funding. A February 1829 report from the Committee of Naval Affairs presented to the United States Senate underscored why. The report indicated that the House of Representatives declared “it expedient that one of the small public vessels be sent to the Pacific ocean [sic] and the South seas [sic], to examine the coasts, islands harbors, shoals and reefs in those seas, and to ascertain their true situation and description…”\footnote{U.S. Congress, Senate, Committee on Naval Affairs, \textit{Exploring Expedition to the Pacific, Exploring Expedition, 20th Cong., 2d Sess., 1829}, S. Doc. 94, 2-9.} Congress took no significant actions, nonetheless, and the report instead expressed the Committee’s distaste for the extensive
planning that took place for such an expedition without congressional input. The report noted, “However desirable it may be ‘to open new sources to our commerce,’ or to give greater security to those who navigate those seas; the Committee cannot perceive why those objects would be deemed of more value than ‘to open new sources’ to agriculture, or give security to those who may be engaged in other branches of industry.” The Committee delayed the proposed expedition, citing the exorbitant expense of an all but congressionally authorized activity. For Congress, the cost outweighed the public necessity of the Ex Ex. Given that unpopular President John Quincy Adams extensively championed the Ex Ex may also account for its failure in committee.

American science needed support from business interests to receive attention from Congress. Decades before the Ex Ex departed the United States, American merchants had charted territory in the South Pacific. Parties interested in America’s foreign markets, following in the footsteps of their European brethren, partook in whaling and fur sealing, for instance, in the during the 1780s and 1790s. Even still, whaling added peripheral value to American foreign commerce. For instance, by the 1850s, “…whaling was grossing less than $11 million, [while] the total value of American foreign commerce exceeded $583 million.” Despite these figures, advocates with whaling interests like Jeremiah Reynolds persuaded the American Government to fund the Ex Ex in the 1830s. By March 1836, the Committee on Naval Affairs, the same legislative body that derailed Adams’s plans seven years earlier, reported “No part of the commerce of this country is more important than that which is carried on in the Pacific ocean [sic]. It is large in amount…Its results are profitable…It is a nursery for seaman for which no substitute can be found…The

45 Ibid.
47 Johnson and Best, The United States and the Pacific, 52.
48 Ibid, 53.
commerce of the Pacific may be greatly extended in all its departments.” Barry Joyce explains that the Ex Ex had several goals. First, the mission had to secure whaling routes for American sailors, ensuring that Pacific Islanders would not interfere with commerce through violence or theft. Second, professional American scientists saw an opportunity to further investigate the varieties of plant and animal life, geographical features, and Native customs of the South Seas in order to better understand the origins and mechanics of the world. This curiosity about where humanity emerged would provide Americans with a better understanding of the nature of mankind, which impacted social and legal policies toward non-whites. The Ex Ex would also place professional American science within the ranks of European accomplishments as Americans, in general, sought to conquer westward lands through Manifest Destiny. Consequently, American business interests in the South Pacific, Manifest Destiny, and a desire to understand the mechanics of the universe all intersected to make this watershed moment in professional American science a reality.

Science Defined

The definition of science in antebellum America had manifold meanings, and science faced an identity crisis as professionals sought to grapple with the efficacy of their methods. Researchers were caught between maintaining the status quo—ingrained in the seventeenth philosophy of Sir Francis Bacon—and developing procedures that moved beyond data collection and inductive reasoning. For over two centuries, the study of natural history and natural philosophy revolved

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around the teachings of Bacon who, in 1620, argued that “the formation of notions and axioms on the foundation of true induction is the only fitting remedy by which we can ward off and expel [false] idols.”\textsuperscript{51} Bacon believed that proper thinking, which sought truth in nature, involved amassing information which could then be used to inductively reason to conclusions. He explained, “The human understanding is, by its own nature, prone to abstraction, and supposes that which is fluctuating to be fixed. But it is better to dissect than abstract nature…It is best to consider matter, its confirmation, and the changes of that confirmation, its own action, and the law of this action or motion…”\textsuperscript{52} This philosophy spread throughout Europe during the Enlightenment in the eighteenth century, and, later, to the United States. Indeed, by the turn of the nineteenth century, “the Baconian Philosophy so dominated that whole generation of American scientists that it is difficult to find any writer…who did not assume…that readers knew all about it.”\textsuperscript{53}

The Baconian method changed over two centuries, however, and came to possess several meanings for nineteenth century American scientists. According to George Daniels, most American scientists did not follow Bacon’s philosophy to the letter, but “they were struck by Bacon’s eloquent appeal for the study of facts as opposed to idle speculation…”\textsuperscript{54} Bacon’s approaches, then, aimed at discerning fundamental truths about nature through observation of natural phenomena and collection of data; the avoidance of hypothesizing outside of the boundaries of the data, which is to say that reasoning had to be induced from the available evidence; or equivocating science with the classification of data (or taxonomy).\textsuperscript{55} These methods could be applied to almost any branch of science in America, though to mixed degrees of success.

\textsuperscript{52} Bacon, \textit{Novum Organum}, 27.
\textsuperscript{53} Daniels, 63.
\textsuperscript{54} Ibid, 65.
\textsuperscript{55} Ibid.
For researchers who sought merely to classify specimens by name and description—like minerals, insects, or shells—the Baconian system served their purposes well. For geologists like James Dwight Dana, who sailed onboard the Ex Ex and sought a unifying theory of the earth’s formation and structures, it did not. As Daniels explains, a geologist could not obtain a piece of the earth’s crust or delve deep into its mantle. Some types of investigations required educated speculation. Consequently, several Americans further adapted Baconianism to suit their intellectual goals.

By the 1830s, scientists began to shy away from Baconian philosophy, citing its shortcomings as their reason for doing so. One major feature of Bacon’s methodology was the process of producing detailed nomenclature for natural phenomena. This involved, for instance, dividing and grouping botanical, mineralogical, zoological, and other natural collections into categories according to similar features or functions. Mineralogists grouped rocks and minerals based on shape, size, color, and/or texture; zoologists clustered animals according to physical and behavioral features; botanists organized plants according to their sexual systems; ethnographers situated races of man based on facial features, body types, complexion, and behavior. Daniels writes, “Most scientists tended to think that when a piece of data was finally located in its place in the truly ‘natural system’ they would have complete scientific knowledge of that data. Bacon himself had placed great emphasis upon arranging data systematically in tables…” Nevertheless, the tabular and descriptive systems of organizing plants and creatures became too unwieldy and inadequate. Possibly nowhere was this more clearly seen than in botany. Since the eighteenth century, when Swedish botanist Carl Linnaeus established his classificatory system for distinguishing plants based on their sex organs, many botanists had adhered to this scheme that

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56 Ibid, 108.
57 Theoretical physicists, today, would consider this type of hypothesizing integral to their work. In the nineteenth century, this sort of exercise was taboo for strict adherents of Bacon’s philosophy.
58 Daniels, 103.
brought some semblance of order to the plant world.\textsuperscript{59} American botanists like John Torrey and Asa Gray, however, attempted to move away from this organizing method, which even Linnaeus admitted was arbitrary.\textsuperscript{60} New plant discoveries in the United States, Africa, and in the North Atlantic, which did not fit into Linnaeus’s system, made this effort even more paramount. According to Daniels, “…to Gray, all the proposed classifications began with an a priori judgement…of which organ system was ‘most important.’ And in every system some group or other formed in accordance with it was demonstrably unnatural.”\textsuperscript{61} Despite endeavors to create a better system, American botanists still struggled to reconcile their subjective categorizations with a scheme that reflected the realities of nature.\textsuperscript{62} The science of mineralogy was somewhat more fortunate in this regard, as chemical analysis began to define the compositions of rocks and minerals, offering a more nuanced view of the specimens than simple exterior observation could provide.\textsuperscript{63} In 1826, physician James E. Dekay, in an address to the Lyceum of Natural History in New York, noted, “The first attempts to arrange minerals by a certain supposed resemblance in their properties was evidently unsatisfactory and insufficient…it was not until the composition of minerals by chemical analysis was attended to, that Mineralogy was fairly entitled to take the rank of science.”\textsuperscript{64} For Dekay, chemical analysis provided detail about the fundamental structure of minerals that mere description based on external features could not. This, in turn, made mineralogy a more proper science. Even though American research remained grounded in the Baconian system beyond 1860, some scientists began to adapt the centuries’ old methodology to suit their needs or move away from it all together.

\textsuperscript{59} Ibid, 112-113.
\textsuperscript{60} Ibid.
\textsuperscript{61} Ibid, 113.
\textsuperscript{62} Ibid, 114-116.
\textsuperscript{63} Ibid, 106-110.
Underlying Cultural Assumptions and Their Effects on American Science

In conjunction with the methodologies emerging in the early nineteenth century, underlying cultural traditions and presuppositions permeated American science. These assumptions—engrained in the European Enlightenment, discourse about the value of material culture, the othering of non-Western peoples, and the intermingling of science and religion—consequently influenced methods and conclusions. In this sense, American research violated Bacon’s principles. The philosopher warned, “…by far the greatest impediment and aberration of human understanding proceeds from the dullness, incompetence, and errors of the senses; since whatever strikes the senses preponderates over everything, however superior, which does not immediately strike him.”\(^{65}\) American scientists often integrated supposed truths about nature into their thinking, and these persistent cultural beliefs served as a baseline of fact for them. The lasting impact of the Age of Enlightenment provided Americans with many of these cultural norms. Richard Lansdown notes, “…Enlightenment thinkers [such as Montesquieu, Diderot, and Voltaire, Hobbes, and Rousseau] were bent on exposing injustice, illuminating government inefficiency, and rectifying administrative processes. Furthermore, the movement hoped to free humankind from superstition and religious dogma, and it believed that scientific knowledge and education could do this…”\(^{66}\) Nevertheless, another central tenet of the Enlightenment held that people could move from savagery to civilization over time if placed in the proper environment or if educated, thereby improving their societies.\(^{67}\) According to this notion of improvability, mankind existed in various forms of progress throughout the globe and Native peoples represented earlier stages of

\(^{65}\) Bacon, 26.
\(^{67}\) Lansdown, “The Noble Savage,” 65.
society, providing civilized individuals a glimpse into the past.⁶⁸ The eras of man could be traced from savagery, to an intermediate stage between savagery and civilization, and finally to civilization. The savage, according to Jean Jacques Rousseau, exhibited behaviors both admirable and distasteful, explaining that:

…savage man, wandering in the forests, without work, without speech, without a home, without war, and without relationships, was equally without any need of his fellow men and without any desire to hurt them…Being subject to so few passions, and sufficient unto himself, he had only his true needs…and his intelligence made no more progress than vanity…There was neither education nor progress…the species was already old, and man remained eternally a child.⁶⁹

The savage, therefore, did not burden himself with the turmoil of civilized societies, but neither did he improve his life, living in a childlike state in an ahistorical society.⁷⁰ Rousseau wrote in response to Thomas Hobbes who claimed that savage life was violent and repulsive, and both views were read by European intelligentsia. Despite the differences in their philosophies, Rousseau, Hobbes, and many other Enlightenment thinkers forged a view of indigenous peoples that made their way into the approaches and conclusions of American scientists working in the Pacific.

The Enlightenment also framed Western conceptions of time and the stages of society, linking history with individual and societal progress, which, in turn, could be studied with scientific methods. For Europeans, progression meant moving from brutal, warring factions of men to a morally just society. J. G. A. Pocock writes, “History was beginning to look like a sequence of moral and cultural transformations, concerning each one of which the consciousness must reach contestable judgements because the consciousness itself was historically generated…Europeans

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⁶⁸ Lansdown, 67-69.
⁷⁰ Lansdown, 70.
became possessed by...an extremely complex history of themselves...and a narrative of conflicts between encoded values and states of civilization...”

Mitchell’s Geography, an American textbook published in the 1840s, illustrated this unfolding of time, demonstrating how European Enlightenment views influenced Americans well into the nineteenth century. The frontispiece contains an illustration titled “The Stages of Society” (Fig. 1) showcasing the progression of man from barbarism to enlightenment. The evolution in the image occurs clockwise, as if man could improve himself as time advanced. The savages, located in the upper left-hand portion of the illustration, ride on horse or camelback and carry long spears. They walk around naked and live in an arid land. The enlightened and civilized groups, appearing in the lower-left hand corner of the image, however, don Victorian dresses and pantaloons, as if they belong to the gentry, and engage in conversation amongst fully bloomed trees. Several American scientists, including some onboard the Ex Ex, believed that humanity evolved in this manner, as long as Natives were placed in the proper environment. But these temporal notions also provided American scientists with justification for devaluing non-Western peoples, like Pacific Islanders, because according to their ethnographic and philological observations, Indigenous Islanders remained stuck in the past. Conversely, Americans, despite some European protestations, had reached a pinnacle in their existence as a people.

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73 Some European thinkers at the turn of the nineteenth century believed that America represented a new, untamed wilderness in which savagery was rampant. American Indians lived as savages, according to these thinkers, because of environmental determinants. Americans descended from colonial transplants understood, though did not necessarily agree with, the implication inherent in these beliefs: they, too, could become savage if left in uncivilized locales. See Robert E. Bieder, Science Encounters the Indian, 1820-1880 (Norman: The University of Oklahoma Press, 1986), 1-2.
Philologists and ethnologists fixed their work within these cultural and intellectual biases. Philologists, for example, believed that the study of language offered a window into the development of societies and cognition. Robert Bieder explains, “The search for a universal grammar and the collecting of languages were rooted in the Enlightenment belief in universal consciousness and faculties of perception. Comparative study of ‘primitive’ languages…would hold clues not only to the origin of language, but also to reason itself, since ‘primitive’ languages were considered simpler and thus older than historic language…” Ethnographers also engaged in their scientific pursuits within this Enlightenment Era paradigm. Through observation of peoples and cultures, ethnographers believed they could study the history of humanity, especially with

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regards to the progress (or lack thereof) of Indigenous Peoples. For instance, Albert Gallatin, founder of the American Ethnological Society, argued that “all mankind constituted a single species [and] progressed from savagery through barbarism to civilization…” He also believed that environmental factors explained the livelihoods and behavior of Native tribes at a time when other American scientists and thinkers increasingly began to ascribe race as the cause. Ethnography and its differing schools of thought became popular among scientists in antebellum America, leading to the formation of the American Ethnological Society in 1848. By gathering as many observations about peoples and their cultures, American ethnographers believed they could develop broad conclusions pertaining to their origins and ascribe causal factors to their behaviors. In this sense, American ethnography followed Baconian principles. Gallatin also believed there were practical elements to ethnography, writing, “The American Missionaries in distant parts are manifesting an interest in it, inasmuch as many of them are aware that a knowledge of the history, manners, language, and literature (if any) of the nations among whom they labor, is the first essential step to the introduction among them of the religion and knowledge of Christendom.” Accordingly, ethnography could offer insight into the origins of man and offer practical benefits for missionaries who sought to improve the nature of Natives. Though ethnography had been practiced by scientists before the founding of Gallatin’s society, by the 1840s the field had entered the professional scientific realm in America, shaping ideas about the origins of humanity.

Religion and science intersected in several important ways for antebellum Americans that affected results produced by researchers. The first was the debate over monogenesis and polygenesis. Reginald Horsman explains that some Enlightenment Era intellectuals in Europe and

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75 Ibid, 32.
76 Ibid, 35.
77 Ibid, 1.
the United States had posited that all humanity spawned from Adam and Eve four thousand years earlier, implying that all human species were one species—an idea called monogenesis. Others, however, could not fathom the lack of progress in civilization perceived in Native tribes, and believed that attempts to move them into new environments or educate them were futile. This concept, known as polygenesis and promoted by scientists like Samuel George Morton, held that “the other people who appeared in every way ‘savage’ and physically different could not have sprung from the same ancestors.” These “savages,” therefore, could be classified as a different species, divided into races distinct from Anglo-Saxons who had descended from Adam and Eve. According to Robert Bieder, “For polygenesists, it was obvious that darker skin and inferior mentality differentiated mankind’s races from one another since the Deluge and probably since creation.” Monogenesists and polygenesists grounded their beliefs in the origins stories found in the Bible, but they diverged on whether the narratives explained the full history of man’s racial divisions. The racial theory of man established by German scientist Johann Blumenbach in the late eighteenth century, widely assumed in America, held that five races existed: Mongolian, American, Caucasian, Malayan, and Ethiopian. Each race had its own set of characteristics that were generally immutable. Bieder adds, “…although the concept of species was the usual expression of zoological classification, in nineteenth-century racial theories of man the species concept was replaced by the concept of type; that is, each race had a set of typical physical characteristics that identified its members and that were inherited from an original type.”

80 Ibid, 48.
81 Bieder, 90.
82 Bieder, Science Encounters the Indian, 61.
83 Bieder, 81.
polygenesists, these types, and by extension races, were evidence of separate creations by God and indicative that several species of man existed.

Phrenologists, like Morton in the 1830s and 1840s, thought that any efforts to change these inherent characteristics of an individual species through environment or education was as foolish as trying to transform a wolf into an elephant.\(^{84}\) According to Morton, racial distinctions and ability could be distinguished by measuring the capacity of human skulls. Barry Joyce explains, “…surrounded by this macabre collection at home in Philadelphia, the doctor could impassively and calmly measure, sort, pour his pepper seed [into the skull cavity], calculate the results, and objectively organize mankind into a fixed hierarchy.”\(^{85}\) Phrenology was not a fringe science, and Morton was highly respected as a researcher. In a review of *Crania Americana*, Morton’s monograph about skulls in North and South America, the prestigious *American Journal of Science and Arts* commended Morton for “the most extensive and valuable contribution to the natural history of man which has yet appeared on the American continent, and anticipate for it a cordial reception by scientific men, not only in the United States, but in Europe.”\(^{86}\) Beliefs like these, in turn, justified slavery and aggressive expansionism in the United States since, “to many people it seemed obvious that Indians resisted civilization and were ‘blighted’ by its contact and that blacks could only be partially civilized.”\(^{87}\)

Not all Westerners believed that human conditions were static, however, as seen through the activities of missionaries. Western missionaries in the Pacific, for example, sought to civilize and domesticate the Islanders they encountered. An article in the inaugural issue of *The

\(^{84}\) Ibid, 89.
\(^{85}\) Joyce, 19.
\(^{86}\) Prospectus of *Crania Americana* found on the back of a letter from George Combe to Samuel George Morton, November 4, 1840 (date approximate), Samuel G. Morton Papers, American Philosophical Society.
\(^{87}\) Ibid, 83.
Polynesian, an American periodical published in Hawaii during the early 1840s, noted, “Situated as we are in the North Pacific…fast developing its great natural resources, and becoming a focus for civilization, and surrounded by islands and countries springing, almost Minerva like, into the rank of civilized nations, or on the borders of those empires, whose exclusive policy is rapidly wearing away before the more powerful friction of greater civilization.” 88 The spread of knowledge was integral to these civilizing efforts in Hawaii. In a subsequent issue of The Polynesian, an article appears advocating for the education of the offspring of local chiefs, stating, “Children, even of the highest potentate, must be led along the same path in which the peasant boy climbs the hill of science…The necessity of the children of the chiefs being thoroughly educated is apparent from the fact that they will be called, before long, to stand at the helm of government.” 89 These missionaries combined their religious work with the teaching of future Hawaiian leaders, linking education to a well-functioning government. Missionaries stemming from the London Missionary Society also interwove religion and science, believing that Christian theology and understandings of nature complemented one another, with the rational, Christian God at the helm of creation. 90 Sujit Sivasundaram explains, “Since scripture provided the ultimate word on how evangelicals should govern their lives…In adopting a distinct style and stating from a firm belief in its reliability, missionaries hoped to provide a Christian alternative to the proliferation of [islander] accounts of exotic nature.” 91 Missionary endeavors, therefore, were a means of teaching, cultivating, and spreading Western ideas about nature and altering the supposedly faulty notions possessed by Islanders. Abby Jane Morrell, who traveled with her husband Captain Benjamin

88 “The Polynesian,” The Polynesian, June 6, 1840.
Morrell to the South Seas between 1829 and 1831, testified to the efficacy of missionary work on the lives of Indigenous Peoples in her journal. She noted, “Wherever an intelligent missionary establishment is to be found, there good results have been witnessed, notwithstanding the abuse of some…”

Though balking at the introduction of vice, such as liquor, into Native lands Morrell believed that exploring expeditions could be advantageous not only for commerce, but for the well-being of civilization.

