

**Noble Hills:
Settler Colonialism and the Making of the Lick Observatory, 1846-1919**

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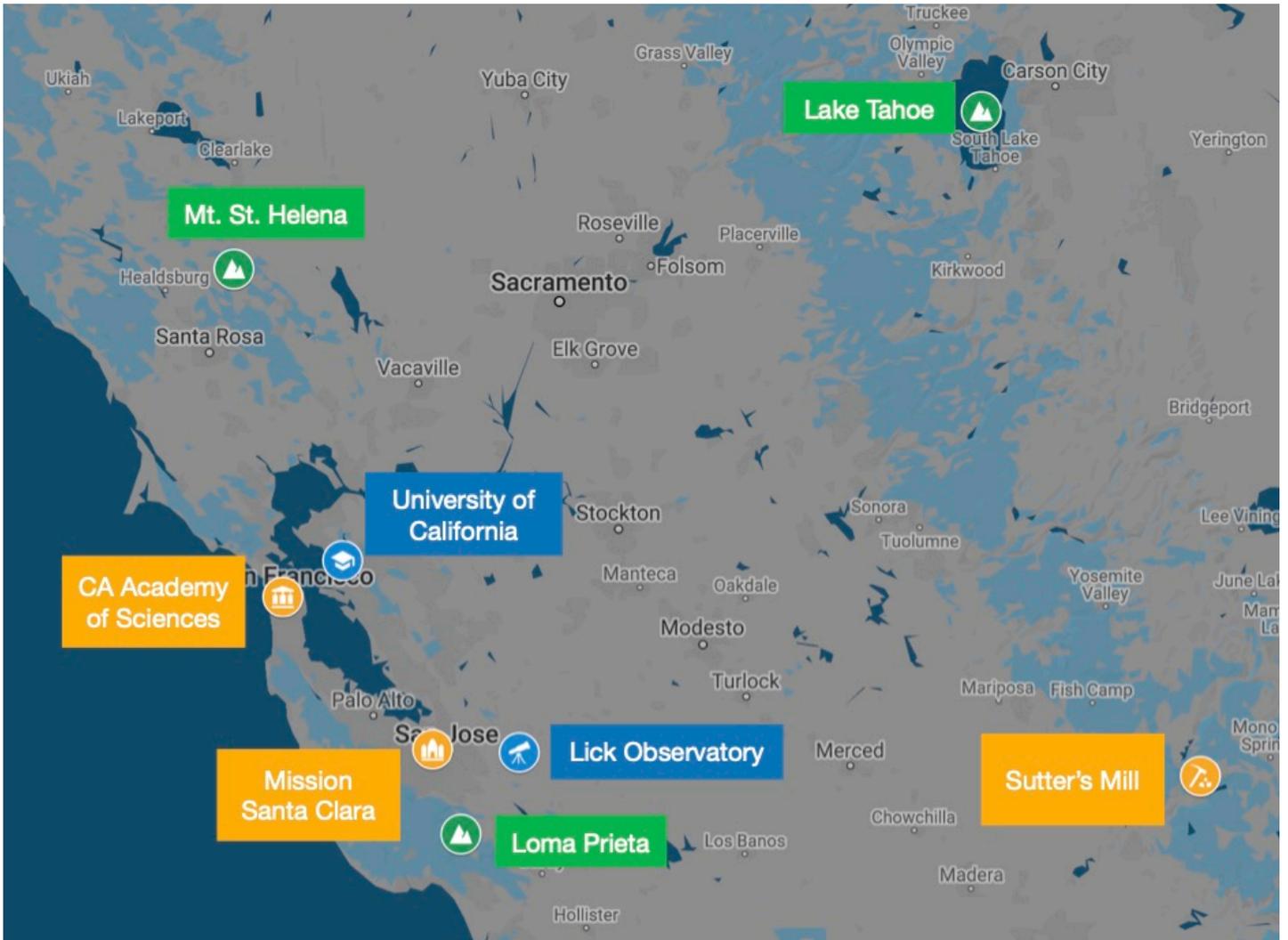
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A Note on Terminology

Among the many tragedies of colonialism is the attempted homogenization and erasure of the national and ethnic identities of Native American communities in historical records. As such, it is not always possible – nor appropriate – to refer to specific tribal names. Where this is the case, I will follow the California Indian practice of calling the Indigenous peoples of California as a whole California Indians or Indians. There are many names used to describe Indigenous peoples of the United States, among them Native Americans, Natives, Indians, American Indians, Indigenous people, and NDNs. Each of these names carries its own set of often-fraught historical contexts and sociopolitical connotations, which are constantly evolving. In addition, a name that is preferred by one individual or community may be hurtful to another individual or community. I will use the terms currently in common use by California Indians and historians where tribal names are not applicable.

Map of the San Francisco Bay Area



Introduction

Recent controversy surrounding the Thirty Meter Telescope has brought into the public eye the long-standing relationship between astronomy and settler colonialism. The Thirty Meter Telescope is a project intended for the summit of Mauna Kea, a mountain in Hawai'i that is sacred to Native Hawaiians. This controversy has raised questions about the history of astronomy. What exactly is the relationship between astronomy and colonialism? How did it originate, and how is it manifested?

To examine these questions, I turned to the Lick Observatory, the first permanent mountaintop observatory in the world. The prominent California philanthropist James Lick funded the Lick Observatory, which opened on Mount Hamilton, near San Jose, in 1888. As I learned more about James Lick, the establishment of the observatory, and its early operations, I realized that it has an important place in history. The observatory was established against the backdrop of national projects of racialization and land conquest. California had passed from Spanish, to Mexican, to United States jurisdiction, and each introduced waves of dispossession and violence.

Historians have long elucidated the ways that science and technology are fundamentally inseparable from their historical contexts - including structures of oppression built on race, colonialism, and the exploitation of land and labor. These entanglements are highly visible in histories of the biomedical sciences that explore whose bodies have been studied, commodified, and stolen.¹ Scholars have long implicated engineering and agriculture in histories of settler colonialism, which is differentiated from other forms of colonialism by its aspiration to the replacement of native societies by invader societies and its permanent transformation of

¹ Sappol, *A Traffic of Dead Bodies*; Schienbinger, *Secret Cures of Slave*.

demography, economy, government, culture, and land.² In contrast to other disciplines, the physical sciences have not been explored in this context to the same degree, even by historians of science.³

Simultaneously, narratives of western astronomy in America mainly focus on either astrology, natural philosophy, and almanacs in early colonial America, or modern observational astronomy in the 20th century. However, historians of the 19th and early 20th centuries have the potential to situate astronomy in the context of dramatically changing structures of power and oppression and show how astronomy was transformed into a professionalized, institutionalized science in this particular historical context. In addition, the origins of astronomy in the American West tell a different story about the development of scientific institutions in America, correcting histories of early educational institutions that focus on the Northeast and its European inheritance.⁴

A close examination of the Lick Observatory helps us answer these questions. The observatory is fundamentally entangled in its settler-colonial context. I will argue that the conditions for the observatory to be established were created by dispossession, violence, and colonial systems of wealth accumulation. The land for the observatory was then acquired – and later protected – by legal systems embedded in both dispossession and colonial extraction and conservation, i.e. land grants and game refuges. In addition, James Lick’s decision to establish the observatory was motivated by the colonial capitalist desires to establish a legacy. Finally, I will show that at the beginning of the 20th century, the observatory’s operations were shaped by

² Wolfe, *Settler Colonialism and the Transformation of Anthropology*, 2; Wolfe, “Settler Colonialism and the Elimination of the Native,” 388.