Belief in the tenets of Christianity was not unusual for nineteenth century American scientists either. Men like Samuel George Morton, Asa Gray, and James Dwight Dana thought that Christianity informed their work and served as the underlying system upon which it was built. Asa Gray, for example, a friend and admirer of Charles Darwin and an advocate for his theory of natural selection, came of age in Presbyterian and Congregationalist traditions and believed that God’s influence could be seen continuously throughout nature. He did not believe in polygenesis and concluded that all men were equal in God’s view. Over several decades, through his work in botany, Gray also discerned that species changed over time by adaptation to their environments. In 1854, Gray began a correspondence with Charles Darwin that lasted for over two decades. Gray did not shy away from his religious beliefs, and instead allowed them to inform his spirited debates and collaborations with Darwin. The botanist believed that God’s power could be seen through the interconnectivity of nature. Rather than contradict the existence of God, Darwin’s theory of natural selection showcased the mechanisms God used to facilitate existence.

William E. Phipps writes, “[Gray] observed that humans have more physiological similarities with primates than the

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96 Ibid, 170
higher mammals have with many species lower on the evolutionary scale...Gray believed that evolutionary theory might result in a healthy humility among humans as to their place in the natural order.” So impressed by Darwin’s theory, Gray even helped him publish *The Origin of Species* in the United States in 1860.

Similarly, the underlying principles of geology and conchology combined scientific methods with theology. James Dwight Dana believed that God played a role in the formation of the earth’s geology. Dana’s investigations into rock, coral, and volcanic formations precluded him from agreeing with monogenesists that the planet was only four thousand years old. Nevertheless, like Gray, he believed that God’s mechanics could be seen, albeit only partially, through geological transformations. In observing the islands of the South Pacific while a member of the Ex Ex he wrote:

> It is vain hope to understand fully the works of Him who is himself infinite and incomprehensible. The scrutinizing eye of science penetrates with far-reaching sight the system of things about us, and in the dim limits of vision reads everywhere the word mystery. All life, animal, and vegetable, and all that is inanimate, declare it; surely there is no special reason, except such as may arise from want of study and consideration, for attributing it pre-eminently to the humblest grades of existence.

Conchology—the collection and study of mollusk shells—practiced by professional scientists and non-trained Americans alike, could, too, illuminate God’s plans. Conchology was rooted in Baconian traditions, the countless shells available throughout the globe ripe for collection and description. Non-trained researchers, like Abby Jane Morrell, could partake in the study of shells, admiring their beauty and connecting history to the design of a Creator. In the published journal of her explorations, she wrote, “The admirable construction of shells for the purposes of which

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97 Ibid, 173.
98 Phipps, 169
they were intended, and the beautifully variegated colours [sic] with which many of them are adorned, afford additional proof to the observer of nature of the superintending hand of Providence extended even to the minutest objects of creation."\textsuperscript{100} Thus, for Gray, Dana, and untrained investigators like Morrell, theology was not anathema for science, but rather a systematic way to understand God’s designs.

That science and religion coexisted without major clashes during the first sixty years of the nineteenth century is not surprising given the importance of religion to Americans at this time. The Second Great Awakening spawned religious devotion throughout the country and different branches of Christianity adapted their messages to reach wider audiences.\textsuperscript{101} Daniel Walker Howe explains that churches inspired minorities, women, and immigrants, along with many other Americans, to participate directly in their communities.\textsuperscript{102} Consequently, it was difficult to find Americans who were not connected to Christianity in some way. Howe also explains, “A combination of Protestantism with the Enlightenment shaped American culture and institutions. Morse’s telegraph appealed to both these strains in American ideology…Many Americans interpreted their nation’s destiny in religious terms, as preparing the world for a millennial age of free institutions, peace, and justice.”\textsuperscript{103} American professional science worked within this milieu. George Daniels argues that numerous scientists attempting to legitimize their work sought to keep the devout content by connecting their endeavors to theology to demonstrate that they were worthy of examining God’s divinity.\textsuperscript{104} Furthermore, as noted above, scientists like Dana and Gray believed that religion and science were not contradictory to each other. For scientists like them,

\textsuperscript{100} Morrell, \textit{Narrative of a Voyage}, 187.
\textsuperscript{101} Daniel Walker Howe, \textit{What Hath God Wrought: The Transformation of America, 1815-1848} (Oxford: Oxford University Press, 2007), 201
\textsuperscript{102} Howe, \textit{What Hath God Wrought}, 165
\textsuperscript{103} Howe, 3.
\textsuperscript{104} Daniels, 52
Daniels explains, “Every instance of order scientists found in nature, if properly interpreted by a learned hand and pious mind, could be used to reinforce belief in a benevolent God…The general acceptance of this conception of the scientist’s tasks meant that even the abstract researcher…could be described as performing a service function of great public utility.”¹⁰⁵ Dana, Gray, and Morton were certainly not the only pious scientists in America. Indeed, many of them had some connection to Christianity in the antebellum era. Moreover, religious doctrine, as evidenced by the debates between monogenesists and polygenesists about the races and stages of man, entered directly into scientific beliefs. Accordingly, the lines between science and religion in early to mid-nineteenth century America blurred significantly.

A Watershed Moment in American Science: The United States Exploring Expedition, 1838-1842

After a nearly ten year delay due to political infighting, on August 18, 1839, the United States Exploring Expedition finally set sail from Norfolk Navy Yard in Virginia in a fleet of six vessels—Vincennes, Relief, Porpoise, Peacock, Flying Fish, and Seagull.¹⁰⁶ A crew of seven hundred men filled the ships along with seven professional scientists: James Dwight Dana (geologist); Charles Pickering (naturalist and zoologist); Horatio Hale (philologist); Titian Ramsey Peale (artist-naturalist); William D. Brackenridge (botanist); William Rich (botanist); and Joseph P. Couthouy (conchologist).¹⁰⁷ Also part of the scientific corps were Joseph Drayton and Alfred

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¹⁰⁵ Ibid, 53.
¹⁰⁶ Though initially conceived of as a voyage to the South Seas, “In time…the objectives multiplied. The expedition was to round Cape Horn and, by way of Tahiti and Australia, head for the Antarctic in search of the landmass that supposedly lay hidden beneath the ice. Following a stay in New Zealand, it was next to continue to the South Seas to chart and explore islands such as the Fijis. From the Fiji group, the voyage was to continue to the Sandwich (Hawaiian) Islands and from there to the northwest coast of America for more charting and exploring,” Joyce, The Shaping of American Ethnography, 14.
Agate, official artists of the expedition, and John G. Brown, instrument repairer. The public and private writings of the scientific corps highlight how much the professional paradigm in America influenced the work of the group.

The Ex Ex was the culmination of decades of creating a professional system of American science, parts of which, were built upon previous European achievements. Despite his training in naval science, perhaps no teacher had a more profound influence on Ex Ex Captain Charles Wilkes than English Captain James Cook. In his years surrounded by books in east coast boarding schools, he more than likely encountered the tales of Cook, who scoured the South Pacific seventy years before Wilkes commanded the Ex Ex. The bourgeoning American sailor revered the English naval pioneer, as did many Enlightenment Era explorers. Nathaniel Philbrick notes, “First and foremost…Cook had been an explorer, and the Pacific served as his route to glory. For the young Wilkes, the South Sea came to represent not only a means of escape from an unhappy childhood, but, even more important, a way to win adulation he had been craving for so long.”

The nature of Cook’s excursions, detailed in published journals and disseminated throughout America and Europe, dazzled audiences with descriptions of pristine environments and exotic peoples. During three voyages on behalf of Great Britain between 1768 and 1779, Cook led crews of naturalists and artists throughout the Pacific. Cook first traveled to Tahiti in 1769 to witness the transit of Venus, and over a decade, the Englishman and his crew visited and surveyed not only Tahiti, but also New Zealand, Australia, and Hawaii, lands that Wilkes and the Ex Ex scientists would

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108 A detailed description of the debates that occurred in the professional scientific community over selection of the Ex Ex researchers can be found in Joyce, The Shaping of American Ethnography, 11-27.
110 Philbrick, Sea of Glory, 4.
encounter between 1839 and 1842.111 William Goetzmann shrewdly summarizes the significance of Cook’s voyages stating, “Cook’s journals, maps, collections, and drawings represent an immense inventory, which forced savants back in the centers of learning to rethink fundamental premises about natural history and the richly varied peoples of the globe.”112 But Cook’s influence went beyond the transformation of perceptions about nature. His journeys inspired generations of young sailors, like Wilkes, to embark on treacherous, though stunning, voyages upon the high seas.

A year passed before the Ex Ex entered the South Pacific, and once it did, the scientists experienced a mix of elation and frustration. For the first several days, Wilkes did not allow the ships to make landfall. Midshipman William Reynolds explained, “He would not let us land, neither did he afford the scientifics [sic] an opportunity for research that would have afforded a collection of curious things.”113 A year into the Ex Ex, Wilkes had angered members of the crew and hindered scientific endeavors. Titian Ramsay Peale, reflecting on his year abroad, stated, “It is natural to form an estimate of the labors of the past year, which it grieves me to find have been unproductive…”114 Because of Wilkes’s refusal to land, the scientists could only make superficial observations of peoples and geological formations, as opposed to interacting with the Indigenous Islanders and rendering close studies in other fields of research. Commenting on the cursory glimpses of the island of Clermont Tonnere, Peale wrote, “Commenced a running survey of the Island with the ships…It is a sorry business that our government should have sent a Scientific

112 Goetzmann, New Lands, New Men, 52.
Corps…when the officer whose charge it has been placed should consider it quite unnecessary to appropriate a single boat out of the whole squadron for their use…”¹¹⁵ Near the end of August 1839, the Ex Ex briefly surveyed islands which had been studied by other Western expeditions.¹¹⁶ This was unacceptable to Peale, who believed that seeking out new discoveries was a core tenet of their mission. He explained, “If we see no land, no accounts will be expected from us, but in surveying old discoveries we lay ourselves under obligation to add something to the general fund of knowledge…”¹¹⁷ For the artist-naturalist, the practice of science merited seeking out new findings, even in previously charted territories. Wilkes, in the eyes of his crew members, hindered the progress of the scientific corps, making them ineffectual.

Wilkes appeared to be irritated by the inclusion of the scientific corps in the Ex Ex, believing his crew could accomplish the necessary work. In 1836, he outlined in a memorandum to Commodore Isaac Chauncey, president of the Board of Navy Commissioners that, “All the duties appertaining to Astronomy, Surveying, Hydrography, Geography, Geodesy, Magnetism, Meteorology, and Physics generally to be exclusively confirmed to the Navy officers, these are deemed the great objects of this expedition and it is con[fi]dently believed that there are some who are so well acquainted to perform them.”¹¹⁸ He also thought that the work in zoology, geology, minerology, botany, and conchology could be undertaken by the medical team on the Ex Ex.¹¹⁹ In a response to Wilkes, Secretary of War Joel Poinsett wrote, “…it would appear injudicious to dismiss entirely the whole of the Scientific Corps…but every judicious effort ought to be made to reduce the minimum to as low as possible. The propriety and even necessity of doing so the

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¹¹⁵ Peale, Titian Ramsay Peale, 1799-1885, And His Journals of The Wilkes Expedition, 150.
¹¹⁶ Peale, 153.
¹¹⁷ Ibid.
¹¹⁹ Wilkes, “Extract from Wilkes’ Memorandum,” 119.
different literary and philosophical Societies may not only acquiesce in but will probably lend their aid in accomplishing…”

Secretary Poinsett’s response to Wilkes is indicative of the secondary role some government officials believed science should play in the Ex Ex, a voyage approved by the American Government primarily because of its potential benefit to commercial interests.

Wilkes frustrated members of the scientific corps because he prevented them from engaging with subject matter, a practice central to professional American science. Researchers needed subjects to study, and this involved a process of identifying evidence with which to work, observing or testing said evidence, dialoguing about its significance, comparing it with other data available, and reporting about it. Collection of evidence played a key role in this procedure as well. Researchers amassed shells, cultural artifacts, plant life, minerals, and countless ethnological observations, among other innumerable data. One such collector was Samuel George Morton, who, over the course of thirty years, received approximately one-thousand human skulls which he used to determine the cranial capacity of individuals belonging to particular races. Morton generally did not seek out cranial specimens himself but relied on the work of the legion of scientists and collectors who hoped to contribute to his study of phrenology. Morton wished to obtain crania from various races, especially those which he did not already have. Robert Bieder explains, “Initially, Morton primarily sought American Indian crania, but later he added others from Egypt, India, and European countries.” Ann Fabian notes that Morton most likely would have been anxious to see a Fijian skull returning with the Ex Ex. Morton’s fieldworkers reported their findings, along with the content the revered phrenologist could expect in their shipments to him,

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120 Joel Poinsett, “Extract from Poinsett’s Endorsement of Wilkes’ Memorandum, in Science in Nineteenth-Century America: A Documentary History, 120.
121 Bieder, 64.
122 Ibid.
in correspondence written between the 1830s and his death in 1851. In one correspondence, astronomer Edward Herrick wrote to Morton in December 1835, “I have obtained for you a skull from an Indian burying-ground (in East Haven)… It has lost the lower jaw but is otherwise in good order.” Another letter from physician Samuel P. Hildreth stated, “The Black squirrel and garfish heads were sent in a box of shells to Mr. Hyde. The Box with indian [sic] crania I have ascertained were [sic] safely delivered…” Ultimately, in true Baconian fashion, the more human skulls Morton received, the more he could refine his theories on the races of man.

Language factored heavily in this process of scientific subjectification as well. In the two letters quoted above, Herrick and Hildreth did not appear to differentiate between value or quality of specimen, lumping the acquisitions of human skulls with the collection of squirrels, fish, or shells. For them, each was a specimen to be examined—part of the arsenal of a scientist—and the matter-of-fact language highlights this utilitarian view of the crania. Obtaining skulls from burial grounds, to Herrick and others, was merely part of field-work. Dozens of Morton’s assistants scavenged through the ground, sometimes with their bare hands, infuriating protectors of cemeteries and expedition teams to which they were attached. As such, the correspondence between Morton and his workers, equivocates the specimens in terms of usefulness to research.

In their process of creating subject matter, American scientists also spent ample time dealing with the dead. The letters of Morton indicate that specimens, other than human skulls, were shipped by scientists across America and the Atlantic, including countless fossils of various animals, shells of mollusks long defunct, and other remnants of past life. Artwork, in turn, could

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126 Joyce, 19.
transform the representation of dead subject matter. For example, as a boy Titian Peale was thrust into the world of science, growing up in a family of artists and museum curators from whom he learned “the applied arts of collecting, preserving, describing, and illustrating specimens, a properly interdisciplinary, Enlightenment practice.”

In 1817, Peale partnered with scientific pioneers William McClure (geologist), Thomas Say (naturalist and conchologist), and George Ord (naturalist) to conduct a collecting survey throughout Georgia and Florida. Treks like these became common in the early years of the nineteenth century as Americans sought to understand the geological and zoological makeup of land obtained only a short time previously. For the next several years, Peale would continue his work as a natural historian, out in the vast expanse of North America, creating precise sketches and watercolors of the scenery before him. Peale was also an avid butterfly collector, and his illustrations “occasionally documented the violence of collecting, which almost invariably required killing the creatures…More typically, though, his compositions artfully evaded the fact of death, in compositions designed to represent each given specimen alive…”

In this regard, natural history artwork sought accurate representation of a specimen’s features through manipulation of reality. The life of the butterfly had been destroyed, but its body remained extant, which for the collector, was enough for study.

To be sure, artists also captured scenes of living data, and the Ex Ex employed two official artists, along with Peale. Philbrick explains, “In an era before photography, artists were a crucial part of any expedition, providing drawings and paintings that were later used to create illustrations for the published reports and narrative.”


130 Philbrick, 78.
the peoples of the South Pacific in their published reports and journals using descriptive language to denote the features of Islanders. But the renderings of the subjects by the artists-naturalists presented visuals of areas considered exotic and mysterious to individuals who had never encountered them. The intermingling of science and art had its roots in Cook’s voyages. Though he was not the first naval officer to employ artists on explorations, James Cook established a standard that married science and art in “what Professor Bernard Smith has declared to be ‘the European vision of the South Pacific’, an important paradigm in which science and art came together to change the thought of Europe.” As science in America became professionalized, artists were also employed on expeditions, thereby offering the world images through American perspectives. American scientists, then, cultivated data, in part by using methods stemming from English endeavors.

The scientific corps of the Ex Ex engaged in each of these methods of subject creation, but they also had to add a step to the process. Friendly encounters ensured working environments free from violence. So, when the Ex Ex eventually began landing on the islands, the crew initiated a bartering system that allowed them to accomplish their work. Depicting one engagement, Reynolds explained, “Friday morning we made Searle Island, 20 miles to the Northward & Westward of Clermont Tonnere…They [the Natives] manifested all the signs of peace & desire for intercourse…They gave us cloth made of bark, feather plumes & fish hooks. In return, we gave them knives, handkerchiefs, &c…” Charles Pickering, too, noted several dynamics central to many of the Ex Ex’s encounters throughout their journey in the South Seas. Writing on August 24, 1839, he observed, “…the natives were glad to get pieces of cloth that were thrown them; they

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‘had no Cocoa-nuts (though we saw plenty of trees) and the articles they offered in exchange were pieces of matting which they used for clothing, shell…their clubs…but they would not part with their long spears…”’\textsuperscript{133} Pickering’s entry underscores one desire of the scientific corps: obtaining ethnological artifacts for study. In this case, the Islanders did not care to part with their spears, but the trade garnered some materials for the researchers. Moreover, the ease with which the interaction between the Americans and Islanders took place on this island suggests that the inhabitants had encountered Westerners previously and knew how to peacefully engage. This type of encounter would occur throughout the South Pacific as the Ex Ex proceeded on its mission, though certainly not always.

Throughout many of the islands visited by the Ex Ex, the Americans had no choice but to trade commodities, as opposed to legal tender, to facilitate amicable relations between the them and the Islanders. In the Village of Leone in Samoa, Reynolds saw that “Dollars & cents have as yet no existence in the minds of the people of Samoa…”\textsuperscript{134} In Tahiti, however, an island gripped by Western influence since the eighteenth century, currency was valuable to Islanders. As Reynolds recounted, “The most prominent traits exhibited by both sexes in their intercourse with us were a rapacious desire for money…Money is valuable, because it is demanded as a fine for various offenses.”\textsuperscript{135} Per Reynold’s observations, Tahitians incorporated Western currency into their own livelihoods to effectively navigate through their transformed world. Reynolds predicted something similar would occur in Samoa, explaining, “…they will soon be grasping as the Tahitians—the white men, with all their ideas of good & evil, carry their own vices with them wherever they go, & the thirst for ardent spirits & the love of money to an excess soon becomes

\textsuperscript{133} Charles Pickering, Journal, August 24, 1839.
\textsuperscript{134} Reynolds, 106.
\textsuperscript{135} Ibid, 94.
part & portion of those who were innocent of either.” Reynolds’s entry not only reflected on the effect of Western incursions into the South Pacific, but also emphasized that the Ex Ex scientists essentially paid to conduct their work.

The observed behavior of the Pacific Islanders left no doubt in the minds of some of the scientific corps that the Native inhabitants of the South Seas were “uncivilized.” Descriptions of the behaviors and customs of Indigenous Islanders abound in the records of the Ex Ex. Peale, for instance, recollecting an episode in the Tuamotu Archipelago in August 1839, wrote, “On regaining our position to the southward of the Island…13 canoes with three natives each came off to us but could not be tempted to come on board. They were a thievish set and very dishonest in their attempts to trade.” Several months later, Reynolds, jotted down about his time in Samoa, “I could not be evil minded in the midst of primeval innocence…” In highlighting the use of money by Tahitians, Reynolds noted the “most open & profligate display of the most extreme & wanton licentiousness” of the Islanders. Hale mentioned of New Zealanders, “It has already been said that their division into numerous tribes, and the continual wars which result from it, have tended to render them ferocious and bloodthirsty,” but contrasted them with the Islanders of Marquesas by stating that they “have all the ferocity and all the free spirit of the New Zealanders, and are far more sensual and dishonest…” With regards to cannibalism, for which Islanders were known in the Western world, Hale stated, “Of the four Oceanic races, the Polynesians and the Melanesians are, generally speaking, addicted to cannibalism, while among the Natives of Australia and Micronesia it is, so far as we are informed, unknown.” Slowly, but surely, the Ex

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136 Ibid, 106.  
137 Peale, 152.  
138 Reynolds, 110.  
139 Ibid, 94.  
141 Hale, 36  
142 Ibid, 39.
Ex scientists not only identified their subject matter, but began observing and yielding conclusions based on the data they gathered. Furthermore, to relate the information, they used descriptive language rooted in Enlightenment Era notions of savagery. In Hale’s view, Indigenous Islanders differed greatly from each other, and he disagreed with those who thought Pacific Peoples were one in the same. He wrote, “These expressions are evidently founded on a loose idea that a certain sameness of character prevails among barbarous races... A little consideration will show that this view must be erroneous. It is civilization which produces uniformity. The yellow and black races of the Pacific, inhabiting contiguous islands, differ more widely from each other than any two nations of Europe.”¹⁴³ Thus, Hale, by concluding that Islanders lacked uniformity in their behaviors and customs, also underscored their supposed paucity of civility.

An interesting observation made by Hale about the treatment of the dead highlights the differences between civilized and uncivilized individuals in the eyes of the scientific corps. He explained, “The Polynesians do not, usually, like many savage tribes, torture their prisoners to death, nor are they wont, as a general thing, to preserve any part of the body of a slain enemy as a trophy...But it is their chief object, and especial delight, to secure the corpse, for the purpose of practicing upon it every horrible disfigurement which the imagination can devise.”¹⁴⁴ He attributed this lack of respect for the dead to the inadequacy of Islander religions to address this immoral behavior. He further surmised that such a people could not help but eat their fellows because no aspect of their religion hindered them from doing so.¹⁴⁵ But Morton’s assistants regularly desecrated grave sites to procure crania, even in full view of descendants of the dead whose graves were being robbed. Hale had immersed himself in professional American science before the launch

¹⁴⁴ Ibid, 38.
¹⁴⁵ Ibid.
of the Ex Ex, so he no doubt knew about Morton’s acquisition of skulls. One possible explanation for Hale’s failure to connect these apparent disparate treatments of the dead stems from the perceived civility of Americans. To Hale, science was a marker of civilized society, and thus digging through graves to collect specimens for those ends, perhaps justified the effort. The lack of respect for the dead by Islanders, conversely, could be explained by an absence in their moral code, which in turn emphasized the savagery of Natives.

Enlightenment Era philosophies permeate the depictions of Pacific Islanders in the written records of the Ex Ex. In the minds of the scientific corps, the stages of man could be seen first-hand on the islands. Given that some of the scientists described Islanders as partly civilized, like those in Polynesia and Micronesia, the Americans believed they were witnessing an intermediary stage of man’s progression. Furthermore, the linguistic illustrations of savagery—from the “primeval” disposition of Samoans to the “bloodthirsty” nature of New Zealanders to the lack of respect for the dead by Polynesians and Melanesians—were rooted in Enlightenment Era traditions. Hale, however, like Albert Gallatin, believed that environment could impact the livelihoods of Natives. In discussing Polynesians, Hale argued that “Perhaps no savages have ever shown such a capacity and disposition for improvement.” To Hale, Islanders could be stymied by their environments in two ways. The Polynesians, for example, demonstrated intellectual abilities but had reached their limit given their surroundings. Micronesians, conversely, “descended from a higher grade which had been attained in some more favourable [sic] situation.” Hale based his conclusions, in part, on a conversation with Horace Holden, an American who had been held prisoner on the island of Tobi in Micronesia from 1832 to 1834.

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146 Joyce, 25-26.
147 Ibid.
148 Ibid, 74.
During those two years, Holden examined the island, its peoples, and their way of life. Explaining that the Islanders subsisted on coconuts and taro, he saw a people on the verge of famine. Hale believed that this was the cause of their behavior, and indeed, the actions of Islanders in general. Reynolds also believed that Pacific Islanders could improve if given a proper education. In Samoa, he witnessed Natives who “had books in their hands & were either going or returning from lessons. We had seen nothing of this at Tahita, & this was the first evidence we had of the wide difference in the character of the people of the Islands, & of the more moral & improved condition of those we were now among.” These episodes during the expedition underscore the effects of Western cultural norms on the conclusions drawn by the members of the Ex Ex. To them, the stages of man could be observed in the South Seas and confirmed the “truth” of Enlightenment Era thought. Scientists like Hale, however, could also shirk the wisdom of some American scientists, like Samuel Morton, who believed that Natives could not change their fundamental nature even if placed in new environments or given an education.

Perhaps the greatest diversion from traditional scientific wisdom came from Charles Pickering. For one, Pickering did not believe that the Indigenous Islanders in Fiji were savages, considering them to possess some of the attributes of a civilized society. He explained to Morton, “The Feejeees [sic] are not savages…for they live in towns, are a most ingenious people & excel in various arts and manufactures…” Furthermore, during a sojourn in Australia in November 1839, Pickering ruminated in his journal about the races of man, writing, “Having now had an opportunity of personally inspecting each of the five faces of mankind, which even at the present

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149 Ibid, 78-79.
150 Reynolds, 104-105.
151 Charles Pickering to Samuel George Morton, August 7, 1840, Samuel George Morton Papers, American Philosophical Society.
days falls to the lot of but few…I feel pretty well suited that these are only five…”\textsuperscript{152} As Pickering continued to ponder his work—categorizing humans according to facial features, skin color, body and hair type, and behaviors—his thinking evolved. In a letter to Morton written several months later, Pickering explained, “I started on this Expedition with a firm persuasion that there were 5 races of mankind. I have now seen 8! and am not without expectation of meeting with others before reaching home.”\textsuperscript{153} Nevertheless, Pickering could not conclude whether the discovery of these races indicated that separate species of man existed.

In \textit{The Races of Man}, one of his reports of the Ex Ex published in 1848, Pickering deemed that eleven races could be found throughout the world: the Arabian, Abyssinian, Mongolian, Malay, Papuan, Negrillo, Indian or Telingan, Ethiopian, Australian, and Negro.\textsuperscript{154} In the report, he sought to answer how the races of man populated the globe, tracking their chronological dispersion and meticulously detailing the features inherent in the various races he observed. Pickering noted further that despite this understanding, the geographical boundaries of races were unknown, and “this then was one of the objects [he] proposed to [himself] on joining the Exploring Expedition.”\textsuperscript{155} In attempting to shed some light on the origins of man, Pickering wrote, “There is, I conceive, no middle ground between the admission of eleven distinct races in the human family, and the reduction to one. The latter opinion…implies a central origin…Further, Zoological considerations, though they do not absolutely require it, seem to most favour [sic] a centre [sic] on the African continent.”\textsuperscript{156} Pickering also refused to place the categories along a racial hierarchy. By breaking with conventional wisdom, Pickering saw his work relegated to near obscurity. Barry

\begin{itemize}
\item \textsuperscript{152} Charles Pickering, Journal, November 30, 1839.
\item \textsuperscript{153} Pickering to Samuel George Morton, August 8, 1840, Samuel George Morton Papers, American Philosophical Society.
\item \textsuperscript{154} Charles Pickering, \textit{The Races of Man and Their Geographical Distribution} (Philadelphia: C. Sherman, 1848), 3.
\item \textsuperscript{155} Pickering, \textit{The Races of Man}, 3.
\item \textsuperscript{156} Ibid, 306.
\end{itemize}
Joyce states, “His reliance on his observation of a limited—though diverse—sample of populations also did not endear him to those preferring Morton’s supposedly more data-based methods. Those interested in questions of race and species ultimately found Morton’s work eminently more useful…”157 Others hoping to use scientific justification for racial biases also could not use Pickering’s work to support their beliefs.158 Such were the products of Pickering’s ethnological investigations during the Ex Ex.

Though his work may not have been appreciated in antebellum America, Pickering utilized methods standard in American science and subject matter creation. His conclusions derived from observing his subject matter, in this case Pacific Islanders, and noting their complexions, features, and behaviors. He compared these peoples to others he had seen and attempted to group them according to perceived similarities. He discussed his initial findings with Samuel Morton, an individual who did not agree with Pickering’s assessments. He then reported his conclusions about the races of man in a publication, which though not well received, offered a theory as to the origins of humanity. The thread of Baconianism ran through this process, and it was similar to that used by Asa Gray, Samuel Morton, and countless other scientists who sought to ascribe causality to natural phenomena. Several Natives were even sketched by the Ex Ex artists, rendering their images through the lens of an American researcher.

For his part, Reynolds questioned the propriety of Western incursions on the islands when he wrote, “It is a problem with me whether the Example

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157 Joyce, 154.
158 Ibid.
& sway of the whites will in the end better the condition of this portion of the human race. I should like to see them left to themselves…”\textsuperscript{159} Nevertheless, because of the supposed inherent savagery of the Natives, Reynolds concluded that Anglo-Saxons had no recourse but to intervene in their lives, stating, “But still the change must be effected at any cost. They must be redeemed from their barbarism, though the half of them perish in the attempt.”\textsuperscript{160}

Conclusion

At the turn of the nineteenth century, a professional scientific paradigm emerged in antebellum America which sought to understand natural phenomena. The paradigm developed along several tracks. First, scientists attempted to conduct their work in cooperation and competition with Europe, which was known for prestigious scientific achievements. Second, as Americans attempted to adapt centuries-old research methods proposed by philosopher Francis Bacon, they engaged in a process of subject matter creation that involved collecting specimens, organizing them according to certain characteristics, and rendering judgements about their place in the natural order using descriptive language and artistry. But the research methods used by Americans, who sought objectivity in their work, were mired in cultural biases denoting that humanity existed in stages. Intellectuals disputed whether man could progress from savagery to civility and whether non-whites were even of the same species as whites. Since German scientist J. F. Blumenbach posited that man could be categorized into five races, Americans questioned these assumptions that held major implications for ideas about the origins of man and legal policy.

After processing their own observations, Horatio Hale, Charles Pickering, and Samuel Morton injected themselves into these discussions, offering quite different conclusions. Morton,\textsuperscript{159} Reynolds, 106.\textsuperscript{160} Ibid.
for example, did not believe Anglos and non-whites belonged to the same species. Moreover, he argued that skin color and cranial capacity determined that non-whites could never advance as far as Anglo-Saxons. Conversely, Hale stated that Native “savages” could become more civilized if placed in the proper environment. Pickering, in perhaps one of the biggest departures from conventional scientific thinking at the time, posited the existence of eleven human races and refused to place them along a hierarchy. Other cultural norms influenced scientific results as well. Researchers like Asa Gray, Samuel Morton, and James Dwight Dana held that Christianity served as the bedrock of inquiry and that science could shed light on God’s divine plans. Zoologists, botanists, mineralogists, ethnographers, and philologists alike were influenced by these cultural factors as they attempted to create a professional scientific paradigm in America. These methods and assumptions also traveled with the scientific corps attached to the United States Exploring Expedition, and during this four-year trek, the South Pacific served as a laboratory where American approaches and presuppositions were tested and refined.
“It is not a little remarkable that though the Feejeeans are indigenous, shrewd, quick-witted people, surpassing the Polynesians in their knowledge of various arts, and have a more regular and artificial system of government, they are yet spoken of by all voyagers as savages…while Polynesians are regarded rather as a semi-civilized race,” wrote Horatio Hale in the official account of his scientific findings while assigned to the United States Exploring Expedition.  

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reflection is telling for two reasons. For one, it showcased a common perception held by Western observers who traveled to the islands of the South Seas for centuries before the Ex Ex. As shown in Chapter One, many of the Indigenous populations in the Pacific encountered by Westerners in the nineteenth century were considered savage and uncivilized, reflecting Enlightenment philosophies regarding the origins and stages of humanity. Trained scientists, like those onboard the Ex Ex, as well as amateur ethnographers and observers who traveled to the islands, made considerable efforts recording their observations of Native behavior, appearance, and culture in journals, travel narratives, artwork, and other testimonials, verifying or rebutting these cultural assumptions. On balance, Westerners viewed Pacific Islanders as subjects to be converted, investigated, and/or exploited.

But Hale’s observation is also telling because of the agency it provided Pacific Islanders, in this case “Feejeeans.” Indeed, though remarking on the barbarism of the islanders, Hale highlighted the arts and governmental system of the Indigenous Peoples he studied in Fiji. Reports by the other Ex Ex scientists also showcased the complex lifestyles of Pacific Islanders, including their intellectual systems of thought and how knowledge yielded therefrom connected to greater cultural obligations. The observations of Americans writing about Pacific Natives in the early nineteenth century, coupled with anthropological, archaeological, and linguistic evidence, can shed light on the ways islanders created broad systems of thought to understand the world around them. Indigenous Peoples in the Pacific, despite their perceived savagery, held wide-ranging beliefs and created extensive traditions to systematically perceive, organize, understand, and explain the world around them, just as Americans did. And like American science, these Indigenous intellectual systems were rooted in religious principles, social dynamics, and connections with nature, and they manifested themselves in transmissions of knowledge, artwork,
exploratory activities, and other processes (like agriculture, botany, and navigation) that yielded various technologies for the benefits of their societies.

This chapter serves two purposes. First, it seeks to explain how Indigenous groups living in the islands of the Pacific during the first half of the nineteenth century observed and understood the world around them based on intellectual traditions stemming back thousands of years. Second, the concept of “science,” as it was defined by Americans working in the Western scientific tradition during the first half of the nineteenth century, will be deconstructed to show that science was not merely a Western phenomenon. Moreover, the scientific practices of Indigenous Islanders and Americans will be compared to demonstrate that science should not be viewed separately from broader cultural networks, or as a cold and detached system of knowledge-gathering intent on establishing objective results. Rather, it should be understood as a component of the greater intellectual traditions in which it develops and contingent on the environment in which it is practiced. The chapter begins with a discussion of the significance of religious beliefs to Islanders; proceeds with an analysis of the science of the mundane, or the ways Islanders incorporated science and technology into food preparation, tattooing, and other activities; and ends with a comparison of Indigenous and American scientific customs.

Religion as a Means of Understanding Cause and Effect

Among Pacific Islanders, religious beliefs were crucial for understanding the mechanisms of nature and existence. These spiritual views varied across the Pacific and changed as Europeans, beginning in the sixteenth century, and Americans in the late eighteenth and early nineteenth centuries, encountered Indigenous populations. Following the American Revolution, private commercial interests, including whalers, merchants, and fur traders in America trekked to the
South Seas to reach lucrative trading routes in Asia and India. The islands in the South Pacific became hubs where Americans stopped, explored, and attempted commercial ventures prior to sailing onward. Hawaii was one of the most important stops for Americans during this time. Indeed, by 1810, “most of the foreign visitors to Hawaii, though not yet most of those residents there, were Americans.” Hawaiian and Americans interacted with each other significantly over the next several decades as missionaries, diplomats, and merchants began to flood the Hawaiian Islands.

One first-person account illustrates Islander religious beliefs and the extent to which Americans influenced those ideas. In “The Memoirs of Thomas Hopoo,” the eponymous author describes his life in the Sandwich Islands (Hawaii) following his birth in 1795. Raised by an aunt and uncle and then his father, Hopoo was reared in the religious traditions of his patriarch. An inquisitive youth, Thomas (originally named Nauhopouah) inquired as to his father’s religious beliefs, where his father’s god could be located, the entity’s shape, and the types of sacrifice it preferred. Hopoo’s father explained that “his god was a spirit, and that he was everywhere present. This led my [Hopoo’s] mind to worship that spirit, whom, he believed in from his childhood.” His father, however, could not give much more detail about his god, including where the god resided specifically, whether the being was responsible for the creation of the heavens and the earth, or how the being controlled celestial objects. In describing some of the religious practices of his neighbors Hopoo stated, “They believe that the spirit comes into the wood; so they take an axe and cut the wood into many shapes, about five or six feet high, then set

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163 Johnson and Best, *The United States in the Pacific*, 80.
166 Hopoo, 43.
it up in the temple…They have two sacrifices in the morning…two in the evening.” Thus, from a young age, Hopoo desired to understand the workings of the universe, probing his father and neighbors for answers to these questions. Though for Hopoo the answers revolved around a deity, one can read this memoir as an illustration of the types of questions and answers about the world sought by Polynesians. Indeed, Hopoo searched for underlying causes explaining the way the world was organized around him. To what extent his religion had been modified over generations is not made clear in the memoir. Nevertheless, Hopoo described his childhood experiences with his community’s spirituality to highlight his conversion to Christianity after leaving the islands to travel to the United States.

Hopoo was not satisfied with the answers about the mechanisms of the universe that his father’s religion provided him. During his travels he lived in New York, where several individuals influenced his conversion to Christianity. He recounted that some of the Americans with whom he lived asked him about his own religious beliefs, while subsequently promoting their own Christian views. He described an interaction with Doctor O. Hotchkiss, in whose house he resided in New York, explaining, “A few weeks after our coming to this place, I was to know about the true God…He [Dr. Hotchkiss] told me I must immediately believe, and love that God, who made the heavens and the earth and all the people in the world…when I came to die, he would take me up into heaven, where he is: but if I did not believe…he would send me to hell…” Not content with this initial explanation, Hopoo asked Hotchkiss what kind of man this entity was and sought more information about heaven, hell, and how long the dead reside in those realms. Hopoo struggled with his religious beliefs for some time, and only after several near-death experiences and a dream

167 Ibid, 43.
168 Ibid, 45.
169 Ibid.
in which he heard the Christian God say, “Except a man be born again, he cannot see the kingdom of God,” did Hopoo finally convert.\textsuperscript{170} Though one might argue that Hopoo became a Christian out of fear of the Lord’s punishment, Hopoo’s memoir demonstrates the inquisitiveness of this young Polynesian man as he sought answers to questions pertaining to human origins and the afterlife. Ultimately, after dealing with his own experiences and pondering the teachings of Christianity, it appears Hopoo may have chosen a system of beliefs that afforded him with the best answers to his questions.