³ Crease, Martin, and Staley, “Decolonizing Physics: Learning from the Periphery.”

⁴ Morison, “The Harvard School of Astronomy in the Seventeenth Century;” Lockwood, “The Scientific Revolution in Seventeenth-Century New England.”

settler-colonial assumptions about land and resource use, as illustrated in part by the observatory's water supply management policies. Each of these themes are also present throughout the Lick Observatory's early history; for example, the observatory's early land purchases were influenced by understandings of land's "value" predicated on resource extraction and other colonial logics.

As such, the observatory serves as a case study for examining the origin of broader dynamics between astronomy and colonialism. It also shows that astronomy, despite looking to the sky, is grounded in its materialities, lands, and local contexts. Just as the Lick Observatory is now a lens through which astronomers study the sky, it is also a lens through which to examine the multiple dimensions of history that it sits squarely in the middle of.

Two books comprise the current base of literature about the observatory: Helen Wright's 1987 *James Lick's Monument* and Donald Osterbrock, John Gustafson, and W. Unruh's 1988 *Eye on the Sky: Lick Observatory's First Century*. Helen Wright – the wife of a former director of the observatory – worked with Mary Lea Shane – the wife of a later director – to compile what would become the Mary Lea Shane Archives of the Lick Observatory Endowment at UC Santa Cruz.⁵ When she wrote her history of the observatory, she was writing mostly against accounts written by and influenced by Edward Holden, the first director of the observatory.⁶ Holden was a contentious figure, and according to Wright, had greatly exaggerated his role in the founding of the observatory.⁷ In response, Wright's work focuses on amplifying the roles of Richard Floyd, the president of the Lick Trust and therefore posthumous manager of his assets, and Thomas Fraser, the superintendent of construction. Osterbrock, a former director of the

⁵ Wright, *James Lick's Monument*, ix.

⁶ *Ibid.*, x.

⁷ *Ibid.*, x.

observatory, Gustafson, a science writer, and Unruh, an observatory guide, attempted somewhat of a broader account in which “parts...are about astronomy, but parts...are about the America we live in.”⁸ However, this account too remains largely biographical, focusing on “the great figures of each time” in the observatory’s first century of history.⁹

While these characters – Lick, Floyd, Fraser, the directors, astronomers, and others – are important to the history of the observatory, they alone do not explain it. We need to understand the Lick Observatory as an outcome of settler colonialism. In the last two decades, the framework of settler colonialism has been employed to understand the American West. It rejects glorifications of Manifest Destiny, treatments of settler and Indigenous societies as separate objects of study, and other frameworks of racialized violence that do not invoke colonialism.¹⁰ Recently, scholars such as Jeffrey Ostler and Benjamin Madley have also begun to understand settler-colonial violence in the American West as intentional, planned genocide.

The primary instruments of settler colonialism are violence and dispossession. In the United States, land in the west was “ceded” throughout the nineteenth century by coercive or unratified treaties, Congressional acts, and executive orders. Some of that land was distributed to the university land grant system, wherein the federal government granted parcels of land across the nation to universities, which then sold that land for profit – to entities such as the Lick Observatory – to fund their activities. Significant work in the last decade has uncovered the detailed connections between particular universities, land holdings, and treaties.¹¹

⁸ Osterbrock, Gustafson, and Unruh, *Eye on the Sky*, ix.

⁹ *Ibid.*, ix.

¹⁰ See: W. Hixson, *American Settler Colonialism: A History*, the *Journal of the West* Fall 2017 issue (ed. Laura Barraclough), works by Nancy Shoemaker, Jeffrey Ostler, and Margaret Jacobs.

¹¹ Nash, “Entangled Pasts: Land-Grant Colleges and American Indian Dispossession”; Lee et al., “Land-Grab Universities.”

Another tool of settler colonialism is the construction and romanticization of ideas of wilderness and nature.¹² Mark Spence links the cultural myth of wilderness with dispossession in *Dispossessing the Wilderness*, arguing that “natural” landscapes had to be constructed, and their conservation depended on dispossession and the strict separation of the wild and the civilized. These ideas were at odds with pre-colonial land stewardship, which required not the preservation of untouched environments, but rather the tending and management of complex ecologies.¹³ In contrast, colonial land use was exploitative, and extraction of natural resources fueled the rapid economic growth of the American West, which in turn created aggravated social tensions and cleavages. These cleavages both rendered Indigenous people even more vulnerable to violence and discrimination and motivated philanthropy as a way for those with extreme wealth to present themselves as socially benevolent.¹⁴ These trends illustrate that just as much as science and technology were governed by norms of objectivity and detachment, as sociologists of scientific knowledge in the 1960s and 70s would have argued, they were also governed by market forces and political motivations.¹⁵ In addition, histories of science have also been influenced by postcolonial studies – which do not imply the end or the deconstruction of colonialism, but rather analytic modes which incorporate an understanding of colonialities and deconstructions of homogenizing narratives of global technoscience.¹⁶ Works such as Leandra Swanner’s 2013 dissertation, *Mountains of Controversy: Narrative and the Making of Contested Landscapes in Postwar American Astronomy* treat postwar astronomy in the era of Big Science in this lens.¹⁷ This work brings together these analytics of settler colonialism, dispossession, conservation, and

¹² Denevan, “The Pristine Myth;” Preston, *Vanishing Landscapes*.

¹³ Anderson, *Tending the Wild*.

¹⁴ Rieppel, *Assembling the Dinosaur*, 8.

¹⁵ Merton, *The Sociology of Science*; Rieppel, *Assembling the Dinosaur*, 10.

¹⁶ Anderson, “Introduction: Postcolonial Technosciences.”

¹⁷ Swanner, “Mountains of Controversy: Narrative and the Making of Contested Landscapes in Postwar American Astronomy.”

land use to supplement existing traditions in the history of science and astronomy, and view the transformative period of the 19th- and early 20th-centuries through a postcolonial lens.

In addition to these contexts, the bulk of my material comes from the Lick Observatory Records at UC Santa Cruz. Some of these archival sources are part of what formed the basis of *James Lick's Monument* and *Eye on the Sky*, the two main histories of the observatory, published in 1987 and 1988 respectively. These overlaps include accounts of James Lick's life and motivations, his correspondence with acquaintances, and details about the siting of the observatory. However, I also rely on records of land acquisition, water supply management, and conservation, that are not included in these other renderings.

In Chapter 1 of this thesis, I provide historical context for the establishment of the observatory by giving an overview of the political and economic events in California (and specifically, the San Jose area) in the early- and mid-19th century. This chapter shows how the series of layered types of colonialism between the end of the 18th century and the late 19th century, including Spanish missions, dispossession, and finally violence and genocide, created the material, political, and economic conditions for the establishment of a major scientific institution.

Chapter 2 is concerned with James Lick, from his arrival in California in 1848 to his decision to build a telescope in 1873. In this chapter, I demonstrate how simultaneously with the events of Chapter 1, astronomy was brought to California, how wealth accumulation and philanthropy occurred, and how broader historical contexts motivated the desire to establish a legacy through science.