Some of the religious practices of Hopoo’s Hawaiian community corresponded to broader Polynesian creation stories that evolved over thousands of years and which were rooted in the belief systems of various Asian and East Indian cultures. Cook Islands anthropologist Kauraka Kauraka, citing the work of Polynesian religious ethnographer E. S. Craighill Handy, notes that evidence of Polynesian religion could be found in “ancient Indic, Southern Asiatic, historic Hindu, Chinese, Melanesian, and American Indian traits.”\textsuperscript{171} Moreover, these traits had been incorporated by Southeast Asian or Indonesian populations and then transferred to the Pacific Islands by way of migration over a millennia ago. Kauraka Kauraka identifies similar traits between Hawaiian, Tahitian, and Cook Islands religions.

Pacific Islanders used religious cosmogony to attribute causes to natural phenomena. Central to each incarnation of spirituality in Polynesia was the concept of harmony. Kauraka Kauraka writes, “In the Cook Islands, our ancestors probably worked with nature and not against it. Traditional knowledge, such as using the phase of the moon to guide the time for planting, fishing, and so on, is evidence of this working in harmony with the season and with nature.”\textsuperscript{172}

\begin{footnotesize}\begin{itemize}
\item \textsuperscript{170} Ibid, 47-49.
\item \textsuperscript{172} Ibid.
\end{itemize}\end{footnotesize}
Horatio Hale also noted religious connections with nature amongst Fijians in Melanesia in one of his official reports of the Ex Ex. Describing a deity named Ndengei, Hale explained the near ubiquitous belief in the god whose residence was in a cave in the mountains of Viti-levu. According to Fijian tradition, “Earthquakes are supposed to be caused by the god shifting his position—and one of the thimbis…which the natives frequently sing in their dances refers to this belief: ‘Ndengei turns over, The earth trembles.’” Vendovi, a Fijian captured by the Ex Ex commanders, also related a story about a great flood that washed away villages and killed many islanders. Hale wrote:

After the islands had been peopled by the first man and woman, a great rain came, and the waters began to rise. Then there came two enormous double canoes, commanded one by Rokona, the god of carpenters, and the other by his head workman, Rokola. They picked up a number of the people, and kept them onboard until the flood subsided, when they deposited them again on the islands…Vendovi said that in former times, the Feejeeans always kept large canoes laid up in readiness against another flood.

Upon hearing this story, Hale surmised that the Fijians may have attached this explanation to surges in the ocean—or tsunamis—that destroyed homes and killed inhabitants. A search of data sets available through the National Centers for Environmental Data indicates that at least three tsunamis occurred in the South Pacific between 1819 and 1837, with ten other possible tsunamis transpiring between 1767 and 1840. Reliable data does not exist prior to this time, but earthquakes and volcanoes have been prevalent in the South Pacific for centuries, if not millennia. Thus, it is probable that Hale’s hypothesis was correct, demonstrating the religious connection Fijians ascribed to natural phenomena.

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174 Ibid, 52.
175 Ibid.
176 Ibid, 55.
The story of demi-god Maui, who figures heavily in Polynesian religion, showcases how Polynesians tied their technological achievements and understandings of the world to their spirituality. Polynesians have depicted Maui as an avid and skilled fisherman, as the entity who stole fire from the Underworld and offered it to mankind, and as a farmer and domesticator of plants and animals. In this sense, Maui epitomizes the wandering of Polynesians and their quest for sustenance by providing technology (in the form of fire) to mankind and underscoring the proper methods and value of agriculture.\textsuperscript{178} I. F. Helu writes, “Maui started as a navigator discoverer of islands...as the founder of communities. He is next shown as the originator of civilization and creator of the principal departments of culture...This sequence of myths is surely the epic evolution of Tongan society.”\textsuperscript{179} Nevertheless, Helu argues that creation myths are not accurate scientific explanations, stating, “…creation myths offer nothing to science...because nature and its parts have their own ways of working, which are independent of human social interest. Hence, any reliable explanation of natural phenomena must be in their own terms.”\textsuperscript{180}

Helu’s statement is in disagreement with the present study. In attempting to grasp how people (Indigenous Islanders, as well as Americans) made sense of their existence, origin stories must be viewed as tools for systematically organizing thoughts and observations about the mechanics of the universe. Even if an origin story turns out to be an inaccurate or unreliable explanation, creation narratives functioned in the islands of the Pacific as means to provide reasons for occurrences, just as Polynesians linked Maui’s adventures to their origins and Fijians surmised that deities controlled surges in the ocean. Moreover, if Maui reflects the evolution of Tongan society as Helu claims, and, broadly speaking, the evolution of Polynesian cultures, then the quest

\textsuperscript{179} Helu, “South Pacific Mythology,” 47.
\textsuperscript{180} Helu, 50.
for sustenance in the form of fishing, agriculture, and domestication of animals; navigation, exploration, and colonization of various Pacific Islands; and the formation of community were all integral and intertwined within Polynesian systems of understanding the world. Consequently, Maui, who plays a role in a grander Polynesian creation narrative, offers a view of Native intellectual understandings and technological achievements.

Indeed, the story of Maui and other Polynesian creation narratives place importance on travel, geography, and community formation. Polynesians were abundantly aware of the power of land and sea, and successfully traversed both. Colin Richards argues, “Polynesian voyaging…is about people engaging with particular materials and substances and the necessary transformation and reconstruction of ‘things’ and social identity incurred within a series of strategic encounters.”

Seafaring and the construction of vessels, therefore, possessed a spiritual and transcendental meaning. The desire to travel may have stemmed from ancient tales about dispersion. Some Maori traditions, for example, held that social identity was based upon “migratory voyages from a distant Polynesian island homeland known as Hawaiiki.”

Furthermore, dispersal amongst these peoples led to the colonization of various islands in what later became known as Polynesia, and double-hulled canoes functioned as their vehicles for exploration and expansion. Construction of these expansive canoes, which were possibly up to

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thirty meters in length and could hold up to one hundred people, was a community endeavor in which possibly thousands of Islanders built and hauled the vessels to the edge of the beach. In turn, social identity was forged in the process. Richards explains, “Here it is argued that the constructional sequence and order of the voyaging canoe…was metaphorically linked to cosmogony…Handy records that tree felling for canoe hulls in the Marquesas was accompanied by ritually potent cosmogonic chants, and thus the construction of the canoe is referenced back to the creation of life.”185 The voyages, some of which may have reached as far as South America prior to 1300 CE, potentially brought life-preserving sustenance back to the Pacific Islands. Archaeological and DNA evidence currently suggests that the variety of sweet potato encountered by Captain James Cook and his crew in Polynesia in the mid-eighteenth century was “introduced to Central Polynesia by approximately AD 1200 to 1300, most likely by Polynesian voyagers who reached South America and subsequently spread the crop to the widely dispersed islands of the Polynesian triangle.”186 Thus, Polynesians innately tied their technological pursuits to their religious beliefs. For the islanders, these beliefs constituted part of their greater intellectual system of thought and influenced their seafaring and agricultural practices and successes.

Indigenous Beliefs and the Impact of the West

The Ex Ex’s excursions in Tahiti, the nearby islands with which Tahiti had contact, and the subsequent narratives stemming therefrom, provide further evidence for understanding Polynesian intellectual traditions and technology. Furthermore, the reports compiled by the American scientists also emphasized the amount of influence Western encounters had on this

185 Richards, 213.
island realm prior to the nineteenth century. Before landing in Tahiti, the Ex Ex came upon the Western Paumotuan Islands, which had contact with Tahiti. Charles Pickering observed, “On the following morning, we reached Raraka, and saw the Taheitian [sic] flag; a subject of general congratulation; and for myself, I may say, that never on any occasion, was an emblem of civilization more welcome.”187 The naturalist expanded upon his perceptions of the area when his ship reached Tahiti. In his report, he praised the kind manners of the Natives, the architecture of the houses, and the “cleanliness in the details of domestic economy,” implying that contact with the West had partially civilized Tahitians.188

Tahiti had been a source of excitement and bewilderment for Westerners since Captain Samuel Wallis and his crew encountered the island in the 1760s. For nearly a century prior to the arrival of the Ex Ex, European missionaries settled on the island with the intention of converting the Islanders. Tales had proliferated about Tahiti in the West, offering contrasting views of both an utopia and a hedonistic dominion of sexual immorality.189 Rowland Hassall, a Congregationalist missionary from Coventry who lived in Tahiti between 1796 and 1799 and later became a shop owner in Parramatta, New South Wales, offered readers a glimpse at pre-Ex Ex interactions between Westerners and these Indigenous Islanders. In describing his interactions with a Tahitian chief, Hassall wrote, “Being now set in a praying posture, he began to pray to his god, he told him the substance of what we had been talking about [adherence to English customs and shirking of native religious practices] and prayed him not to be angry for putting away the custom…”190 Just then, a bird appeared and chirped, indicating to the chief that his god was not angry. Hassall

188 Ibid, 69.
continued, “I asked him were [sic] his god dwelt...[and] he told me that his god...always sent that bird to tell him when he was pleased.”\(^{191}\) Hassall then remarked to the chief, “...birds [are] very common and that his god, worship, & bird were mere vanity...”\(^{192}\) Hassall’s narrative proceeds with detailed accounts of Christian missionary attempts to convert the Tahitians they encountered. In some ways, this story bares similarities to that of Thomas Hopoo. In both accounts, the Islanders understood their world as one in which a deity, who was prone to punishing offenders, affected their livelihoods. Furthermore, their worship of deities also corresponded with the interconnectedness of nature and spiritual beings. Lastly, in both accounts, Christians attempted to convert both Islanders by cross-examining them about their beliefs and, just as quickly, negating them. Efforts to Christianize and civilize Natives would continue over the next century, with efforts made to convert Islanders to a contrary understanding of religion and nature. Sujit Sivasundaram argues, “...missionaries hoped to point Pacific islanders to an alternative theology of nature, and away from what was said to be an irrational attitude toward the environment. They instructed Pacific islanders to study nature, imitate the European missionaries, [and] convert to rational religion.”\(^{193}\) By the time the Ex Ex arrived in Tahiti, the island had been heavily transformed by contact with the West. A snide entry by Titian Ramsay Peale in his journal illustrated the ongoing interactions between Tahitians and Westerners. Upset by the lack of opportunity for new discoveries, Peale wrote, “The new grounds it grieves me are now being passed as quite unworthy of delay, it as I understand being necessary for us to be at Tahiti in the early part of next month. (Is Tahiti unknown or requiring a new survey?)”\(^{194}\)

\(^{192}\) Ibid.
The Science of the Mundane: American Observations of Indigenous Islanders

In the writings of Americans who encountered Indigenous Islanders in the South Pacific, one finds a wealth of information that can be used to understand how Native populations observed and organized the world around them. Amateur and professional scientists alike acted as ethnographers, detailing in their journals and published works the mundane actions of the Islanders they studied. Several members of the scientific corps on board the Ex Ex—Charles Pickering, Titian Ramsay Peale, Horatio Hale, and James Dwight Dana, along with midshipman William Reynolds—frequently referred to the various groups they encountered as savages or uncivilized, and commonly compared Native groups to each other in their reports of the Ex Ex and in their personal journals. For instance, Polynesians (particularly Tahitians) were occasionally considered more civilized when compared to other Islanders (like Fijians), but not as advanced as Micronesians for scientists like Hale. Pickering, on the other hand, did not believe Fijians were savages at all. Writers like Herman Melville, who spent time on board several overseas expeditions in the Pacific and later wrote about his experiences, also described the everyday lives of Indigenous Islanders in his works. At first glance, it may be easy to disregard the behaviors and daily lives of the Natives described as “simple” or primitive,” and certainly some of these writers did just that. Upon a closer reading of these sources, however, one can discern how various Native cultures in the Pacific created complex societies, developed artwork imbued with meaning, and fostered the use of technologies for the benefit of their people. This section uses some of the accounts spawned from the Ex Ex; two of Melville’s early works, Typee: A Peep at Polynesian Life and Omoo; and secondary literature about the cultural traditions of Pacific Islanders, to shed light on how the mundane livelihoods of Indigenous Peoples living in the South Pacific contained far greater significance than initially met the eyes of American observers. Furthermore, analyzing these
sources allows one to understand how Indigenous Peoples systematically perceived and made sense of the environment around them.

**Encounters and Curiosity**

Charles Pickering, one of two naturalists assigned to the expedition, stressed the inquisitive nature of the Polynesians with whom he interacted and depicted their agricultural achievements in *The Races of Man*. Pickering spent several months between 1839 and 1840 with Polynesians, carefully evaluating their behaviors, cultural artifacts, systems of cooking, technology, and customs. During his initial encounters with Natives on the island of Clermont-Tonnerre, Pickering witnessed an area whose inhabitants mostly remained hidden from view and possessed “the long javelin, the favourite [sic] weapon of the Polynesians.”\(^{195}\) As the Ex Ex proceeded through the Disappointment Islands, encounters with Natives varied. Some appeared frightened by the arrival of the Americans, while others demonstrated a certain curiosity, or at least willingness, to deal with the foreigners. In one episode in *Races of Man*, Pickering described “The surf being slight…several of us, therefore, landed [upon the beach] by swimming, and we then obtained a nearer view than was altogether agreeable; for there was no escaping the Polynesian sign of friendship, that touching of noses.”\(^{196}\) At the very least, these brief illustrations give us a sense of how Natives may have perceived American encroachment onto their lands. Some were eager to interact with Americans, trading gifts with the explorers as an apparent sign of good will, and some also seemed curious about the strangers and the massive vessels in which they arrived. Pickering, relating one meeting between the scientists and some of the peoples on the


\(^{196}\) Pickering, *The Races of Man*, 57.
Disappointment Islands noted, “The natives sometimes came near enough to touch the ship’s side, and picked up different articles that were thrown to them…One of them was addressing us, saying as it appeared, ‘you have got a fine canoe.’”  

The curiosity of Pacific peoples, as seen in Pickering’s account, was frequently depicted by other American writers. William Reynolds, discussing the crew’s interactions with Tahitians in September 1839, wrote, “These [Tahitians] seemed to have nothing in the world to do but to gratify their curiosity by mingling with us.” In another section of his journal, Reynolds explained his encounters with the Islanders in the Village of Fungisaá, in Samoa, explaining, “We were closely watched in everything we did, however trifling. Their sharp, prying eyes were always upon us, and in the remarks they made, they evinced a shrewdness in observation & ingenuity of conjecture…They gazed with interest of people witnessing a tragedy, & were eternally whispering in tones of wonder about the habits that seemed so strange to them.” Though interactions between the Americans and Polynesian islanders were often friendly, Reynolds explained that it was not just the Americans who observed the behaviors of individuals from apparently exotic lands. The Islanders themselves kept a close watch on the Americans, using their intelligence and inquisitiveness to draw their own conclusions about the visitors. In one humorous episode, Reynolds illustrated how well islanders had adapted to the climate of the South Seas, wearing little to nothing at all, while the Americans donned “Two shirts, two trowsers, a coat, stockings & shoes, & a hat, and an eye glass that must always be hung around the neck, & a kerchief for the throat & one for the pocket, and a toothpick & penknife, and a toothbrush and towels--all used & resorted

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197 Pickering, 56.
to, as if they were absolutely necessary for existence...”

According to Reynolds, the Natives were stupefied by this display and attempted to make sense of it. Reynolds also implied that the Natives did not understand why Americans deemed it essential to wear so many articles of clothing when the Islanders had become well-adapted to their environments without having to wear much. Herman Melville offered similar descriptions of Western encounters with Natives in *Omoo*. A fictionalized account of Melville’s experiences in the South Pacific, several of the novel’s protagonists find themselves briefly incarcerated in Tahiti for mutiny aboard their ship. Their holding cell, which is visible to the public, provides little privacy as “we had no lack of visitors among such an idle, inquisitive set as the Tahitians…During this period we were the lions of the neighbourhood [sic]; and no doubt, strangers from the distant villages were taken to see the…white men, in the same way that countrymen, in a city, are gallanted to the Zoological Gardens.”

In this account, the Westerners find themselves in the position they often intended to place Islanders: as subjects to be investigated and observed. The Islanders watch the prisoners, as if the incarcerated were expositions in a natural history museum in America. Thus, curiosity and powers of observation and reasoning, tools crucial to the practice of American science, were also displayed amongst Islanders attempting to understand Westerners.

*The Cocoa Palm and the Bread Fruit: A Study in Indigenous Resource Management*

As the Ex Ex proceeded through the South Seas, the American scientists noted the importance of the cocoa palm to survival on the islands. Central to Pickering’s observations in the Coral Islands was the proliferation of the cocoa palm and its implied usage by Indigenous Islanders. Pickering noted, “The *Cocoa* palm is the principal one [tree] and so invariably is its

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200 Reynolds, 109.
presence attributable to human operations, that it has become a guide to the traders, in seeking for natives…Without going into details, I will…quote the old remark, that it is possible to ‘build vessels, fit them for sea, and freight them, exclusively from the materials afforded by the Cocoa palm.’”202 He further stated, “It should…be observed, that at these islands, marks of cultivation were only seen in the occasional planting of the cocoa palm…”203 He explained that the cocoa palm, because of its usefulness, typically provided evidence to Western voyagers that humans could be settled in areas near this vegetation. James Dwight Dana also provided a summary of the uses of cocoa palm, writing, “The cocoanut, the tree of a thousand uses, grows luxuriantly on the coral-made land, after it has emerged from the ocean; and the scanty dresses of the natives, their drinking vessels and other utensils, mats, cordage, fish-lines, and oil, besides food, drink, and building material, are supplied from it.”204 Based on Pickering’s observations, we can conclude that, at the very least, Indigenous Peoples in the Coral Islands cultivated the cocoa palm to a limited extent, and based on Dana’s, we can conclude that Islanders used this resource in myriad ways. Given the potential usefulness of the palm for building sailing vessels, it also seems safe to assume that Natives regularly used them to build their own canoes, an example of Indigenous resource management for the purpose of developing technology. In fact, Pickering, recording some of his initial observations of the South Pacific in his personal journal stated, “…Several canoes came about the ship…Each canoe had an outrigger on one side, and a projecting point before and behind…They appeared to be formed of stocks of Cocoa-nut wood sewed together, but we were not near enough to ascertain at this point…”205

202 Ibid, 60.
203 Ibid.
205 Pickering, Journal 2, August 24, 1839.
Titian Ramsay Peale’s journals indicate that the inhabitants in and around Samoa were well-versed in agriculture and architecture, another example of Indigenous resource usage. A telling entry from October 18, 1839 offers a glimpse at the connection between ancient Polynesians and their descendants who encountered the Americans of the Ex Ex. Upon exploring the island on this particular Wednesday, Peale and the Islanders who served as his guides came across an ancient morai (or pyramid-type structure). The Natives were unsure of its uses or age, but Peale, including a sketch in his journals, wrote that “It stands on a point of land, is built of coral blocks, is about 40 feet high, 20 feet wide on the top with a base of rather more than 50 feet…It is…like the pyramids of Mexico, but these have now disappeared…” As the group proceeded, they encountered more morais, and Peale remarked that these were made of lava, the blocks used of “uniform size and nearly round.” At one of the structures, Peale encountered a Native who was working in a pit of breadfruit located within. The Native commented that the pit had once been used by his ancestors to trap enemies, “a large fin being made where the wall was thickest, in which the bodies were consumed, the ashes being afterwards buried in another enclosure.” Currently, however, the pit was used to preserve breadfruit. Peale explained in a footnote located in his journal, “Bread fruit wile [sic] not usually kept for any length of time, but by burying it in pits, in which it has been well marked and covered with leaves and stones, it then ferments and forms a substance…In this state, it will keep for several years…”

In his journals, Peale captured several ways Samoan society observed and understood the world. First, the Islanders maintained a connection with their deceased ancestors by utilizing tools once used by ancients in vanquishing enemies to preserve life-sustaining food over a significant

206 Peale, Journals of the Wilkes Expedition, 159.
207 Peale, 159.
208 Ibid.
209 Ibid.
period of time. While it is unclear from Peale’s journals if the Natives intentionally made this connection to their ancestors, maintaining spiritual ties with the dead could generally be found in Polynesian religious practices. Moreover, enduring links with ancients were central to many Polynesian creation stories which speak of a “Sky Father” and “Earth Mother” who created the earth and, in Tahitian traditions, gave rise to the first anthropomorphic gods.210 Thus, the continued association with deceased relatives could have reflected the important links between the original father and mother of the Polynesians and the Islanders to whom they gave life. Second, Peale’s description of the morai structures indicates that the Natives who built them used sophisticated architectural techniques and uniform measurements to construct, what at times, were multi-purpose edifices. Lastly, Peale offered a glimpse at Tahitian food preservation, an effort rooted in Tahitian comprehension of technology. It should be noted that the preservation of breadfruit, arguably, possessed greater cultural purposes. Peale noted, “[Breadfruit] is used for sea stores by the natives visiting the low archipelago when fishing for pearls, etc,” or as items that could be used in gift exchanges.211

Indigenous food preparation appears in several other Ex Ex accounts. Reynolds, writing about the crew’s visit to the Village of Leone in Samoa, related, “The pigs were baked in the Native manner whole, in ovens formed of heated stone. Bread fruit & taro & cocoanuts, with some luxuries of our own made the accompaniments…Edibles were served up in the leaves they had been baked in…”212 Reynolds’s account demonstrates the significance of sharing food for these Islanders. In this instance, cordial relations could be forged over a communal meal. Hale also illustrated the tradition of kava drinking, a beverage made from the piper methysticum plant, and

211 Peale, 159.
212 Reynolds, 104.
the process undertaken to illicit its intoxicating effects. He wrote, “It is first chewed, several persons being usually engaged at the same time in this part of the operation. The morsels…are placed in a shallow wooden bowl, and when a sufficient quantity has been thus prepared, water is poured upon it; after which the infusion is strained through a mesh of the fibres [sic] which form the husk of the cocoa-nut, and it is then ready for drinking.” Though an overindulgence of kava could lead to impairment and even death according to Hale, he admitted its usefulness, in moderation, during chiefly celebrations in Tonga and Samoa, and amongst other Polynesians who connected its consumption with the sacred. Thus, the science of food preparation was linked with spiritual notions and community development in the South Pacific.