Chapter 3 details how and why Mount Hamilton was chosen as the site for the observatory in 1875, and the mechanisms through which land on its summit was acquired by the

Lick Trust from 1876 to 1908. This shows not only what Lick and his successors desired in a site, but how the process of land acquisition was enabled by legal systems embedded in dispossession as well as being impacted by outlooks on the “usefulness” of different lands.

Finally, in Chapter 4, I sketch two case studies in how the Mount Hamilton land was used during the beginning of the observatory’s tenure which demonstrate how the observatory had to reckon with the constraints of the land and the limitations of colonial land management practices. One of these case studies deals with water supply management, and the other with the establishment of a game refuge. A series of issues with the water supply between 1896 and 1913 demonstrate between how the observatory attempted to use repeated technological interventions to contend with the environmental fallout from extractive mining and colonial agricultural development. The establishment of a game refuge at the Mount Hamilton summit in 1919 illustrates how legal and bureaucratic systems of land use and classifications were negotiated to protect the observatory from hunters.

In February 2020, I took the notoriously winding road from San Jose to the summit of Mount Hamilton. At the top of the mountain, just inside the entrance to the original 1888 observatory building, is a bust of James Lick, which was installed on the 200th anniversary of his birth. The inscription reads¹⁸:

James Lick
August 25, 1796 - October 1, 1876
Pennsylvania Dutch Farm Boy - Master Craftsman and Pianomaker
South American Business Entrepreneur - California Pioneer
Real Estate Investor - Santa Clara Valley Agricultural Developer
Builder of Lick House, San Francisco’s First Great Luxury Hotel
Early California Philanthropist - San Francisco Public Benefactor
Patron of Education, Art, Public Welfare, and the Sciences

¹⁸ “James Lick,” Inscription plaque.

In this world of the American West, where pioneer, investor, agricultural developer, and philanthropist were irrevocably linked roles in the emerging colonial state - it is the “and the Sciences” with which I am concerned – the how and why of science’s participation in, utilization of, and constructed exemption from the other professions, events, and structures on which it depended.

Chapter 1: Hill Country

Driving up the road to the summit of Mount Hamilton, the first thing visitors see when they park in the small lot that overlooks the San Jose valley to the west are the imposing double doors of the pale yellow observatory building. Through those doors, straight across the hallway, and out into an oft-ignored pseudo-courtyard, a small stone gazebo houses a bust of the Reverend Laurentine Hamilton. In 1853, Hamilton was a preacher in Ovid, New York. Isabella Mead, who later married Hamilton, taught at Ovid Academy. One of her fellow teachers, William Brewer, became their close friend.¹⁹ Two years later, Hamilton was called to a small gold rush town in the Sierra Nevada. Brewer travelled to Europe to study chemistry in Germany and France. In 1858, he returned and married Angelina Jameson of Ovid, but she tragically died within a year. Soon after, Brewer moved to California where he served as chief botanist of the California Division of Mines and Geology, which later became the California Geological Survey. He came to Sierra Nevada in that capacity, and rekindled his friendship with the Hamiltons.²⁰ Professor Charles Hoffman, a topographer, accompanied him.²¹

One Sunday afternoon in late August 1861, Brewer mentioned to Hamilton that he and Hoffman were planning to ascend the highest point in the mountain range east of the San Jose valley the next day.²² To Brewer's delight and surprise, Hamilton wanted to join the excursion. The morning of August 26th, the three men set out.²³ They made their way up the trail-less mountain, navigating through fields of brush and trying to find the best route to the summit.

¹⁹ William H. Brewer to A. T. Dewey, Jan 3, 1888. Series 8, Box 31, Folder 10, Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

²⁰ *Ibid.*

²¹ *Ibid.*

²² *Ibid.*

²³ *Ibid.*

Brewer and Hoffman were carrying surveying equipment.²⁴ As they neared the top, Hamilton rushed ahead and shouted, “first on the top – for this is the highest point!”²⁵

As they returned to their office, Brewer and Hoffman debated what to name the mountain. Brewer made “diligent inquiries” into whether it had a previous name, but the only information he could find about the mountain was that no gold had been found when it was prospected between 1849 and 1860, and that bears were prevalent on the slopes.²⁶ They proposed naming it after their chief in the California Geological Survey, J.D. Whitney, but he vetoed the idea.²⁷ They decided to name it Mount Hamilton in honor of their friend, the preacher who had accompanied – and beat – them to the summit.²⁸

Of course, the mountain had a name – possibly many—before this excursion. The most recent had been *La Sierra de Santa Isabel*, as recorded in several Spanish colonial *diseños* (maps accompanying land grant applications).²⁹ Furthermore, Mount Hamilton was not the highest peak in the range. In 1895, the California Geological Survey determined that a peak two miles to the southeast—now called Mount Isabel--was fourteen feet higher.³⁰

Brewer and Hoffman had treated the mountain as *terra nullius* – nobody’s land – and assumed the power to name it. Their triumphant expedition to the summit revealed a reality of colonialism –in which settlers reorder and rename the landscape, replacing indigenous understandings of nature and place with their own. Repeated innumerable times, such episodes inscribed a new history upon the landscape. Spanish colonization, the Mexican *ranchero* period,

²⁴ Ibid.

²⁵ Ibid.

²⁶ Ibid.

²⁷ William H. Brewer in “Up and Down California,” August 26, 1861. Series 8, Box 31, Folder 10, Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

²⁸ William H. Brewer in “Up and Down California,” August 26, 1861. Lick Observatory Records.

²⁹ “California Place Names,” 153. Series 8, Box 31, Folder 10, Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

³⁰ Ibid., 152.

the Mexican-American War, California statehood, and the gold rush not only preceded the Lick Observatory, they combined with the genocide of California Indians to form its history.

The name, *La Sierra de Santa Isabel*, came from the Spanish colonial period. For thousands of years before 1769, many Indigenous peoples—including the Ohlone and Coastal Miwok—occupied the San Francisco Bay region. Ohlone communities inhabited the coastal range that includes Mount Hamilton. Today, the Ohlone are the descendants of many communities that were not and did not view themselves as one homogeneous group. These communities spoke six different Ohlone languages when the Spanish arrived.³¹ The Spanish established missions to convert California Indians to Catholicism. Between 1789 and 1816, Mission Santa Clara, founded in 1777 near San Jose, was the largest of the seven Ohlone missions.³² In 1799, the Mission Santa Clara priests began to bring in people from the mountains east of San Jose. The missions introduced Catholicism and sweeping demographic transformations. From 1769 to 1846, more than 150,000 California Indians perished; a third of them died at coastal missions.³³ By 1845, the Indian population at Santa Clara was just 130.³⁴

Mexico's secularization act of 1833 dismantled the California missions and parceled out those lands into *ranchos*, one half of which were to be returned to California Indian families. In fact, wealthy and well-connected *rancheros* bought most of the mission lands. In 1834, only 4 of the 1,108 Mission Santa Clara Indians in 1834 received land grants.³⁵ The abandonment of repatriation added to the legacy of dispossession and drawing former mission lands – i.e. California Indian lands – further into the colonial capitalist market.

³¹ Milliken, Shoup, and Ortiz, *Ohlone/Costanoan Indians of the San Francisco Peninsula and their Neighbors, Yesterday and Today*, 1.