In one of his reports of the Ex Ex, Horatio Hale provided some of the clearest ideas of Indigenous scientific methods and technology. While elucidating that many of the Indigenous Peoples whom he encountered were members of “barbarous tribes,” he maintained that Polynesians provided examples of friendly, curious Natives and commended them for their cultural and technological achievements. Hale explained, “Indeed, it is easy to see that before they were visited by whites they had attained a grade of civilization nearly as high as their circumstances would permit. A few thousand people…without metal, with no large animals for labour [sic] or transportation…must find progress beyond a certain point barred by insurmountable obstacles.” Hale credited the prosperity of the Polynesians to their rationality and intellectual curiosity that allowed them to overcome these geographical determinants of their culture. The philologist also added that, despite the odds, “Their taste and ingenuity appear to advantage in the carving of their canoes and weapons, in their tattooing, and the colouring [sic] of their cloths and mats….They are
a race of navigators, and often undertake long voyages in vessels in which our own sailors would hesitate to cross a harbour [sic].”216 Also noted in Hale’s writings are brief explanations of other Polynesian technologies which allowed for the manufacturing of cloth, the construction of canoes, and the development of weapons. In describing textile manufacturing, for instance, Hale stated, “It consists in peeling of strips of bark of the paper-mulberry or of the breadfruit-tree…and after being soaked for a time in water, are laid upon a smooth plank and beaten out, by repeated blows of a mallet…”217 Thus, per Hale’s observations, Polynesians possessed technologies that they developed despite geographical barriers and progressed as a society as far as these factors gave them the way to do so.

The prominence of breadfruit in the reports compiled by Ex Ex scientists demonstrates how Pacific Islanders used an agricultural staple to their advantage. Breadfruit is a green, spherical crop that is similar in appearance to a cantaloupe. Long a significant element of Micronesian diets, the breadfruit could be found throughout the Pacific Islands in the nineteenth century.218 The fruit, like bananas, was integral to Native diets because of its rich protein content. Furthermore, writes Glenn Petersen, “In addition to being an excellent source of nutrition, it can be prepared in a variety of ways…Cultivation requires very little labor input once new shoots are transplanted.”219 Though Petersen’s study focuses on the cultivation and evolution of breadfruit in Micronesia, his description of the food sheds light on the ways Polynesians might have cultivated it and used it as well. Recent studies of the genetic composition of breadfruit found in the Pacific Islands also indicates that its spread through the South Seas was most likely the result of human migration.

216 Ibid.
217 Ibid, 42.
Nyree J. C. Zerega, et al., found that Polynesian ancestors known as the Lapita depended on crops that reproduced by vegetative propagation, such as bananas, taro, kava, and breadfruit.\textsuperscript{220} The Lapita, according to Zerega, et.al., most likely made a switch to cultivating and consuming crops which could reproduce asexually, and “this shift to vegetative propagation would have made long-distance transportation of breadfruit possible…”\textsuperscript{221} By the time the Ex Ex scientists encountered breadfruit in the Pacific, human migrations and persistent traditions most likely would have led to the continued use of the crop by Natives. The breadfruit, like the aforementioned sweet potato, which appears to have been transported to the Pacific Islands by human movements across the sea in the large canoes previously described, clearly held value for the Indigenous populations as a food staple. In the case of the breadfruit, Polynesians learned how to ferment and preserve the crop for sustenance and manufactured textiles out of its tree bark.

Hale also evaluated the work of Islanders in Melanesia and Micronesia, comparing their accomplishments to those of Polynesians. He explained that Fijians cultivated fields of yams and taro (a starchy, tropical plant) following consumption of kava at a community structure or temple, once again demonstrating the connection between food cultivation and preparation, the spiritual world, and community.\textsuperscript{222} Besides other brief comments on what he perceived as a lack of understanding of astronomy by Fijians, which he ascribed to their lack of voyaging, Hale did not mention much else pertaining to Melanesian scientific practices. Nevertheless, his descriptions of Micronesians emphasized his admiration for their accomplishments. Comparing Micronesians to Polynesians, writing, “They are excellent navigators, governing their courses by the stars with


\textsuperscript{221} Zerega, et. al., 764.

\textsuperscript{222} Ibid, 69.
great accuracy,” Hale differentiated between the two groups by stating, “They are very intelligent. The same observation has been made concerning the natives of Polynesia, but a distinction is observable between the two in this respect…The Caroline [Micronesian] islanders…are a considerate and reflecting people, and desirous of understanding the meaning of any novel appearance.”

The reasons for Hale’s favorability of Micronesian intellectual practices is unclear, and the accuracy of his assessments is not paramount in this case. Indeed, based on observations made by Reynolds and Pickering, one can argue that Islanders in Polynesia and Melanesia were just as inquisitive as those in Micronesia. What is crucial in Hale’s report is a passage found a page later. He wrote, “Although the Caroline islanders are not more ingenious or enterprising than the Polynesians…yet in many of the arts, and what may be termed sciences, they are decidedly superior.”

The preceding pages of this chapter argue that Indigenous Islanders engaged in scientific and technological practices and offers examples from the Ex Ex to establish this. Hale’s statement, however, is one of the only (if not the only) instances of an Ex Ex scientist describing the work of islanders as “scientific.” By implication, Hale seemed to agree that the Polynesians used science and technology as well, though not with the same success as Micronesians. Despite characterizations of Islanders as savage, uncivilized, or barbaric throughout the reports and journals produced by the Ex Ex, two aspects found in civilized cultures according to Western thought at this time—science and technology—were linked with the achievements of some Pacific Islanders.

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223 Ibid, 73.
224 Ibid, 74.
Tattooing among Islanders remained a strong point of interest amongst the Ex Ex scientists and amateur observers of the Pacific Islands as well. Frequent references are found in the works of Pickering, Hale, Peale, and Reynolds as to whether the peoples they encountered were tattooed or not. Moreover, some of the scientists ascribed technological properties to tattooing. Hale, for example, stated that in Polynesia, “The colouring [sic] matter is a mixture of soot, or powdered charcoal, with water and oil. This is struck into the skin by means of a small implement of bone, resembling a fine-toothed comb, fixed transversely to the end of a short handle…after fashioning an adze.” Melville offered conflicting accounts of tattooing. In Typee, a semi-autobiographical tale about an American seafarer living amongst a band of Polynesians in Nuku Hiva in the Marquesas Islands, he described a rather terrifying scene in which an artist named Kory-Kory attempts to tattoo Tommo, the story’s central character. “Horrified at the bare thought of being rendered hideous for life if the wretch were to execute his purpose,” Tommo fights off the artist and his two assistants who attempt to restrain him and escapes. Tommo then remarks, “What an object he would have made of me!” In Omoo, the protagonist observes tattooers in La Dominica, also in the Marquesas Islands, who make their markings upon the upper class men on the island, explaining, “They had carried their art to the highest perfection, and the profession was esteemed most honourable [sic].” The process of tattooing there involved fasting to inhibit blood flow to the skin that inevitably became inflamed due to its puncturing by needle. Moreover, the practice of tattooing could be impacted by a failure in agriculture, as Melville highlighted that several years

225 Hale, 39.
227 Melville, Typee, 219.
228 Melville, Omoo, 31.
229 Melville, 31.
prior [to 1842] “…there happened to be a season of scarcity owing to the partial failure of the bread-fruit harvest for several consecutive seasons. This brought about such a falling off in the number of subjects for tattooing, that the profession became quite needy.” In this passage, then, Melville drew a connection between the art of tattooing, which involved Indigenous knowledge and technologies to pursue, and the significance of agriculture to the island’s inhabitants.

Though Tommo’s encounter in Typee may seem barbaric and frightening because of the violence forced upon him, tattooing was common practice amongst Pacific Islanders and filled with cultural and spiritual significance. In the case of Tommo, the Typee (based on the real-life Taipis), with whom he lived in Nuku Hiva, sought to convert him to their ways, in part by marking him as one of theirs with a tattoo, and consequently protecting their island from Western incursion. Tattoos could also illustrate Native adaption to Western influence, as evidenced in Peale’s journals in which he describes a design with a ”square body with the cross of St. George,” found amongst peoples in the Phoenix islands. Overall, tattooing was an artform that further enriched Indigenous Islanders’ views of the mechanisms of the universe, their relation to good and evil, and their connection to the afterlife. Nicholas Thomas explains, “Oceanic art was and is created in a cultural milieu that does not share Western premises about what art is, how it is produced, or what its effects are.” In the case of Polynesians, for instance, tattooing highlighted the dualistic worldview held by the islanders in which “the realm of darkness, death and the gods (the po) is juxtaposed with the world of the living and the light (the ao or te ao marama).” A range of daily activities, from fishing to agriculture, began with sacrifices to the po, indicating that

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230 Ibid.
232 Peale, 179.
234 Thomas, Oceanic Art, 106.
darkness precedes light. Sacrifices would then end with appeals to the *ao* or *te ao marama*.

Thomas mentions that tattooing offered another way to represent this harmony between the spiritual and physical worlds because it involved a ritualistic process of destruction and repair; tattooing broke the skin and then mended it by using ink to blot the damage. Moreover, tattoos offered protection to Polynesian warriors because “the process of wrapping in images…not only provided the warrior with additional skin or shell,” but also protected them from suffering.

Tattooing demonstrates how Pacific peoples used technology to create artwork that often connected the individuals receiving them to deities who oversaw their security, life, and death. Tattooing, then, was another manifestation of the broader intellectual tradition in which some aspects of Pacific science and technology developed.

**Indigenous and American Science Compared**

Thus far, this study has attempted to outline the scientific systems produced by Americans and Indigenous Pacific Islanders in the first sixty years of the nineteenth century. Several similarities between the systems can be drawn, as can numerous differences. The clearest comparisons can be made by analyzing the effects of religion, the role of artwork, and the nature of explorations on these intellectual structures.

Throughout the nineteenth century, American science was influenced by Christianity. At least one scientist on board the Ex Ex, James Dwight Dana, was a staunch Christian who believed science could be used to discern the nature of God’s work. As noted in Chapter One, Dana wrote in one of his published reports, “It is vain hope to understand fully the works of Him who is himself infinite and incomprehensible. The scrutinizing eye of science penetrates with far-reaching sight

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235 Thomas, 106.
the system of things about us, and in the dim limits of vision reads everywhere the word mystery.”

At this time, Dana pondered the unity of the earth’s geography, believing that the physical makeup of the Pacific could offer explanations into the formation of North America and other parts of the world. Nevertheless, David Igler believes that Dana’s theories about the geological formation of islands corresponded with Polynesian creation stories describing the same phenomena. Igler argues, “If he heard these stories…it is hard to believe he did not…they most likely captivated him. Dana would have recognized the basic process of island uplift described in the Maui fishing episode, and he would have heartily agreed with the divine origin of geological events,” using technical scientific language to illustrate the igneous causes, denudation, and disruption of earth’s features. Dana probably would not have considered the Polynesian creation narratives to be based in truth, but that is only because he believed that geology provided insight into the designs of the God of Christianity. Geologists like Dana were not the only American scientists to ascribe religious intervention to natural processes. Indeed, as seen in the previous chapter, ample scientific study pertaining to the races of man stemmed from the debate over the tenets of monogenesis and polygenesis and whether non-white populations could be considered as part of the same species as whites. Missionaries also attempted to inculcate their Indigenous converts with a proper understanding of the environment—one based in Christianity that would eliminate savage instincts. Thus, American scientists and Indigenous Islanders grounded their intellectual systems to observe and understand the mechanics of the universe in religious ideals.

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237 Dana, Geology, 80.
Artwork was also paramount to scientific work in America and the South Pacific. As noted in the previous section, tattooing on the islands involved technology to mix dyes and insert them into the skin using needles. Knowledge of the body in the Marquesas Islands also precluded individuals receiving tattoos from eating for a short time to reduce inflammation caused by the procedure. Tattooing was grounded in spiritual concerns, cultural beliefs about life and death, and preservation of island cultures. American scientists also used art to offer detailed renderings of their subjects before photography. Watercolors, sketches, and paintings captured representations of flora and fauna, marine life, peoples and many other foci, even if these illustrations were filtered through the eyes of the artist. For American scientists, artistry was a means of capturing data and communicating it to colleagues and the public without using technical jargon. It could also serve to transform specimens, manipulating their appearance to give the appearance of life to subject matter that expired as it was being collected.

Furthermore, Indigenous Islanders and Americans sailed the globe for centuries, another hallmark of scientific exploration. The United States Exploring Expedition voyaged in the shadow of scores of European excursions to the South Pacific that had occurred since the sixteenth century. Beginning in earnest in the eighteenth century, colonial powers launched scientific expeditions with the purpose of gathering information used to exert imperial influence in areas far from the homeland. But evidence suggests that over three hundred years before Christopher Columbus charted a course for India and happened upon the New World, Polynesian seafarers—without the use of navigational instruments—reached the shores of South America and returned with crops used to sustain life on the islands of the South Seas.

The preceding examples demonstrate similarities between Indigenous and American scientific practices, but they also highlight important differences. First, in antebellum America,
scientists attempted to build a professionalized system. This involved debating the proper scientific method, establishing networks of commerce, creating subject matter to be studied, and navigating complex political and economic bureaucracies. Pacific Islanders in the first half of the nineteenth century, conversely, did not practice science professionally. Some established commerce with neighboring lands. Many developed some form of agriculture to feed their populations and cultivate resources to be used in production of impressive sailing vessels and assorted implements. Others attempted to comprehend the workings of the universe by ascribing the effects of natural phenomena to deities. But Indigenous science was not an independent vocation like it was in America and the West. While American and Indigenous science both existed in connection with greater social customs, Indigenous practices were part of the mundane. Science and technology served Islanders’ needs as they attempted to survive, explore, and understand their origins.

Second, Americans and Indigenous Islanders circulated knowledge quite differently. As professionals, American scientists tended to publish written reports of their findings in journals, lecture in front of large audiences, share findings and ideas through correspondence, and jot observations in notebooks. Average Americans might have been left out of this process as technical jargon began to fill the pages of professional scientific publications. But scientists, generally, did not attempt to prevent the flow of information. Instead, they encouraged the exchange of research. Islanders, contrarily, generally shared their knowledge orally in chants, songs, and histories.241 David Chappell, in recounting his time researching in Samoa, offers one reason why. He describes a chief who had once attempted to write down information to pass on to others. A hurricane, however, destroyed the thirty pages he crafted. According to Chappell, “[The chief] decided his namesake, Tagaloa (the Creator) was trying to tell him something: The best place to keep history

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is in your head and not everyone should have equal access to it.” For some Islanders, then, knowledge could also be imbued with sacred properties, which meant there was a limit to the extent that it could be shared. Certainly, some Islanders, like Thomas Hopoo, learned how to write and expressed their views on paper. David Chappell explains, “Sources produced by kanakas, or indigenous go-betweens who worked, and even voyaged with, Westerners offer unique perspectives. Many of these individuals left their homes to travel with Americans and Europeans, learning to read, write, and speak in English, and becoming acculturated in Western society.” Kanakas aided in the circulation of knowledge, and this is clear in Hopoo’s autobiography. Nevertheless, in the first half of the nineteenth century, many Islanders still grappled with the wonders of the universe based on knowledge that had been passed down orally from elders.

In short, Americans created a scientific intellectual system grounded in professionalization, while Islanders created frameworks used in daily life. These peoples, however, engaged in science as a means to appease their curiosities about the world. They used their senses to observe natural phenomena and explain it, and they experimented with different technologies. In conducting this work, Pacific Islanders and Americans sought fundamental truths about the mechanics of the universe.

**Conclusion**

Pacific Islanders sought to observe and understand the mechanics of the universe systematically, but they remained uncivilized in the eyes of many American scientists, even when the products of their labors were recognized. Nevertheless, Indigenous and American intellectual systems for understanding the universe were much more similar than the Ex Ex scientists perceived.

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242 Chappell, *Double Ghosts*, xiii.