³² *Ibid.*, 140.

³³ Madley, *American Genocide*, 49.

³⁴ Milliken, Shoup, and Ortiz, *Ohlone/Costanoan Indians of the San Francisco Peninsula and their Neighbors, Yesterday and Today*, 200.

³⁵ *Ibid.*

On May 13, 1846, US expansionism sparked the Mexican-American War. The US victory two years later brought a national debate over the admission of California as slave and free states vied for power. The Compromise of 1850 admitted California as a free state. That sequence of events also left California Indians racialized, marginalized and exploited. In 1851, the first governor of California, Peter Burnett, proclaimed that “[the] small and scattered tribes...[which] have not only seen their country taken from them, but...see their ranks rapidly thinning from the effects of our diseases...instinctively consider themselves a doomed race...[which] leads to war between them and the whites; and war creates a hatred against the white man that never ceases to exist in the Indian bosom.”³⁶ The state legislature passed laws that allowed the incarceration and auctioning of jobless Indians, the seizure of orphaned children who were then bound to white families, and to the revocation of citizenship, and the rights to testify in courts or serve on juries.³⁷ Amidst tensions of the pre-Civil War era, white Californians violently constructed a racially stratified system of unfree labor while avoiding the political and economic uncertainties of black slavery.

This marginalization was exacerbated by two major events. After the discovery of gold in the mountains northeast of San Francisco and San Jose in 1849, many Mexican *rancheros* sent the ex-mission Indians into mining. Other ex-mission Indians became independent prospectors and miners.³⁸ However, with the influx of prospectors and settlers into Northern California, most of the mines came under the control of North American settlers, who sought to limit Hispanic and Indigenous presences.³⁹ California Indian workers were pushed out of the mines, and then

³⁶ Burnett, Peter, “State of the State Address.”

³⁷ Milliken, Shoup, and Ortiz, *Ohlone/Costanoan Indians of the San Francisco Peninsula and their Neighbors, Yesterday and Today*, 176.

³⁸ *Ibid.*

³⁹ *Ibid.*

displaced from other labor sectors in the San Francisco area, leaving them more vulnerable to the vagrancy and forced labor laws.⁴⁰ In the early 1860s, a drought came as many Hispanic ranchers' were completing their land claims, forcing them to accumulate debt or sell their lands.⁴¹ As in the earlier mining industry, these new landlords aggressively removed Indian workers.⁴² These transformations completed the settler-colonial project, in which the state was not "primarily established to extract surplus value from indigenous labour...[but rather was] premised on displacing indigenes from (or replacing them on) the land."⁴³

In addition to legal and economic disenfranchisement, North American settlers also brought direct violence. Aggravated by "fear, hatred, greed, and the impulse to teach Indians to fear whites by physically destroying them," settlers perpetrated violent atrocities against California Indians.⁴⁴ These acts had remained limited and isolated until 1850, when government officials of the brand-new state of California sanctioned the violence.⁴⁵ In 1851, Governor Burnett declared that "a war of extermination will continue to be waged between the races until the Indian race becomes extinct."⁴⁶ That was no hollow promise. Between 1846 and 1873, settlers murdered between nine and sixteen thousand California Indians.⁴⁷ Minor incidents triggered mass violence against entire communities, and soon, volunteer militias were routinely engaging in killing expeditions.⁴⁸ By the 1870s, the California legislature began repealing the

⁴⁰ Ibid., 180.

⁴¹ Ibid., 177.

⁴² Ibid.

⁴³ Wolfe, *Settler Colonialism and the Transformation of Anthropology*, 1.

⁴⁴ Madley, *American Genocide*, 239.

⁴⁵ Ibid., 239.

⁴⁶ Burnett, Peter, "State of the State Address."

⁴⁷ Madley, *American Genocide*, 50.

⁴⁸ Ibid., 396.

indenture laws and bans on citizenship, and settlers stopped perpetrating mass killings.⁴⁹ By that time, however, the entire Indian population of Santa Clara County was just five people.⁵⁰

When Brewer, Hoffman, and Hamilton climbed up Mount Hamilton in 1861, it was less an unexplored site for adventure than it was a hallowed ground. The ease with which Brewer and Hoffman placed a name on the empty site was because it had been *emptied*. Although they could not see it, dispossession and violence along the California coast had opened a new set of possibilities that shaped their venture.

⁴⁹Milliken, Shoup, and Ortiz, *Ohlone/Costanoan Indians of the San Francisco Peninsula and their Neighbors, Yesterday and Today*, 177

⁵⁰*Ibid.*, 200-201.

Chapter 2: Establishing a Legacy

On January 7th, 1848, the *Lady Adams* ended its long seaborne journey in the port of San Francisco. None of its passengers could have predicted it, but just two weeks later, gold was discovered in Coloma, California, and two weeks after that, the Mexican-American War ended and California became a state. When the *Lady Adams* departed from Lima, Peru, it carried James Lick, who, within a few years, became the richest man in California. Born in rural Pennsylvania in 1796 to a cabinetmaker, Lick worked as an apprentice to his father until 1819, when he left Pennsylvania for Baltimore.⁵¹ There, he applied his woodworking skills to manufacturing pianos.⁵² The next year, he moved to New York City and set up a successful piano shop, which included a significant trade to Buenos Aires. In 1821, he left for South America.⁵³ After a few years in Buenos Aires, he had amassed enough wealth to tour Europe and make a return visit to Pennsylvania. During that trip home, he was rejected by a former lover with whom he had a son. Political unrest in Argentina left him with few options. In 1832, he relocated to Valparaíso, Chile, which had its own political instabilities. In 1835 he settled in his South American home: Lima, Peru.⁵⁴ Lick lived in Lima for eleven years, adding to his fortune and expanding his business interests.⁵⁵ Finally, in 1848, he boarded the *Lady Adams* and sailed back to North America, where he established his permanent home in California. He had bet his future and his legacy on the hope that California would shortly become a territory of the United States. He was right.

⁵¹ Wright, *James Lick's Monument*, 2.

⁵² *Ibid.*

⁵³ Osterbrock, Gustafson, and Unruh, *Eye on the Sky*, 3.

⁵⁴ *Ibid.*, 5.

⁵⁵ Wright, *James Lick's Monument*, 2.

Lick quickly began buying up real estate around San Francisco, San Jose, and Santa Clara County, including some lands likely on the market due to mission secularization. Although the Gold Rush increased the value of his properties as prospectors flooded into San Francisco, he stayed clear of the gold fever. He kept his sights on real estate.

Lick's decision to fund a large astronomical observatory might rightly confuse even his biographers. Scholars have offered a number of explanations for his decision to build a telescope. Helen Wright's 1987 *James Lick's Monument*, for example, describes three increasingly fantastical stories: that he had a "mystical belief in the cosmos as God's heavenly handiwork," that he was enamored by ancient beliefs espoused by a priest in Rio de Janeiro, or that he suddenly declared his intentions while walking down the street.⁵⁶ The truth is probably a much less ethereal story; that, simply, of an elderly rich man who wanted to establish a legacy in a world increasingly obsessed with classifying and predicting the natural world. These obsessions were part of the particular cultural desires of the American West, and of the colonial world more broadly. In addition, Lick's ability to make this decision in the first place – to choose how to redistribute his wealth – was predicated on colonial systems of capital and land accumulation.

Lick's first encounter with astronomy was likely through George Madeira, a geological engineer and paid scientific lecturer from a mining town in the Sierra Nevadas who had developed an interest in astronomy at an early age. In a July 1889 letter to Edward C. Holden, the first director of the observatory, Madeira recounted his initial meeting with Lick after an 1860 lecture in San Jose. Lick invited him to his mill near the Gaudalupe River.⁵⁷ He wrote,

⁵⁶ Wright, *James Lick's Monument*, 6.

⁵⁷ George Madeira to Edward Holden, July 14th, 1889. Series 8, Box 31, Folder 2. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

There for three days, with the little instrument I had with me, we viewed the heavenly objects visible and invisible. The Gentleman talked of the infinite wonders of the universe and of the possibilities of large instruments. I gave him all the knowledge I possessed. Described the large instruments of the world, and what Rosse's, Herschel's, and others had discovered, of the limitless regions of space, and what might be discovered with a large achromatic telescope. Of the then supposed impossibility to make a large lens, such as has been furnished for the Lick Observatory.⁵⁸

Madeira wrote this letter in 1889, when he was jockeying for a position in the observatory. He had reason to emphasize his influence on Lick's decision. According to Wright, the two men met again a few years after their 1860 meeting, by which time Madeira had established his own small telescope in the Sierra Nevadas. It is likely that this is where they discussed Rosse and Herschel, and where Madeira said, "If I had your wealth, Mr. Lick, I would construct the largest telescope possible."⁵⁹

Around that time, Lick also met Joseph Henry, director of the Smithsonian Institution and president of the National Academy of Sciences, when Henry visited San Francisco. Henry outlined "the wants of science" during this 1872 meeting and in a subsequent letter.⁶⁰ He described James Smithson's bequest, which he had been administering for 25 years, to advance science.⁶¹ That model may have inspired Lick, for in early 1873, he made his first such philanthropic gift, transferring land in downtown San Francisco to the California Academy of Sciences for a new, larger headquarters.⁶² Henry quickly praised Lick's gift,

The study of abstract science without regard to its immediate appreciation forms an essential element in the advance of the world in its moral and intellectual development. Without a constantly increasing knowledge of the laws of nature, modern civilization much in time became stationary, like that of Japan and China, It is only by making new conquests in the realities of nature that man is enabled to control her forces and apply them to her manifold uses.

⁵⁸ Ibid.

⁵⁹ George Madeira to Edward Holden, July 14th, 1889. Lick Observatory Records,

⁶⁰ Joseph Henry to Thomas Huxley, August 1st, 1874. Series 8, Box 31, Folder 2, Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

⁶¹ Joseph Henry to James Lick, August 3rd, 1874. Series 8, Box 31, Folder 2, Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

⁶² Osterbrock, Gustafson, and Unruh, *Eye on the Sky*, 11.

This conception of science paralleled colonialism, casting the planet and the universe as targets of conquest and control. Henry continued,

Money is the representative of accumulated power and every dollar contains a certain amount of potential energy which can command labor, but while there are thousands of enterprising men in our country who have talents for accumulating wealth there are but very few like yourself who have the vision and enlightened sympathy to apply it as you have done. There is in such men an instinct of immortality which induces the desire to live favorably in the memory of their fellow men after they have departed in this life, and surely no one could choose a more befitting means of creating a monument to himself more enduring or more worthy of admiration than that which you have chosen.⁶³

Posthumous recollections describe Lick as a generally abrasive character redeemed by his philanthropic gestures. H.S. Foote remembered a “miserly, irascible, selfish, solitary” man, who “cherished little affection for his race or kin,” and whose “chief delight appeared to lie in the indulgence of the whims of a thorny and unfragrant old age. Beneath the ice of his outward nature flowed the warm currents of a philanthropic heart.”⁶⁴ Lick’s philanthropic endeavors may have compensated for more than his chilly personality. His generation faced growing concerns about wealth inequality and class division. Lick’s generation of extraordinarily wealthy landowners faced growing concerns about tensions surrounding wealth inequality and class division and increasingly used philanthropy as a way to ease their reputation with the working class.⁶⁵ But that never undid the fact that philanthropy is fundamentally predicated on

⁶³ Joseph Henry to James Lick, March 10th, 1973. Series 8, Box 31, Folder 2, Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz; for more on Joseph Henry, James Smithson, and the establishment of the Smithsonian Institution, see: Rhees, William. “James Smithson and His Bequest.” *Smithsonian Institution Annual Report for 1879*. Washington, D.C.: Smithsonian Institution Press, 1880; Molella, Arthur. *A Scientist in American Life: Essays and Lectures of Joseph Henry*. Washington, D.C.: Smithsonian Institution Press, 1980; True, Webster. *The First Hundred Years of the Smithsonian Institution, 1846-1946*. Washington, D.C.: Smithsonian Institution Press, 1946.

⁶⁴ H.S. Foote, “The Lick Observatory on Mt. Hamilton,” Santa Clara County, California – Pen Pictures from the Garden of the World, 126. Series 8, Box 31, Folder 1, Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

⁶⁵ Rieppel, *Assembling the Dinosaur*, 8.

accumulating disproportionate wealth, which Lick did with vigor by buying up what were probably former mission lands.

In February 1873, Lick met with George Davidson, then president of the California Academy of Sciences.⁶⁶ Davidson had a passion for astronomy, and he and Lick began a close relationship. In October of that year, Lick announced that he planned to build an observatory in the Sierra Nevada. Some years later, Davidson recalled that Lick

...seemed especially interested in astronomical matters, although he had never looked through a telescope or read a work on astronomy. In time he disclosed his intentions about a great telescope. I soon found that he had no idea whatever of the structure of the telescope and its accessories, or of the purposes of a great observatory...He had never looked through anything larger than a ship's spy-glass, and was eager to get an idea of what the telescope revealed.⁶⁷

Lick was not a professional astronomer, but he was also not a victim of mysticism or rogue priests. His planned gift reflected his desire to determine his legacy, and his ongoing participation in the settlement of California and an American capitalist order. But the question remained: where?

⁶⁶ George Davidson, "A Few Incidents in My Conferences with Mr. James Lick in the Matter of the Great Telescope," James Lick and the Great Telescope, the University of California Magazine, 131. Series 8, Box 31, Folder 2, Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

⁶⁷ Ibid.

Chapter 3: Siting and Land Acquisition

The debates about the location of the observatory reveal how the dispossession of California Indians created opportunities for repurposing lands, rewriting their histories, and changing their social meanings. At first, James Lick had no intentions of building the observatory on a high mountaintop, out of public sight. According to California Academy of Sciences president George Davidson's recollections some years later, Lick had originally chosen a site next to the California Academy of Sciences in downtown San Francisco. This location would have given the public access to the telescope, but it would have also exposed it to light pollution and smog. Although these may seem like obvious problems for astronomers today, atmospheric issues were not as well understood in the 19th century; moreover, Lick had no experience with astronomy. According to Davidson, it took "several months of quiet but persistent presentation of facts to demonstrate the advantage of great elevation for astronomical observations, if the site were properly tested."⁶⁸ Still, Lick's desire for visibility continued through the two-year search for the site.