243 Chappell, xiv.
in the antebellum era. Each entailed observations of natural phenomena. Each was heavily rooted in religious beliefs that assumed the veracity of their respective dogmas. Science and technology in Indigenous and American systems also utilized artwork. Lastly, each system yielded technologies that allowed peoples to survive and migrate across the expanses of the land and sea. In the case of Polynesians, double-hulled canoes provided for extensive excursions and settlement throughout the Pacific and more than likely led to their acquaintance with South American vegetation. Thus, the systems of thought developed by Pacific Islanders and Westerners shared much more in common than initially noted by American observers.
Chapter 3: The Learn’d Astronomers, The Commoners, and the Islanders

When I heard the learn’d astronomer,
When the proofs, the figures, were ranged in columns before me,
When I was shown the charts and diagrams, to add, divide, and measure them,
When I sitting heard the astronomer where he lectured with much applause in the lecture-room,
How soon unaccountable I became tired and sick,
Till rising and gliding out I wander’d off by myself,
In the mystical moist night-air, and from time to time,
Look’d up in perfect silence at the stars.244


Whitman’s poem, published near the end of the nineteenth century, evokes a certain apathy towards professional science in America. Reflecting on the educated scientist who quantifies, organizes, and explains the wonders of the universe, Whitman’s anonymous Listener has a physical reaction. Not impressed by the scientist’s graphics or explanations of the stars, and feeling ill, the Listener leaves the lecture. It is once the Listener is outside gazing at the twinkling night sky that the Listener grasps its beauty and power. The Learn’d Astronomer, representative of a professionally trained scientist, despite his training and models, cannot not evoke what the Listener beholds through simple observation and reflection. The poem, thusly, can be read as a critique of nineteenth century American science, and illustrates some of the attitudes of common Americans towards professionalized study of natural phenomena.

This chapter examines how Americans untrained in science engaged with studies of natural phenomena in the antebellum United States, highlighting the science of the mundane for average Americans and how these practices interacted with professional American science. For many common Americans, the teachings of the “learn’d astronomer” were often secondary to those provided by other sources, such as textbooks, literature, and other elements of popular culture.

This chapter is founded upon a key assumption: the professional paradigm established by American scientists in the first sixty years of the nineteenth century, on balance, excluded many Americans from practicing science on the methodological terms established by trained experts. Nevertheless, science content in various media increased during this time, enabling Americans to encounter scientific concepts outside of the professional realm. This chapter argues that average Americans often received scientific education from textbooks, artwork, periodicals and trade journals, and in school and at home. The scientific work in these media generally appeared in non-technical language, but literacy was required to glean concepts directly from textual sources. Moreover, scientific education for the layperson focused on the practical or moral benefits of science. Understanding how average Americans grasped science will allow for an analysis explaining how they obtained information about the South Pacific and how this information influenced their view of this region.

This chapter contends that common Americans received much of their information about the South Pacific from the types of sources listed above, oftentimes gaining more knowledge from these avenues than from professional scientists themselves. Indeed, after the Ex Ex docked in New York in 1842, the crew had amassed “over 4,000 ethnographic objects from the Pacific islands and surrounding continents, 50,000 horticultural specimens, over 2,000 birds ready for mounting, 134 mammals, almost 600 fish species, over 1,000 insects (both dead and alive), and Dana’s vast collection of fossils, coral, and crustacean…” not to mention thousands of pages of notes scattered across scores of journals.245 The data gathered by the Ex Ex also yielded twenty-four published volumes and dozens of navigational charts. And yet, the reports received incredibly limited circulation at the outset; only about 100 copies of each report were published and made available.

to learned societies and governmental officials, both foreign and domestic. Moreover, until 1857, the Ex Ex specimen collections withered in poorly maintained storage facilities in the United States Patent Office. It was only once the Smithsonian Institution obtained them that they received a modicum of proper care. Thus, for as wide-ranging in scope as the Ex Ex was, few Americans actually encountered most of the scientific corps’ findings.

Furthermore, during the twentieth and twenty-first centuries, American scientists traveled to the Pacific, continuing the use of the area as laboratory. Others, like Ben Finney (whose story opened the Introduction), began working directly with Pacific Islanders to integrate Indigenous with American systems of knowledge to understand Native technologies. The Pacific also served as a theater of international combat and a site for military science during the Cold War. As such, the timeframe in this section will move beyond 1860, albeit briefly, to discuss some of the lasting impacts of explorations and encounters between Pacific Islanders and Americans that began in the first half of nineteenth century. This chapter is not a comprehensive analysis of the ways average Americans understood science or the South Pacific, nor is it a full analysis of modern-day research in the Pacific. Instead, it seeks to fathom the relationships between the learn’d astronomers, the lay Americans, and their interactions with Indigenous Islanders from the Pacific, and the significance of these exchanges for the study of science in the twenty-first century.

Professional Science Meets Common Americans

It should be noted that professional scientists attempted to engage with America’s youth to instill in them moral and practical teachings in the first half of the nineteenth century. Physicist Alexander Dallas Bache, for instance, redesigned and implemented the curriculum of

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Philadelphia’s Central High School in accordance with Whig values and the yearning to teach students practical scientific skills. In his address to the alumni association of the high school, Bache explained that he based his curriculum on his observations of European schools in the late 1830s. He explained, “…I was fully satisfied, that a mixed intellectual training derived from the classics and modern languages, mathematics, and the natural sciences, was the best for a….continuous course of study, I had been thoroughly convinced that education must not be fragmentary…I had especially studied the schools in Germany…in which I found excellent training produced by the mother-tongue, history, the lower mathematics, and elementary natural science.”\textsuperscript{247} This passage demonstrates that Bache understood the interdisciplinary nature of science. Inspired by European countries with robust professional scientific programs, he ensured that the teaching of students at Central High School would be reinforced by well-rounded instruction in numerous fields. He also wished to impart moral values in the Central High students. He continued, “It was a favorite idea with me, that character could be moulded [sic] in an establishment like this by kindly vigilance of the highest officer of the School, and the necessity for more painful discipline be thus avoided.”\textsuperscript{248} For Bache, the school’s curriculum had to reinforce the study of science with education in other subjects in order to produce morally upright citizens.

Bache’s desire to “mould” the livelihoods of his students stemmed from his commitment to Whiggery, a system designed to transform multitudinous aspects of American society. Hugh Slotten writes, “…Whig culture included two complementary elements: an innovative side supporting economic and industrial growth and a conservative side favoring social order and moral

\textsuperscript{248} Bache, \textit{Address Before the Alumni Association}, 5.
absolutism…Whiggery thus combined an interest in innovation with a desire for order.” As its second superintendent, Bache employed many Central High School students as participants in the United States Coast Survey—a scientific study of American coastlines stemming back to 1807. The survey, which continues presently with new orders under the Office of Coast Survey, mandated “hydrographic surveys and [production of] nautical charts…conducted the first systematic study of the Gulf Stream, designed tidal predication machines, and established the geodetic connection between the Atlantic and Pacific coasts” with the intention of providing better geological and magnetic information for navigators, businessmen, and others seeking to comprehend the landscape of America’s growing territory. By employing them in the survey, Bache provided students with hands-on experience in “fields such as geodesy, hydrography, terrestrial magnetism, meteorology, tidology, oceanography, and the natural history of the ocean.” As such, Bache, who had been instrumental in establishing the professional scientific paradigm in the U.S., could now recruit average Americans interested in science for institutional and national gains. He combined a commitment to Whiggery’s values of economic expansion and innovation with scientific education and practical experience. Building upon these principles, Bache wanted students throughout the United States to attend universities and gain professional employment and for Philadelphia to become a model for internal improvements throughout the country. He expressed, “Philadelphia would, if all her means of instruction were organized in concert…become in education generally what she is now in instruction in the branches of medical science—a leader among rival cities of the nation—a place sought out for the advantages of sound

elementary and higher learning.” For Bache, science played a role within a greater understanding of the intersection of the natural world, national advancement, and building of moral character.

The Science of the Mundane in America: Textbooks, Morals, Practicality, and the Circulation of Information

Many students, however, did not receive their first exposure to science in professionalized settings like the one created by Bache, due to lack of access. Young Americans had several options for pursuing education, but the opportunities to enroll in schools were not as utilized or available as they became in the latter half of the century. State and local governments generally did not mandate compulsory education, and students attended school sporadically. Doris Kearns Goodwin writes of a young Abraham Lincoln in one of the more colorful examples of antebellum American education, “Left on his own, Abraham had to educate himself. He had to take the initiative, assume responsibility for securing books…While no one in New Salem had a proper grammar text, the schoolmaster knew of a volume six miles away. Lincoln rose from the table and started out to procure the book.” Historians generally admit of Lincoln’s genius and love of learning, but this example offers something else—a view of the difficulty that children of limited means had in attempting to gain an education. Nevertheless, efforts to teach America’s youth grew in popularity between the 1820s and 1850s, with the study of science serving as a means to practical, interdisciplinary, and moral ends.

253 It should be noted that some professional American scientists were initially introduced to science in this manner as well, but there was no single way for individuals who became professional American scientists to receive training in the early nineteenth century. This section, however, illustrates how students who chose not to pursue an advanced education in science may have engaged with scientific concepts in antebellum America.
In schools throughout the North, instructors regularly used textbooks in their lessons to shape students’ views of the world. In these manuals, science served part of a larger effort to educate children about proper virtue, the nature of God, and individual improvement. Science education in primary schools, as a result, was also influenced by Christianity in the United States, just like professional science. “McGuffey’s” textbooks—a series of bestselling “Readers” used to teach school children lessons in spelling, reading, and elocution—provide insight into the role science played in instruction of America’s youth. McGuffey’s Readers were composed of selections from “the purest fountains of English literature” and the Bible. Professor McGuffey hoped to train students who could do more than recite passages. He wanted pupils to be “agents capable of collecting, and originating, and producing most of the ideas which are necessary for its education, when presented with the objects or the facts from which they may be derived.”

McGuffey sought to cultivate analytical learners though, as evidenced in *McGuffey’s Third Eclectic Reader*, an analytical student was arguably one who considered the teachings of the book to be correct. The *Third Reader*, for example, is divided into sections or lessons, nearly all of them containing a moral, and some were followed by questions leading students to “proper” conclusions.

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257 The sections are followed by questions to stimulate discussion amongst pupils and instructors, but the questions may have led students to answers instead of eliciting critical thought. The dual tales of George Jones and Charles Bullard are telling. In “The Consequences of Idleness,” George Jones spends his days passing time in pursuit of pleasure instead of studying. Consequently, “he was one of the poorest scholars in the school, because he was one of the most idle.” George fails to change his behavior even in college and is ill-prepared to recite lessons in class, shaking nervously in his seat while waiting to be called on by his professor. His lack of preparation leads to George’s humiliation. According to the tale, “Sometimes he would make such ludicrous blunders, that the whole class would burst into a laugh.” The fable ends as the narrator shares with readers George’s fate: he is now poor and destitute, living in the streets. The narrator ends the fable by stating, “Every child, who would be a Christian, and have a home
Certainly, in McGuffey’s *Third Eclectic Reader*, the individuals who engage in scientific inquiry appear to live fulfilling existences. “How a Fly Walks on the Ceiling” provides students with a lesson on the benefits of questioning mundane phenomena, along with a brief introduction to natural philosophy, or physics. In the reading, a young girl asks her father to explain to her and her siblings how a fly walks along a vertical piece of glass, or on a ceiling. The father takes his children into his study and has them examine the leg of a fly through his solar microscope. He then uses an air-pump, brass plate, and glass vessel to demonstrate the fly’s movement. He states, “When Mr. Fly, then, wishes...to move with gravity around his fair one, without the trouble of raising himself in the air, he stretches out these points, tightens the flap, draws air from under it, and moves along the polished surface of the glass.”  

The fly, according to the father, uses the same philosophical principles to manipulate the atmosphere he himself uses to adhere the glass to the brass plate. While describing the nature of the atmosphere, he confounds his children, and they start asking him questions for clarification. In response to his daughter who is doubtful that air possesses weight and can generate force, the father uses an example she would understand to conjure a mental image. He states, “But you have heard of hurricanes sweeping away forests and houses, and rendering the countries over which they passed, a wilderness...a hurricane is only air...in heaven, must guard against this sin.” Charles Bullard in “Advantages of Industry,” conversely, studies hard and even spends recess going over lessons he did not initially grasp. The narrator explains, “He had studied so well, when he was in the academy, and was so thoroughly prepared for college, that he found it very easy to keep up with his classes, and had much time for reading interesting books.” Upon graduation, Charles finds gainful employment and leads a happy life. The lesson here is clear: “Such are the rewards of industry....The idle boy is almost invariably poor and miserable; the industrious boy is happy and prosperous...And if you do not improve the advantages you enjoy, you sin against your maker.” The questions following the tales do not leave students much room for disagreement with this moral, prompting students to consider “Which of them do you think most worthy of imitation?” and “For what are we placed in this world? Should you not then be diligent in your studies?” These tales, then, offer examples of the types of students McGuffey hoped to forge. The selections highlight how man can improve himself, leading to prosperity, and what happens when man fails to do so. Furthermore, the lessons demonstrate that God monitors human behavior and that failure to work hard and diligently are sins against the Creator. Knowledge and its cultivation, to McGuffey, were integral to living proper lives. See McGuffey, *McGuffey’s Eclectic Third Reader*, 55-60.

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258 Ibid, 88.
As the father continues his lesson, one of his sons exclaims, “That is a very beautiful arrangement…I shall never breathe air again without thinking of its wonderful properties.”

“How a Fly Walks on the Ceiling,” which contains one of the most overt scientific lessons in *McGuffey’s Third Reader*, offers multiple levels of meaning warranting discussion. First, the story highlights how some common Americans (though perhaps those of wealthier classes) might have engaged with science at this time. The father, a patriarch who could afford a library with a small laboratory equipped with instruments, introduces his children, and by extension McGuffey’s readers, to scientific implements. The story does not give any indication of the father’s profession, so it may be implied that he is a non-professional scientist who engages in part-time investigation into the natural world. The father uses the tools in the story to prove his point, demonstrating the effectiveness of experimentation. In addition to experimentation, which offers his children visual portrayals of the fly’s movements and air pressure, the father explains the scientific principles without jargon, utilizing words the children would understand. He furthers his point by connecting atmospheric pressure to a natural phenomenon with which his children are familiar: a hurricane. Thus, the father uses several modes of communication to instruct his children. His daughter, then, connects the lesson to mythology, when seeing the glass adhere to the plate by stating, “How wonderful!...It is as fast to the plate, as the friend of Hercules that I read about the other day, was to the stone on which he sat, in the drear dominions of Pluto.”

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260 Ibid, 86.
261 Ibid, 87.
262 Another entry in the *McGuffey’s Third Reader* is far less acknowledging of this connection between class and the ability to pursue science in one’s home. The excerpt, titled “The Nettle,” depicts a father who explains the purpose of the stingers on a nettle plant to his daughter after she is pricked by one in a garden. Though he explains that the nettle possesses defense mechanisms because God designed it that way, the father also evokes early evolutionary thought in his descriptions, several years before Darwin published his seminal volume *On the Origin of Species*. See ibid, 44-45.
263 Ibid, 86.
willing pupils who, through their inquiry and persistence, learn of the beauty of nature and complexity of the world around them. The passage ends with the three children exclaiming in tandem, “How delightful! How beautiful! How ingenious! I shall never see a fly again without interest.” Consequently, the inquisitiveness of the children and their willingness to learn leads them to a greater appreciation of the natural world and provided McGuffey’s students with a model to emulate. Though it is unclear to what extent students who encountered this story would have absorbed its lesson, it remains indicative of ways that science and its benefits for the individual were communicated to nineteenth century pupils.

Other textbooks taught American children about science by using artistry to reinforce complicated scientific concepts. *Mitchell’s School Geography*, published throughout the nineteenth century, offers several examples. Illustrations of rugged oceans on which ships sail and struggle to stay afloat, and renderings of earth’s diverse geological features abound in the text. Astronomical concepts are also conveyed using imagery. The first chapter opens with a drawing of the earth as seen from space (Fig. 4). Parts of North and South America, Africa, Europe, and Central Asia appear in view. A crescent moon, Jupiter, Saturn, and a sea of stars surround the earth. Though not entirely accurate in terms of geographical positioning, the image provides a perspective of the planet and space comparable to one a grade school student might even view in a contemporary elementary science textbook. Further into *Mitchell’s Geography* another illustration of earth appears, this time with the Pacific Ocean and its islands in the center of the globe (Fig. 5). Astronomical information about the size and shape of the earth follow this illustration. The book is replete with maps and other information pertaining to navigation,

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264 Ibid, 88.
providing its readers with lessons in astronomy, navigation, and oceanography. Thus, the interweaving of science and artistry was a common tool used to illuminate a reader’s view of the world, including distant realms of the Pacific.

Mitchell’s Geography also taught its users about the geographic makeup of “Oceanica,” or the South Pacific, connecting the region’s environment with the race of its inhabitants.  

Mitchell, reflecting Enlightenment Era thinking, wrote of people living in torrid zones, “They are generally of a dark or black colour [sic], and indolent and effeminate in their habits.” (Fig. 6.) Torrid zones existed between the Tropic of Cancer and Tropic of Capricorn, which would include a significant portion of the South Pacific. Individuals living in the North Temperate Zone, however, had “white or fair complexions, and generally more strength in body and mind than the inhabitants of the other

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267 Mitchell, 329.
268 Ibid, 33.
Zones...[They comprise] the most civilized and improved portion of mankind." Accordingly, Americans lived in the North Temperate Zone. Descriptions of individual regions such as Malaysia, Australia, and Polynesia fill the final pages of the 1845 and 1849 editions, providing further descriptions of the races of man living in the islands of the South Seas. According to Mitchell, five races existed: Caucasian, Asiatic or Mongolian, American, Malay, and African or Negro. The people of “Malacca and Malaysia, with those of Polynesia and New Zealand,” composed the Malay race. In reference to Malay race, Mitchell noted, “Many of them are pirates; and the most daring attempts are often made by them to capture vessels of superior force.” The introductory image to the chapter on Oceanica (Fig. 7.) shows a group of “Malays,” unclothed and standing on the beach. The men appear to be engaged in discussion and in a state of waiting as large canoes pack the ocean, demonstrating the navigational prowess of the islanders. But this technological feat is portrayed as an element of Malay savagery, since Mitchell depicts them as pirates who commit acts of violence on the high seas.

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269 Ibid, 34.
270 Ibid, 42.
271 Ibid, 43.
272 Ibid, 330.
273 Ibid, 328.
In a revised edition of *Mitchell’s Geography*, published in 1849, the author stated that he included information gathered from the reports of the United States Exploring Expedition, which had been published over the course of several years, beginning in 1845. Indeed, one modification to the chapter on Oceanica states, “In the year 1841, the American Exploring Expedition visited many of the islands in these seas.” Upon further review of the text, however, it appears that no major substantive changes were made to this section between the 1845 and the 1849 editions. Given that the first publications of the Ex Ex received limited distribution, it is difficult to discern how Mitchell may have obtained the information he claimed he incorporated. Nonetheless, because of the stifled circulation of the Ex Ex publications, it is likely that users of the textbook received more descriptions of the South Pacific and its peoples from it than they did from the reports of American scientists who visited these areas.

The races of man and stages of society were integral to American understandings of science in antebellum America. As outlined in the previous chapters, debates raged between scientists and learned men pertaining to the origins of mankind. Descriptions of the various races encountered during the Ex Ex filled the pages of journals and published reports as the scientists attempted to make sense of the behavior and civility (or lack thereof) of the people they encountered. At times, the scientists’ conclusions defied conventional scientific wisdom. For instance, when Pickering published *The Races of Man*, his report concluded that five races did not exist but rather eleven, in

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274 Ibid, 328-329.
contrast to scientists and textbook authors like Mitchell.\textsuperscript{275} The links between the races of humanity and the stages of civilization were also important to many average Americans because of what their implications meant for the expansion of Anglo-Saxonism throughout the globe. Reginald Horsman explains, “Between 1815 and the mid-1850s an American Anglo-Saxon ideology was used internally to bolster the power and protect the status of the existing population…Internally it was made quite clear that the American republic was a white Anglo-Saxon republic; other white races would be absorbed within the existing racial mass while nonwhites would be rigorously excluded…”\textsuperscript{276} In an example of professional science being disregarded by the public, Pickering’s work did not capture the imagination of most Americans, owing in part to its restricted distribution throughout the country, its failure to place the races along a hierarchy, and its contention that humanity’s origins spawned from Africa.\textsuperscript{277} Accordingly, Southern slave holders could not use the findings in the text to support their contentions that African-American slaves were inferior to their masters.\textsuperscript{278} On balance, Americans, whether professionally trained in science or not, had a vested interest in scientific explanations of race as it pertained to understanding humanity’s origins and territorial expansion.