From 1873 to 1875, the team considered a variety of sites, but each was rejected over atmospheric issues. Davidson suggested that Loma Prieta, an "Astronomical Mecca" on the San Francisco peninsula, but it was vulnerable to fogs and air fronts.⁶⁹ They also considered a peninsula extending into Lake Tahoe in the Sierra Nevadas, about which the engineer A. von Schmidt wrote of favorable conditions and the beauty of the landscape to Lick.⁷⁰ Heavy snows, however, would block access to the observatory in the winter.⁷¹ In addition, Lick – still

⁶⁸ Ibid.

⁶⁹ Ibid., 132.

⁷⁰ A. W. von Schmidt to James Lick, October 27th, 1873. Series 8, Box 31, Folder 15, Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

⁷¹ Wright, *James Lick's Monument*, 17.

enamored with the dream of a public monument – disliked the less accessible Lake Tahoe location.⁷²

Mount St. Helena, an extinct volcano with a fogless flat top, seemed an obvious site for an observatory due to its flat top. Thomas Fraser, superintendent of construction, climbed the mountain in 1875, but found no source of water within 1,000 feet of the top.⁷³ In addition, Lick's taste for the mountain soured after an unfortunate incident with a toppling wagon on the bumpy road in which he was dumped into the mud.⁷⁴ When he decided on the final site later that year, Lick demanded that a first-class road be built to the summit. George Davidson, returning from a trip to the east coast in 1874, strongly urged a site in the Sierra Nevada. To satisfy Lick's preoccupation with public visibility, he emphasized that telegraph lines could spread news of discoveries within an hour.⁷⁵ At last, Lick acquiesced to the reality that atmospheric conditions had to trump his desire for a highly public site.⁷⁶

Fraser suggested Mount Hamilton.⁷⁷ The mountain was tall enough for the air to be clear, but not so tall to make snow a factor. It was far enough away from the growing city of San Jose to avoid its light, but not isolated. In fact, it was close to Lick's homestead and even visible from his mill.⁷⁸ On September 27th, 1875, the *New York Times* noted that James Lick had proposed to the local Board of Supervisors to build the observatory on the Mount Hamilton summit.⁷⁹

⁷² Ibid.

⁷³ Ibid., 25

⁷⁴ William B. Farwell, *The Life of James Lick, Quarterly of the Society of California Pioneers* 1, no. 2 (1924) qtd. in Wright, *James Lick's Monument*, 25.

⁷⁵ George Davidson, "A Few Incidents in My Conferences with Mr. James Lick in the Matter of the Great Telescope," James Lick and the Great Telescope, the University of California Magazine, 135. Lick Observatory Records.

⁷⁶ Ibid.

⁷⁷ Fraser, Thomas qtd. in Wright, *James Lick's Monument*, 25

⁷⁸ Ibid.

⁷⁹ "Mr. Lick's Observatory." *New York Times*, September 27, 1875, 7.

Once the site was chosen, they had to acquire the land. The acquisition process reveals the legal mechanisms of dispossession and privatization, and the settler-colonial revaluation of land in terms of productivity. The Lick Trust accumulated land through federal and state grants, and through purchases of neighboring ranches— some of which had likely been privatized during mission secularization.

The bulk of the observatory lands comprised an 1876 Congressional land grant of approximately 1,350 acres.⁸⁰ In 1878, the trust purchased an additional 191.49 acres from the University of California, unifying most of what became the Lick Observatory Reservation. In turn, Lick committed to transferring the observatory estate to the university.⁸¹ The observatory administration continued to supplement these initial holdings by additional federal and state land grants, as well as smaller purchases of neighboring ranches, well into the 20th century. A map of these early purchases and grants can be found in Figure 1.

⁸⁰ “Lick Observatory Reservation,” June 1st, 1908. Series 2, Box 17, Folder 6; An Act Granting a Site for the Observatory to the Trustees of the Lick Observatory of the Astronomical Department of the University of California, June 4th, 1876. Series 2, Box 40, Folder 1. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

⁸¹ Grant of 150,000 Acres for Agricultural College Purposes, October 1st, 1876. Series 2, Box 40, Folder 1. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

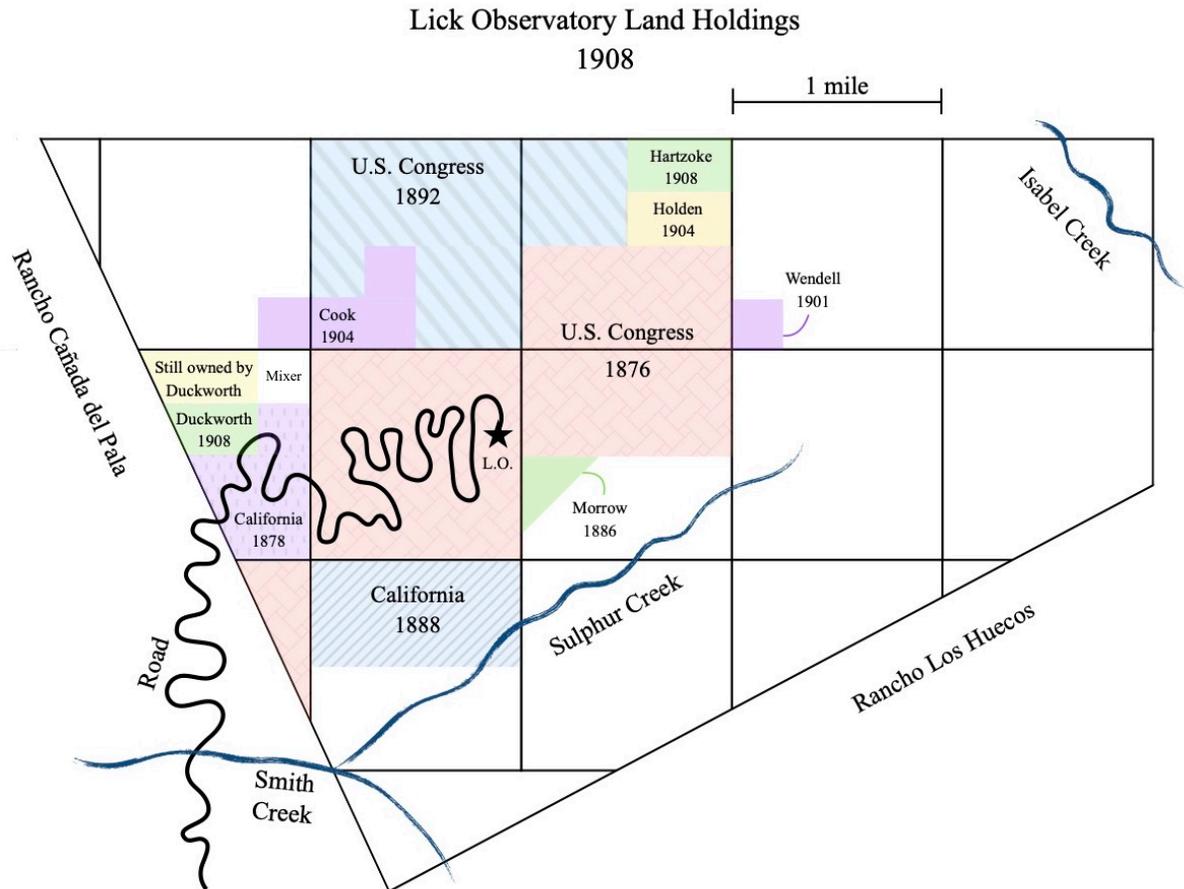


Figure 1. Lick Observatory Land Holdings, 1908. Each square is a one-square-mile sector as denoted in archival maps. Each land holding shows from what party it was acquired (the federal or state government through a grant or purchase, or neighboring ranchers) and the year it was acquired. Proportions are close to but not exactly at scale; road and stream paths are abstracted. Different maps conflict on whether the county road goes through the property purchased from Amelia Duckworth in the west. Map by the author from archival maps and listings.⁸²

Conquest and dispossession prefigured the federal land grant system. The 1878 purchase, for example, was enabled by The Morrill Land-Grant College Act of 1862, which empowered the federal government to transfer public lands to states to support educational institutions. The

⁸² “Map of the Mt. Hamilton Reservation from Official Surveys,” 1876. Series 2, Box 40, Folder 1; “L.O. Reservation,” November 1907. Series 2, Box 17, Folder 6; Map of the western half of the observatory reservation, March 2nd, 1905. Series 2, Box 17, Folder 6; “Lick Observatory Reservation,” June 1st, 1908. Series 2, Box 17, Folder 6. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

democratization of education for white Americans was preceded by the dispossession of Indian nations.⁸³ The 1878 Lick acquisition had become “public” through an unratified 1851 treaty that the United States used to seize more than 2.5 million acres from the Apangasse, Awallache, Aplache, Coconoon, Potoyanti, and Siyante tribes.⁸⁴

In *A Colonial History of the Higher Education Present: Rethinking Land-Grant Institutions Through Processes of Accumulation and Relations of Conquest*, Sharon Stein argues that these types of transfers constituted an “indirect but dependent relationship” between higher education and colonial conquest; although lands of Indigenous peoples were not seized at first for the purpose of funding institutions of higher education, the federal government’s accumulation of land created the conditions under which those institutions could be created and funded.⁸⁵ The same could be said for those first parcels of the observatory reservation. Lands of Indigenous peoples were not seized to advance astronomy, but dispossession came to shape the mode of federal and state support for the observatory and the science practiced there. The Lick Trust fed revenue into a colonial system of ownership in which “land is remade into property” and subsidized the University of California.⁸⁶

Furthermore, these exchanges were predicated on fundamentally colonial and expansionist notions about land that had yet to be ‘properly developed’, i.e. made productive for the ends of capitalist profits.⁸⁷ That notion is reflected in descriptions of the site in field notes on the topography from the California Geological Survey in the 1880s:

The Greater portion of the Public land in this Township is covered with a dense growth of chaparral, chemizal, Scrub Oak...and is entirely unfit for cultivation but on the South and West slope of Mt. Hamilton there is some fine grazing land, with an abundance of

⁸³ Stein, “A Colonial History of the Higher Education Present,” 6.

⁸⁴ Lee et al., “Land-Grab Universities.”

⁸⁵ Stein, “A Colonial History of the Higher Education Present,” 8.

⁸⁶ Tuck and McKenzie, *Place in Research*, 64.

⁸⁷ Byrd, J.A., qtd. in Stein, “A Colonial History of the Higher Education Present,” 7.

White or Black Oak timber and some scattering Pine. At this time of year there is plenty of water in all the ravines but in the summer they are all dry except the two fine streams, Santa Isabel and Smith Creeks.⁸⁸

This emphasis is on the site's usefulness for cultivation and grazing under capitalist definitions of value, which required land to have "use," whether for profit or development, to be considered useful. This framing is also found in correspondence about the purchase of a later observatory property.

At the turn of the 20th century, Amelia F. Duckworth owned a ranch west of the observatory. The correspondence between Duckworth and William W. Campbell, then director of the observatory, illustrate the ways in which conceptions of land were thoroughly rooted in capitalist conceptions of property and utility. In February 1905, Duckworth wrote to the Lick Trustees offering to sell her land (see Fig. 1).⁸⁹ Three and a half years passed before the Lick Trust agreed to buy that property.

Campbell rejected Duckworth's first proposal on the grounds that the natural resources of her property were fully exploited. "I regret to say that the timber has been cut from [your land] with regrettable thoroughness," he wrote.⁹⁰ A month later, he warned that the purchase would end up encircling land belonging to G.H. Mixer, obligating the Trust to also buy that property (see Fig. 1).⁹¹ The value of Duckworth's land to Campbell was dependent on both the resources that could be exploited (timber), and the configuration of adjacent private properties.

⁸⁸ Topography of Lick Observatory, 1880-1889?. Series 2, Box 40, Folder 1. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz

⁸⁹ Amelia F. Duckworth to Trustees Lick Observatory, February 27th, 1905. Series 2, Box 17, Folder 6. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

⁹⁰ William W. Campbell to Amelia F. Duckworth, March 6th, 1905. Series 2, Box 17, Folder 6. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

⁹¹ William W. Campbell to Amelia F. Duckworth, April 7th, 1905. Series 2, Box 17, Folder 6. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

Duckworth emphasized optimizing the geometry of the property: “I wish you could see your way to purchase the whole of [my land]...and you can make good use of it with your own lands, making it a perfect square tract of land.”⁹² She relied on the idea that a square tract was more desirable – a square imposed order on the unwieldy natural topography of the land. This simple assumption captured a feature of territorial expansionism in which imagined and real borders symbolized the economic and political taming of colonized lands.⁹³

Possession introduced disposability. Campbell proposed buying half of Duckworth’s property. “I do not deem it advisable to sell that portion only, as it would be a hard matter for me to dispose of the balance of the ranch,” she replied.⁹⁴ Duckworth found herself trapped in the tensions of capitalist definitions of property.⁹⁵

These discourses re-emerged throughout the negotiations and standstills between Campbell and Duckworth. Finally, in 1908, Campbell made a final survey of the land, and came to an agreement for the observatory purchase the southern half.⁹⁶ On June 1st, 1908, Campbell recommended the purchase of both Duckworth’s land and another tract from a Mr. Hartzoke – which was “required to fill out the northeastern concern of the Reservation” – to the President of the Regents,⁹⁷ which the Regents approved on June 10th, 1908.⁹⁸

⁹² Amelia F. Duckworth to William W. Campbell, August 3rd, 1906. Series 2, Box 17, Folder 6. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

⁹³ Herbst, Jeffrey, “The Creation and Maintenance of National Boundaries in Africa;” Ryan, *The Cartographic Eye*.

⁹⁴ William W. Campbell to Amelia F. Duckworth, April 10th, 1905. Series 2, Box 17, Folder 6. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

⁹⁵ Stein, “A Colonial History of the Higher Education Present,” 6.