The integration of science into education and greater American society did not occur equally throughout the United States, however, as sectional differences defined how children were taught and the usefulness of science in general. Like Northerners, Southerners were adamant about instilling practical skills and moral values in their progeny. In the Gulf States of Alabama, Mississippi, and Louisiana, some students attended private and public schools. If children could

\textsuperscript{275} Charles Pickering, \textit{The Races of Man and Their Geographical Distribution} (Philadelphia: C. Sherman, 1848).
\textsuperscript{278} Ibid.
not afford the cost or time to pursue formal education, their parents often reared them at home or hired private tutors. Learning across institutions could vary, however, especially since parents who instructed their children usually only taught as much as they had learned themselves. Mothers also trained their offspring in maintaining a home, along with “inculcating morals and safeguarding their physical well-being.” Nevertheless, many Southerners often loathed the use of textbooks because of their perceived New England abolitionist bias. According to Ruth Miller Elson, most textbooks were written by authors who lived in Connecticut, Massachusetts, Maine, and New Hampshire. Some Southern educators acquiesced, opting for textbooks that ignored the issue of slavery. According to Elson, “At a convention of administrators and teachers in Augusta County, Virginia in 1853, the following authors were suggested as the best in their fields: for spelling, Webster (Connecticut); for reading, McGuffey (Ohio, though born in Pennsylvania)...for geography, Mitchell (Connecticut) and Smith (Connecticut); for arithmetic, Davies (Connecticut).” During the Civil War, the Confederate States of America sought to differentiate themselves by publishing their own textbooks. One of the most notable examples was Our Own School Arithmetic, published in North Carolina in 1863. This textbook, almost identical in format The Progressive Practical Arithmetic published in Chicago in 1864, was written so that Southerners could claim ownership of their children’s advancement in mathematics, a study useful for scientists, as well as average Americans pursuing agriculture. Southerners, however, may have disregarded the use of textbooks altogether. According to Clay Morton, “Indeed, there is

280 Hyde, Schooling in the Antebellum South, 8.
281 Ibid.
283 Ibid.
much evidence to suggest that they were not used to any significant degree,” for the same reasons noted by Elson.\textsuperscript{285} Instead, Southerners engaged in verbal rhetoric to convey teachings to school children.\textsuperscript{286} The extent to which science entered these lectures is unclear, and science as presented in the textbooks listed above may have emerged in the general instruction of students in the Southern United States infrequently.

Other written texts, nevertheless, like Southern periodicals, could promote the benefits of science. Commentary in the *Southern Quarterly Review*, a popular periodical founded in 1843, demonstrated how the teaching of practical science could aid farmers, upon whom so much of the Southern economy depended. In discussing Professor Justus Liebig’s *Organic Chemistry in its Application to Agriculture and Physiology* J. F. W. Johnstone’s *Lectures on Agricultural Chemistry and Geology*, and S. L. Dana’s *Farmer’s Muck Manual*, the unnamed reviewer of the texts explained how chemistry and geology could be used to improve Southern agriculture. Moreover, the reviewer stated that to not follow the guidance of the scientists would place their labors in peril. The reviewer wrote, “The South, especially needs, now, most emphatically, that the practical principles contained in these volumes be carried out on every plantation within her borders. If this be not done, the time is not far distant when desolation shall reign over a large portion of country the most fertile and delightful, by nature, on the surface of the globe.”\textsuperscript{287} For this reviewer, the practical elements of these sciences could ensure the survival of a Southern way of life, and as such, was necessary for cultural and economic security.

Primary schooling, ultimately, incorporated science into lessons, but it was connected to ideas about religion, the races and stages of man, and morality. In the Northern United States,

\begin{enumerate}
  \item\textsuperscript{286} Morton, “Typographic America,” 45-61.
  \item\textsuperscript{287} Anonymous, *Southern Quarterly Review*, Vol. 3 No. 5, (1843), 185.
\end{enumerate}
textbooks served as important vehicles for the transmission of this information to pupils, along with descriptions of the South Pacific. Though scientists, like Alexander Dallas Bache, recruited students to work in fields of professional science, most students would have received information from primary school teachers without scientific training, who in turn used textbooks to convey lessons. In the Southern United States, these volumes, because of their supposed abolition biases, were often ignored. But other publications disseminated in the South promoted the benefit of science for society. The information presented in these texts tended to illustrate complicated concepts without technical jargon and with illustrations, making details easy to grasp, with the intention of molding ideas about science and the South Seas in the minds of readers.

The Science of the South Seas in Popular Culture

Average Americans did not typically rely on published scientific reports to learn about natural phenomena. The same was true regarding information about the South Pacific. A full-length monograph could be written about the different sources of popular culture that provided Americans with scientific material they could use to make judgements about the world and its peoples. What follows here are just a few examples of how knowledge of the South Seas found its way to the antebellum United States independent of professional scientific publications, and their effects on Americans.

Perhaps no other aspect of the United States Exploring Expedition garnered more attention than Vendovi, a Fijian chief charged with the murder of an American seafarer and subsequently captured in retribution by officers of the Ex Ex. The Brooklyn Daily Eagle, reporting on the return of the Ex Ex, wrote, “Vendovi, one of the principal Chiefs of the Fiji group of Islands, is on board the Vincennes as a prisoner, for having attacked and killed a part of the crew of an American
vessel, after which he and his followers *feasted on their bodies* [emphasis added by article’s author.]” 288 Philadelphia’s *Public Ledger* wrote, “Among the curiosities on board the *Vincennes* is Vendovi, one of the principal chiefs of the Fiji group of islands, a prisoner, for having attacked and killed a part of a crew of an American vessel…” 289 Both periodicals boasted of Fijians tearing the flesh off of their victims, and one of them specifically deemed Vendovi a “curiosity.” These were not the only papers to write about Vendovi’s arrival, as the Fijian chief had captured the imaginations of many Americans. Barry Joyce writes, “What the general public found thrilling about the return of the voyagers was not the glory of their achievements, but the idea that a cannibal would soon be walking the streets of New York.” 290 Americans considered the idea of Vendovi’s arrival both exhilarating and frightening, the concept of a cannibal venturing through New York compounded by the mysteriousness of the Pacific in their minds. Vendovi, however, arrived in the United States with consumption, and died less than a week after the *Vincennes* docked. 291 By June 14, newspapers were reporting dead “Vendovi the Fegee [sic] chief who was brought to the United States.” 292 The Islander’s death made him no less of a curiosity for scientists and the public alike. Surgeons decapitated Vendovi’s corpse and added his cranial specimen to the acquisitions of the Ex Ex. 293 Within two weeks, *The Evening Post* advertised in its “Amusements” section, “INCREASED NOVELTIES, By Permission of the United States Government, the head of VENODVI, THE CANNIBAL CHIEF! from the Fefee [sic] Islands, has been deposited in the Museum for public exhibition, for one week only. It is a true and exact case of this sailor-eating

289 “Return of the Exploring Expedition—Arrival of the Vincennes,” *Public Ledger*, June 13, 1842. The wording of this article is almost identical to the one by *The Brooklyn Daily Eagle* because major newspapers often circulated the same articles to multiple outlets throughout the country in the nineteenth century.
292 “Dead—Vendovi, the Fegee Chief,” *The Baltimore Sun*, June 14, 1842.
293 Fabian, *The Skull Collectors*, 125-162.
chief…” at the American Museum and Gardens run by P.T. Barnum. Though Barnum did not actually have Vendovi’s head, Ann Fabian explains that Barnum used his marketing prowess to tie the mysteries of the sea to Vendovi’s heritage in order to capture imaginations. Barnum had already made a name for himself promoting his acquisition of a deceased mermaid said to have been captured off the oceans near Japan and displayed in London. Though naturalists explained that the mermaid was really comprised of “the tail of a salmon [sewn] onto the head and torso of a baboon…” the general public remained fascinated. Barnum then went a step further, connecting the “Fejee Mermaid” with the capture of Vendovi, making the desire to see even a mold of the Fijian chief’s head palpable. As for Vendovi’s actual remains, his skull was incorporated into the collections of the United States Exploring Expedition and shuffled around Washington, D.C., where it remains today, while his body was buried in the Brooklyn Navy Yard.

Vendovi’s story highlights several aspects of the relationship between the American public, antebellum American scientists, and the circulation of knowledge about the South Pacific. First, despite the vast collections of marine, plant, and ethnological specimens brought back from the South Pacific by the Ex Ex scientific corps, it was the oddity of a “cannibal walking through the streets of New York,” that riled the public. Vendovi’s story was sensational, and it may have been one of the only ways Americans encountered the discoveries of the Ex Ex in the South Pacific because the processing of the Ex Ex’s scientific specimens was delayed amidst legal proceedings and destruction of specimen collections. Charles Wilkes faced courts-martial for “charges of

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294 “Amusements,” The Evening Post, June 28, 1842.
295 Fabian, 156-157.
296 Fabian, The Skull Collectors, 156.
297 Fabian, 157.
298 Fabian, 125; 161-162.
oppression of his men; illegally flogging men in the squadron; illegally detaching enlisted men; scandalous conduct, specifically making a false entry as to the date on which he sighted land in the Antarctic; and…cruelty for killing natives and burning their villages in reprisal for the death of his nephew.”

The collections had also been ransacked by individuals who sought to curry political favor with “partisan gardener-botanists and private collectors.” In addition to these obstacles, the reports of the Ex Ex received little distribution—about 100 copies of each were printed and distributed to learned societies, scientists, and domestic and foreign governmental officials. Most Americans, therefore, did not know exactly what the scientific corps of the Ex Ex encountered. But regardless of whether one was knowledgeable of science or not, the story of a cannibal in America could be read in some of the most prominent newspapers in the country and discussed amongst colleagues and families. Vendovi, thus, was one of the few connections common Americans had to an exploration that ended in quagmire.

Second, as a captive onboard the Ex Ex, Vendovi provided knowledge about Fiji’s culture to the American scientists. As explained in Chapter Two, Vendovi’s descriptions of Melanesian cosmology led Horatio Hale to reflect on the use of religious narratives to explain natural phenomena, like tsunamis. Vendovi also offered the sailors a political history of the islands which had “seen regicides, fratricides, plotting queens, feigned deaths, corpses made to seem alive, perfidy, treason, betrayal, hate, murder, and revenge” in recent years. Vendovi’s life did not lack a history, and the Fijian chief did not lack intelligence. He had been an active member of his village’s political and social history. As a prisoner, he was transformed into someone who, as David Chappell explains, could navigate between Indigenous and Western cultures. Chappell

299 Joyce, The Shaping of American Ethnography, 144.
300 Joyce, 144-145.
301 Ibid, 147.
302 Fabian, 144.
notes, “…Pacific Islanders were often able to transfer traditional skills to their new endeavors, and they actively mediated between ship and shore, making acculturation more of a two-way process.” Vendovi not only served as an example of American maritime justice for the Ex Ex sailors, he also provided the scientists with a wealth of information used for their work. Though much of this knowledge did not reach many Americans in general, at least initially, Vendovi is but one of hundreds of examples of Pacific Islanders (like Thomas Hopoo) who left their homelands and sailed across the globe, living interstitial livelihoods that blended Western, Indigenous, and seafaring cultures.

Whether instilling imagery of the races of man in children’s textbooks or exciting the public with announcements promoting the display of a replica of a Pacific Islander’s head, capturing imagination proved central to formulation of public perception about the South Seas. This could be done, in part, through popular literature. James Montgomery’s epic poem *Pelican Bay*, which James Dwight Dana critiqued for its inaccuracies in describing coral formations, nonetheless, could vividly express to wide audiences that, “Atom by atom thus the burthen grew, / Even like an infant in the womb, / till Time Deliver’d ocean of that monstrous birth, / A coral island, stretching east and west… In the close coral, capillary swarms / Of reptiles, horrent as Medusa’s snakes, / Cover’d the bald-pate reef; then all was life / And indefatigable industry; / The artizans [sic] were twisting to and fro…” The use of poetic license to convey descriptions of the Pacific could stimulate public interest in ways that scientific jargon in professional scientific journals or books simply could not. Similarly, Herman Melville’s novels of adventures in the

Pacific provoked similar interest to those who were curious to enter the exotic islands of Nuka Hiva or Tahiti without leaving their homes.

In Melville’s *Typee*, for instance, Tommo (the protagonist based on the author himself) represents a common American possessing little knowledge of the South Seas and untrained in science. Melville, in reality, deserted the *Acushnet*, the wailing ship to which he was attached, in Taipivai, a valley in Nuka Hiva in the Marquesas Islands. The author spent four weeks with the Taipis (who he calls “Typee” in the novel) and attempted to make sense of their customs. Melville was not properly trained in science and traveled to the South Pacific as a whaleman and sailor in the U.S. Navy. Still he used his powers of observation and storytelling to disseminate information about what he experienced in the South Seas. Upon his return to the United States, Melville wrote a semi-autobiographical account, with some embellishment, integrating secondary source material to round out his own tale.305 John Bryant explains that Melville, in the process of supporting his recollections with narratives about Western travelers in the South Pacific, began to reflect on his own observations. According to Bryant, Melville drew upon Georg H. von Langsdorff’s *Voyages and Travels*, Charles S. Stewart’s *Visit in the South Seas*, William Ellis’s *Polynesian Researches*, Frederick D. Bennett’s *Narrative of a Whaling Voyage*, John Coulter’s *Adventures in the Pacific*, and Sir Edward Belcher’s *Narrative Around the World*.306 Some of these works, like Ellis’s *Polynesian Voyages*, were well-known publications, and a copy of *Polynesian Voyages* was even carried onboard the Ex Ex and cited as supporting evidence in some of the published accounts.307

306 Bryant, xxiii.
But Melville added to this library of South Seas adventures by upending traditional views of Islanders and the scientific methods used to gather that knowledge. Throughout Typee, Melville provided ethnological descriptions of the Natives living in Nuka Hiva, describing their religious beliefs, lack of dress, their sexual proclivities, the physical prowess of the men, and their complexions in aesthetic terms. As such, the content of his observations closely mimicked those of the Ex Ex explorers. He, too, provided exotic imagery of Tahiti in Omoo, depicting the picturesque island surrounded by “The bright blue sea on one side, and the green mountain pinnacles on the other,” and offered insight into his imagination stating, “And what strange shapes were lurking there! Think of those creatures, the mermaids, chasing each other in and out of the coral cells, and catching their long hair in the coral twigs.” At first glance, it seems like Melville may have been confirming antebellum American views of the Pacific as an exotic, ahistorical realm of mythical sea-creatures and savages. But the author disagrees with the assessments of previous voyagers, including those of trained ethnographers, stating, “The fact is, that there is a vast deal of unintentional humbuggery in some of the accounts we have from scientific men concerning the religious institutions of Polynesia. These learned tourists generally obtain the greater part of their information from the retired South-Sea rovers…A natural desire to make himself of consequence in the eyes of the strangers, prompts him to lay claim to much greater knowledge of such matters than he possesses.” Jessie Poesch states that even some of the ethnological data collected from the Ex Ex was incomplete. The data was periodically based on faulty contextual information, and the crew frequently did not spend enough time on individual

309 Melville, Omoo: A Narrative of Adventures in the South Seas (Boston: L. C. Page & Company, 1892 [1847], 130 & 71.
311 Melville, Typee, 170.
islands to draw proper conclusions. He writes, “They could describe native buildings, canoes, weapons, costumes, and other artifacts. But they could only glean fairly superficial information about the religion, the kinship patterns, and the nature of the economy, or the living habits of the natives.”312 This is not to say that the materials they obtained were necessarily incorrect, but this serves as an example of how context and popular treatises could affect conclusions that scientists subsequently shared with audiences who, in turn, used them to inform their own perceptions.

Melville’s works proved controversial because they questioned Western thinking as it pertained to the stages of civilization. In *Omoo*, for example, the protagonist reflects on who truly constitutes a savage, stating, “Indeed, it is almost incredible, the light in which many sailors regard these marked heathens. They hardly consider them human. But it is a curious fact, that the more ignorant and degraded these men are, the more contemptuously they look upon those whom they deem their inferiors.”313 Melville, here, questioned the behavior of his fellow seafarers, and as he described their quarrels while traveling through the South Pacific, the sailors appear to be erratic, irrational, intoxicated, prone to violence, and perhaps the real savages.314 Melville grappled with his secondary source material while writing *Typee* as well, wondering if the islanders he encountered first-hand were truly barbaric. According to Bryant, “Others had seen depravity in Taipivai; Melville saw a happy, moral people living without money and beyond the power and poverty of the industrial West.”315 Upon *Typee*’s initial publication in America, liberal writers like Hawthorne and Thoreau praised Melville’s progressive views. Other readers, however, detested the work, prompting Melville to release a revised edition shortly after its initial publication.316

314 Ibid.
315 Bryant, “Introduction,” in *Typee* xxiii.
316 Ibid, xvii-xviii.
the United States, six thousand copies *Typee* were purchased by 1848, that tally increasing to twenty-thousand in England and the U.S. by the end of the nineteenth century.\(^{317}\) Though certainly not the best-selling travel narratives about the South Pacific, Melville’s semi-autobiographical fiction compelled readers to question their preconceived notions about the region, and received wider circulation that scientific reports stemming from the Ex Ex.

**Epilogue: The Lasting Effects of Science and the Pacific**

In the years following the Ex Ex’s return to the United States in 1842, the professional paradigm established by American researchers and the comprehension of science by laypeople transformed significantly throughout the country. 1860 served as a watershed year for several reasons. First, Charles Darwin’s *On the Origin of Species* had hit bookshelves in November 1859, and almost immediately, Westerners grasped the significance of Darwin’s theory of natural selection. Many struggled to reconcile its implications with Christian dogma and American scientists witnessed the emergence of a stunning theory that had been developed well outside of Bacon’s parameters. Siddartha Mukherjee explains, “Darwin had advanced the boldest new theory in biology…without adequate experimental proof to support it…”\(^{318}\) Nevertheless, Darwin’s theory became widely accepted by scientists, and botanists, naturalists, and geneticists have spent the last one hundred sixty years working within this scientific paradigm.

In 1860, Americans also saw their country on the brink of Civil War. Average Americans engaged with science, usually insofar as it appeared in technological and medical advances on the battlefield or on the home front. The work of professional scientists suffered as well.

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explains, “The Civil War hurt American science in ways that touched Northerners as well as Southerners. On both sides it distracted scientists from their work, reduced their income and support, diverted them—sometimes for good—to other activities, and even killed them.” As such, Americans in 1860 witnessed a pronounced shift in fundamental assumptions about science, religion, and nature, as their country stood at the precipice of carnage. The story of American science and its endeavors in the Pacific did not end in 1860, however. If anything, it demonstrated the power that science and technology could play in saving lives, as well as ending them in violent conflicts. Indeed, science and technology would serve the cause of war increasingly, particularly during World War I and World War II. After the Civil War, staples of the American professional paradigm like Alexander Dallas Bache, Charles Pickering, James Dwight Dana, Charles Wilkes, Asa Gray, John Torrey, Titian Ramsay Peale, and Horatio Hale continued their work until, one by one, death consumed them. Samuel Morton, whose research pertaining to the races and stages of man influenced Western ideals about the value of non-white peoples, never saw the conflict, however. He died approximately ten years before the first shots were fired on Fort Sumter.

Sailing into the Twenty-First Century

Though not within the timeframe established in this thesis, the last section of this chapter serves as an epilogue to the story of professional American science and its engagement with the South Pacific and its peoples, showcasing the lasting effects of nineteenth century incursions and cross-cultural exchanges in the South Seas.

Just like Abby Jane Morrell in 1829, Helen Raitt briefly left a life of relative comfort in the United States to travel with her husband to the South Seas in 1952. Also, like Morrell, Raitt published the journals of her explorations for a mass audience a short time after her return to the U.S, and the parallels between both narratives are striking. Both Morrell and Raitt married husbands whose professional careers led them to spend years on the high seas. Raitt’s husband, Russell, worked for the University of California (UC) as a geophysicist. In conjunction with the Scripps Institution of Oceanography (run by scientists at UC), he embarked on the 20,000 mile sea voyage on the *Spencer F. Baird* “stopping at Suva, Pago Pago, Tahiti, and the faraway Marquesas” that Raitt was eager to join. The nature of Dr. Raitt’s work emphasized the connection between science, American foreign policy, and expeditions to the Pacific during this time. So confidential was her husband’s work that while waiting for him in Fiji (where she had flown, in an obvious departure from Morrell’s trek) Raitt “couldn’t state that our oceanographers had been gone a long time and were engaged in secret work of top priority to our country…” The work conducted by the Scripps Institution combined post-war American foreign policy with science, commerce, and resource management. Harry N. Scheiber explains that the Scripps Institution “became a base of elaborate projects in naval electronics technology, wave and currents research, and other studies in physical oceanography lavishly financed by the military and naval authorities.” Moreover, biologists were assigned by the military to inventory marine life in Japanese territory captured by

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321 Here after referred to as Dr. Raitt; Helen Raitt will be referred to by her last name.
the United States and to establish fisheries.\textsuperscript{325} As such, the voyage of the \textit{Spencer F. Baird} was part of this new world order.

Raitt, who was trained as a journalist, made ethnological observations of the peoples she encountered, as well as the islands, in the South Pacific. Describing her “Tongan Family,” she wrote of the women, “Here everyone works together…Perhaps this was one of the secrets of Tongan life, part of the happiness of their women. No woman is shut up alone in her house as in our world.”\textsuperscript{326} She furthered noted, “From the Tongans I learned about the antiquity of their country…They told me the legend of their origin, how the great Maui from the underworld went to Samoa to obtain a fishhook…and then, using the hook, pulled up Tongatabu and the low islands of Ha’apai, Vava’u and the Niuas…”\textsuperscript{327} The Tongans, accordingly, exposed Raitt to cosmogony expressed to Ex Ex scientists a little over a century earlier. But, unlike Morrell, Raitt had a respect and fondness for the Islanders she encountered during the weeks long adventure. Raitt relished her time in the South Seas, even following the approximate path that Melville did when he first arrived in Nuka Hiva. Raitt stated, “I thought of Melville and how…he had arrived at approximately this same point in 1842…Perhaps it is the magic of Melville’s beautiful prose which haunts all this scenery and makes this trip memorable.”\textsuperscript{328} In underscoring the effects of globalization in Fiji, she wrote, “The problems of this colony revolve around its racial division. In 1946 the Indian population surpassed the Fijian. Of the total population of about 300,000 people, 47 per cent are Indian and 44 per cent Fijian. The rest are Chinese, Rotuma Islanders, Europeans, and islanders from all the other parts of the Pacific,” and Great Britain claimed the island.\textsuperscript{329} Thus, these passages

\begin{itemize}
\item \textsuperscript{325} Scheiber, “Wilbert Chapman and the Revolution in U.S. Pacific Ocean Science,” 225.
\item \textsuperscript{326} Raitt, 22.
\item \textsuperscript{327} Ibid, 26.
\item \textsuperscript{328} Ibid, 212.
\item \textsuperscript{329} Ibid, 11.
\end{itemize}
underscore the increasing impact of nations from the Far East and the West on the islands, an American perspective of the South Pacific that revered island culture, and the effects of nineteenth century popular literature about the region on the imagination of someone living a century later.

Raitt, like Morrell, was a stranger in the South Pacific, and she was also a foreigner in the gendered space aboard the *Baird*. Whereas Morrell believed she could use her gender to promote proper behavior on American sailing vessels in the nineteenth century, Raitt questioned the role she could play as a woman on the ship in a professional field dominated by men. Raitt noted, “I hope they will believe me at home when I say it is a man’s world, not for women, this cruising about studying the earth beneath the sea. It is not simple or safe.”

About a month into her journey, Raitt expressed, “I’m one of a kind in a world that belongs to men, and I am not a man…Perhaps my position would be comparable to that of one brown Polynesian in a world of whites…I on my part have tried to carry out my function on the ship, to type what they want typed, record the mud they want recorded…” In making sense of her identity and purpose onboard the ship, Raitt attempted to learn as much as possible about the instruments in the cramped laboratory in the *Baird’s* midsection, the massive equipment that was used to survey the oceans, and the specifics of her husband’s work, which included conducting seismic surveys and drilling holes nearly a mile long into coral. Despite this, Raitt could not help but question her role as a woman in the still male dominated work of science, stating, “…it is lonely, in a way none of them understands, this loneliness for one’s own kind.”

Overall, Raitt’s journal illustrates change and continuity with regards to scientific explorations in the South Seas. While globalization and advances in discoveries and technology transformed the work of professional American scientists

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330 Ibid, 41.
331 Ibid, 226.
332 Ibid, 40-44; 218-219.
333 Ibid, 226.
in the Pacific, it still involved exploiting resources for national gains, gender barriers, and intrusions into of Islander ways of life.

Indigenous Islanders and Americans have worked together for the last half-century to demonstrate the sophistication of Indigenous scientific practices and culture. But the memory of incursions on Islander cultures by the West has occasionally complicated these endeavors. For example, in 1976, Ben Finney and his team of Americans and Indigenous Hawaiians successfully sailed from Hawaii to Tahiti in *Hokule’a* in order to dispute the hypothesis that Polynesian canoes could not sail against the trade winds, a theory espoused by Thor Heyerdahl. But this partnership also exposed the tenuous relationship between an Indigenous Pacific culture and the West that once exploited it. Herb Kane, one of the Hawaiian team members, began to believe that the voyage should “uplift the Hawaiian people, to be the catalyst for the Hawaiian renaissance. The restoration of the voyaging canoe…would reawaken in young Hawaiians an ethnic pride worn down by the Americanization of Hawaii…”

Other Hawaiians, once they grasped that the canoe was a replica of an ancient Polynesian sailing vessel, balked at the idea that *haoles*, or non-indigenous Hawaiians or Americans, would travel in such sacred transportation. The voyage of the *Hokule’a* almost did not occur, and even during the trek, cultural tensions were palpable. Finney explained, “How naïve it had been to think that scientific research and cultural revival could be easily combined in today’s Hawaii. Angry young Hawaiians feel that things *haole* must be rejected; *haoles* and *haole* culture are their oppressors.” For Finney and his American compatriots, research based on Western methods could unlock mysteries and return a sense of pride to Polynesian Islanders. But

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335 Finney, *Hokule’a*, 35.
336 Ibid, 37.
the response by some of the Islanders underscored what Western research had meant for their culture: erasure or appropriation.

Today, the Pacific continues to serve as a laboratory for international scientific exploits. Researchers from the U.S. Geological Survey and several American universities have attempted to understand the causes of the Kilauea Volcano that erupted in August 2018—the largest of its kind in two centuries. Collaborations between specialists in various fields have allowed them to investigate the volcano which “included both a summit caldera collapse and a flank fissure eruption, a complex event observed only a handful of times in modern history.” \(^{337}\) Utilizing “a dense network of geological, geochemical, and geophysical instrumentation,” such as recently developed aircraft, infrasound, communications, and digital imaging systems, American scientists were able to gain a sense of a rare phenomenon that had global implications. \(^{338}\) Moreover, in April 2019, the first image ever taken of a black hole occurred as a result of scientific work in the Pacific. To capture the image, an “earth-sized” telescope had to be fashioned by placing eight telescopes connected by interferometry around the world, including areas in North America, South America, the Iberian Peninsula, and Hawaii. \(^{339}\) A linguistics professor from the University of Hawai‘i—Hilo dubbed the black hole “Powehi,” which means “embellished dark source of unending creation,” an notion stemming from an eighteenth century Polynesian creation story. \(^{340}\)

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discovery of the black hole, Jessica Dempsey, one of the scientists on the project, said, “We described what we had seen and that this black hole was illuminating and brightening the darkness around it, and that’s when he [Professor Larry Kimura] came up with the name…What’s amazing to me is how deeply the Hawaiians were thinking and understanding the universe [in the eighteenth century].”

The sighting of the black hole, perhaps one of the biggest scientific accomplishments of the last twenty-five years, not only relied on laboratories established in the Pacific, but now bears a name rooted in Indigenous understandings of the universe.

Conclusion

As American science developed in the first sixty years of the nineteenth century, average Americans acquired scientific knowledge and reports about the South Pacific from an array of sources outside the professional paradigm. This chapter highlighted some of them. First, school children received instruction from textbooks that connected science and education to living righteous lives, bound the stages of man to the races of man, and offered descriptions of the South Pacific grounded in Enlightenment philosophies. Textbooks used non-technical language and included imagery of earth’s features and different races. Textbooks were not popular in every part of the country, however, because a number of Southerners refused to utilize tomes containing a perceived abolitionist bias.

Americans could also learn about the South Pacific from popular literature. Herman Melville, though untrained in ethnography, provided his readers with detailed accounts of life in the South Seas, while poets like James Montgomery cultivated images of geological formations using creative license. These sources received larger circulation in antebellum America than the

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published reports of the United States Exploring Expedition, which had been plagued with scandal and mismanagement of collections. Arguably, one of the closest connections average Americans had to the Ex Ex was Vendovi, the Fijian chief who died shortly after arriving in the United States. His head was stored with the collections of the Ex Ex, and profiteers like P.T. Barnum sought to cultivate public interest by linking him to the mysteries of the South Seas.

Since the twentieth century, American scientific pursuits in the South Pacific have increased significantly. Researchers commissioned by the United States military, American scientists working with Indigenous Peoples, and international collaborations have all used the Pacific and its islands as a laboratory. Dr. Russel Raitt studied the geology of the Pacific as part of top secret assignments; Ben Finney and Indigenous Hawaiians sought to recapture the glory of Polynesian technology; and within the last two years, a cabal of international investigators have studied an historic volcano and, for the first time, photographed a black hole. If the last century has produced vast discoveries for Americans in the Pacific, then the origins of this work began with a group of learned individuals attempting to create a professional scientific paradigm in the nineteenth century. But these endeavors would not have been nearly as successful without the knowledge of Indigenous Islanders.
Conclusion

Reflecting on his scientific contributions, Albert Einstein wrote in 1929, “The most beautiful thing we can experience is the mysterious. It is the source of all true art and science. He to whom this emotion is a stranger, who can no longer pause to wonder and stand rapt in awe, is as good as dead: his eyes are closed. This insight into the mystery of life, coupled though it be with fear, has also given rise to religion.” Indeed, it has been humanity’s desire to make sense of the mysterious, of the seemingly incomprehensible, that has led individuals to question and investigate the nature of existence for millennia. In this thesis, I argued that Americans did just that, along with Indigenous Pacific Islanders, in the first sixty years of the nineteenth century. Curiosity about the mechanics of the universe led Americans and Islanders to forge systems of thought to systematically perceive, organize, understand, and explain natural phenomena, ascribing causality to various wonders. But the methods used by these societies did not exist in a vacuum. Instead, they were rooted in religious principles, social dynamics, and connections with the environment, and they manifested themselves in transmission of knowledge, artwork, explorations of the seas, and processes—like agriculture, botany, and navigation—that yielded technologies for the benefit of their societies.

In Chapter One, I demonstrated that a group of Americans, intent on developing a professional system of science in cooperation and competition with Europe, founded their work upon the supposed truths of Enlightenment Era philosophies and Christianity. For many of these researchers, like Horatio Hale and Samuel George Morton, there was no question that the stages of society existed. But scientists quite often debated whether anything could be done for groups to improve their lots in life. In Horatio Hale’s view, individuals—if placed in the proper

environment—could evolve from savage to civilized. For Samuel Morton, conversely, human beings, depending on race, had to be classified as separate species, and nothing could be done to change a person’s circumstances. Moreover, scientists like Asa Gray and James Dwight Dana believed that their work glimpsed at God’s divine plan for creation. Even though professional American scientists were intent on finding objective truth in nature using methods established in the seventeenth century, these cultural factors inevitably affected the results they yielded. American scientists also contended with political infighting as they sought to launch endeavors like the United States Exploring Expedition, the first government funded scientific voyage to the South Seas. The scientists onboard the Ex Ex engaged in inquiry during their four-year trek, taking their methods and biases with them. Americans also created a system that made subject matter out of natural phenomena they cared to study. This process involved collection of specimens or data, observation and/or experimentation, comparison, and use of descriptive language to ascribe properties to the subject matter. Paintings and sketches by artists-naturalists often played a role in this effort as well. Through this process, professional American scientists hoped to glean knowledge about the nature of existence.

In Chapter Two, I argued that Indigenous Islanders whom the United States Exploring Expedition encountered also engaged in scientific study. But they embedded their work in the mundane, which is to say that Islanders incorporated efforts to comprehend the nature of existence into their everyday lives. Polynesians, for example, possessed a cosmology which provided geological explanations for the formations of islands and the development of technology. According to this tradition, Maui pulled the islands of the region out of the ocean with a fish hook, stole fire for the Islanders, and gave them knowledge of agricultural processes. Fijians, likewise, understood tsunamis as cosmological developments, as Horatio Hale noted in one of his reports
about the Ex Ex. Pacific Islanders also forged communal and spiritual links with their science through food preparation, tattooing, architecture, and the construction of sailing vessels. Indeed, in the case of Polynesians, voyaging in double-hulled canoes was a sacred ritual, one that anthropologists argue led to Indigenous colonization of South Sea islands. Other scholars contend that Polynesians reached the shores of South America, transferring agricultural staples back to the islands, approximately two centuries before Western Europeans ever landed in the New World.

In Chapter Three, I showcased some of the ways knowledge of science and the South Pacific affected common Americans. Indeed, the scientific corps of the United States Exploring Expedition faced difficulty disseminating their results after 1842. Consequently, through textbooks, popular literature, amusements, and periodicals, average Americans obtained scientific education and information about the mysterious and exotic South Seas, an area many could only imagine. It is important to note that these were not the only ways Americans received information outside of the professional scientific paradigm, and in the case of Alexander Dallas Bache and the Central High School, Americans could be exposed to science cultivated by experts as well. Nevertheless, it is likely that more Americans received information from popular sources than from professional scientists directly. Moreover, Indigenous Islanders played a key role in the dissemination of information about their ancestors’ ancient intellectual systems. In 1976, Ben Finney and his team of American and Indigenous researchers built a functional model of a centuries old Polynesian canoe using designs and knowledge passed down by the descendants of voyagers. Furthermore, in 2019, scientists photographed a black hole for the first time, in part because areas of the Pacific remain integral to the furtherance of American science. The black hole possesses a name found in Hawaiian cosmology, a demonstration of how much Pacific Islanders understood about the mechanics of the universe within their own systems of thought. Ultimately,
Islanders and Americans have used the Pacific as a laboratory to gain a greater understanding of and appreciation for the nature of existence—Americans for at least two centuries, Islanders for at least a millennium.

No historic study is ever complete, and this one certainly is not either. There are several avenues that could be pursued to better comprehend American and Indigenous Islander science in the nineteenth century. Studies about the United States would benefit by focusing on how science affected and was practiced by women, African-Americans, and Native-Americans. Furthermore, the scientific knowledge Americans received sometimes depended on sectional differences, as evidenced by Southern apprehension to Northern textbooks. As such, new research should focus on the development of science in the United States from regional perspectives, such as the South and the western frontier. Research into the effects of cultural biases on the results produced in quantitative sciences like chemistry, physics, and mathematics would provide another interesting realm of study. With regards to Islanders, abundant scholarship is produced today valuing the contributions made to the world by Indigenous systems of knowledge. These are positive advancements in the historiography of science, Indigenous studies, world studies, and in other academic fields. More needs to be done, however. Historians would be well-served by examining oral traditions, through which knowledge was transmitted, and engaging in interdisciplinary investigations of Native scientific practices. But it is also important to remember that for some Indigenous Peoples, research has unfavorable connotations because of the pervasive intrusions, upending of cultures, and violence it caused in their or their ancestors’ lives. Therefore, any research into Indigenous cultural practices needs to be conducted with the utmost respect, sensitivity, and foresight.
Today, on balance, Americans place ample faith in science. According to a report compiled by the American Academy of Arts and Sciences in 2018, “Americans express strong support for public investment in research,” and “a majority of Americans view scientific research as beneficial.”343 Indeed, as a student once said, science demonstrates that “a fact is a fact.” But this is not necessarily the case. Science is a human-crafted attempt to discern how the universe functions and humanity’s place within it. Societies develop institutions entrenched in their geographical locations and cultural traditions to determine the causes and effects of natural phenomena. As such, conclusions and perspectives of the world may vary. Scientific systems, however, have common threads. Curiosity begets science, and investigation comes from an innate desire to, as Einstein described, see beauty in the mysterious. Science is fueled by the senses, involves experimentation, and yearns to make sense of the seemingly incomprehensible. This was the case in the nineteenth century for Americans and Indigenous Islanders. But science has never completely been identical to truth or fact. It has merely been a way of attempting to grasp both.

Bibliography

Primary Sources


The Baltimore Sun

The Brooklyn Daily Eagle

The Evening Post

The New York Times

The Polynesian

Public Ledger


**Secondary Sources**

National Centers for Environmental Information, National Oceanic and Atmospheric Administration


Curriculum Vita

Roberto “Robert” Jesus Diaz received two Bachelor of Art degrees from The University of Texas at El Paso (UTEP), one in political science and one in history, in 2013, and was selected for the Bill Archer Fellowship in Washington, D.C. the same year.

Throughout graduate school, Diaz was active on campus and elected as president of the UTEP Graduate Student Assembly and Phi Alpha Theta History Honor Society—Gamma Epsilon Chapter. Furthermore, he served as an officer in R.I.S.E (Recover, Inspire, Support, and Empower), an organization dedicated to helping students seeking to enter recovery from substance abuse. Diaz was also a teaching assistant for the History 1301 survey for four semesters and lectured on the development of science in the United States and the U.S.-Mexico War. In 2018, Diaz was awarded the Dodson Research Grant to conduct archival research at the American Philosophical Society in Philadelphia for his thesis. In addition, he was selected to participate in the Deutsch-Französische/Université Franco-Allemande Summer School in Bayonne, France, an interdisciplinary workshop dedicated to studying music in migrant camps throughout the world.

Diaz has been active in promoting the significance of local history as well, serving as an executive officer on the board of directors for the El Paso County Historical Society—a nonprofit research institution—since 2016. In 2018, he was elected president of the organization, the youngest in its 65-year history. Diaz also publishes a monthly article in The City Magazine, highlighting different aspects of El Paso’s history, and is currently working on a chapter for an upcoming publication about the history of El Paso’s “lost” restaurants.

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