⁹⁶ William W. Campbell to Amelia F. Duckworth, May 27th, 1908; William W. Campbell to Amelia F. Duckworth, May 28th, 1908. Series 2, Box 17, Folder 6. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

⁹⁷ William W. Campbell to Benjamin I. Wheeler, June 1st, 1908. Series 2, Box 17, Folder 6. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

⁹⁸ V.H. Henderson to William W. Campbell, June 10th, 1908. Series 2, Box 17, Folder 6. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

Stein argued that settler colonialism uproots “Indigenous understandings of land as a reciprocal, living relation, rather than an object to be possessed.” This correspondence shows how those settler-colonial understandings of land were concretely manifested in the observatory’s land acquisition process. Not only are these understandings evident in the way Campbell and Duckworth described the land, but they tangibly affected which land the observatory chose to purchase. In addition, the bulk of the land was acquired through land grant systems that were predicated on dispossession. These two methods of land acquisition thus illustrate that the observatory’s establishment on Mount Hamilton was embedded in both the legal and bureaucratic systems of settler-colonial dispossession, and in the deeply rooted cultural understandings of land, resource, use, and value of the settler-colonial state.

Chapter 4: “The Small Colony on the Mountain”

One otherwise unhurried day in the winter of 1907, Mrs. Knobloch of Mount Hamilton, Santa Clara County, California, may have set out to do her household’s laundry. As one of the mothers in the 25-person colony on the mountain’s summit, her days were filled supervising children, transcribing her husband’s letters, participating in tennis matches under team names like “Arcturus” and “Aldebaran,” and doing the household chores.¹⁰⁰ But on that day in 1907, she would have found, upon reaching the observatory bulletin board, that yet again, there was not enough water on the mountain for her to do her laundry.¹⁰²

The observatory’s water supply came from a spring – named Aquarius – that flowed strongly in the winter months and dried out during the summer months. Residents stored water during the winter in four large cement and brick reservoirs (Huyghens, Copernicus, Kepler, and Aquarius) containing 27,000-85,000 gallons each, and two tanks, holding 7,400-10,00 gallons each.¹⁰³ As early as 1890, this system could not meet the domestic needs of the 25 residents of the mountain. Workers also used a significant amount of water developing photographic plates and operating the hydraulic floor of the telescope. Director Edward Holden complained that every winter, 200,000 gallons of water were lost due to a lack of storage capacity.¹⁰⁴ Holden suggested building a new reservoir south of the Kepler, raising the brick Aquarius reservoir by four feet, and building a new reservoir to capture the overflow from Huyghens.¹⁰⁵

¹⁰⁰ “Celestial Tennis: Astronomers at Play.” Series 8, Box 1, Folder 17. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

¹⁰² Series 2 Box 39 Folder 4: Water supply, 1888-1901. IMG_2583 Series 2, Box 39, Folder 5. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

¹⁰³ “Memorandum on the Water Supply,” 1890?, 1. Series 2, Box 39, Folder 4. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

¹⁰⁴ Ibid.

¹⁰⁵ Ibid.

Over the next two decades, this sequence of responses solved the water problem for brief periods. Water famines came every few months or years until at least 1913, despite the continuous creation of new supply and storage systems. In the first recorded incident of a water shortage, on November 14, 1896, Holden reported that there was a only “a week’s supply of water at Kepler – and none at the Springs,” and requested that residents of the mountain use water sparingly and stop photographic work.¹⁰⁶ Five years later, in September 1901, his successor, William Campbell, alerted the community to a scarcity of water on the East Peak, which at that time would only affect the operation of the wind mill.¹⁰⁷ However, the situation worsened. In January 1902, he warned of a “danger of the water supply being exhausted.”¹⁰⁸ Campbell attributed the water shortage to excess use by the mountain residents and warned them again in July of that year to limit water consumption to the capacity of the water storage system.

By 1905, the 52 people on the mountain were served by two systems: rainwater for fire protection and the hydraulic movable floor of the original telescope; and two springs for domestic use.¹⁰⁹ The Bay Cities Water Company noted that “the Director of the Observatory has complete charge of the system, and the rules governing the use of water have to be strictly observed...As the consumers are interested in preventing waste, regulation is comparatively easy.”¹¹⁰ The observatory, with its history of rationing the water supply, became a model for other settlements. The per capita water supply was about that of a small town, and that “there

¹⁰⁶ Edward S. Holden, memorandum, November 14th, 1896. Series 2, Box 39, Folder 4. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

¹⁰⁷ William W. Campbell, bulletin board memorandum, September 19th, 1901. Series 2, Box 39, Folder 4. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

¹⁰⁸ R. H. Tucker, bulletin board memorandum, January 6th, 1901. Series 2, Box 39, Folder 4. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

¹⁰⁹ Bay Cities Water Company, “An Example of The Legitimate use of Water for Domestic Purposes,” March 13th, 1905. Series 2, Box 39, Folder 5. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

¹¹⁰ Ibid.

[was] little, if any, restriction to the legitimate use of water,” a fact which was of particular note since the observatory could “show what [could] be done toward preventing waste by intelligent regulation and willing cooperation of the consumers.”¹¹¹

The “problem” of water shaped the modern history of California. As Alfred Crosby argues, the exploitation of Californian resources by European settlers relied on the ability to “Europeanize” the native agricultural outputs, and water management responded to the implementation of European-style farming.¹¹² In this process, “marshes were drained, underground water was tapped by artesian wells, [and] streams and rivers were dammed and diverted for irrigation;” the state’s hydrological systems were completely reshaped.¹¹³ These changes were required for the conversion of large swaths of land to human-managed agricultural systems ideal for monocropping.¹¹⁴ The water landscape was also shaped by growing urban development, which led to massive water management projects in the mid-20th century, such as Hetch Hetchy, the Central Valley Project, and the California State Water Project. These technologies of water control were essential for both agricultural and urban development. By 1905, however, none of these major 20th-century projects had been undertaken; settlers were just beginning to think of the lack of water in growing urban centers as a problem that should be addressed with colonial infrastructures and technologies of development. Settlers in the observatory colony were also trying to inhabit a site with a limited water supply. Ironically, their struggles came to be cast as a success; of course, its actual success was limited.

The colonial assault on California’s hydrological system had the effect of lowering the water table. By early 1907, it was clear that the water shortages on Mount Hamilton were not the

¹¹¹ Ibid.

¹¹² Anderson, *Tending the Wild*, 96.

¹¹³ Ibid.

¹¹⁴ Alfred Crosby qtd. in Ibid.

fault of excessive use by the residents, but rather that the flow of the spring was diminishing. The water situation on the mountain was urgent – the residents had “only ten days’ supply in the reservoirs” and were without adequate fire protection.¹¹⁵ That January, Campbell began a bureaucratic battle for a new electric pumping plant. In the spring, Dow Pumping Engine Works built and installed the electric pump, allowing for 6,200 more gallons per day to be pumped to the Kepler reservoirs.¹¹⁶ ¹¹⁷ Campbell was confident that “[the] annual anxiety as to the water supply will be eliminated.”¹¹⁸

The fact is that the mountain could not sustain a year-round colony, and his relief was short-lived. Just nine months later, in December 1908, Campbell alerted the colony that it was “necessary further to curtail the daily use [of water]” until the next heavy rains.¹¹⁹ That summer, they broke ground on another storage tank– a seventeen-foot tall steel tank, forty feet in diameter, built by United Sheet Metal Works – which abated the water shortages for a year and a half. In January 1911 an earthquake damaged the reservoirs, bringing a new wave of shortages that continued through the next year.¹²⁰ It was clear that technological interventions were unsuccessful in mitigating the underlying limits of the mountaintop water supply.

Half a century earlier, the gold rush had catalyzed technologies for pumping and mining. For the first half of the 19th century, Manifest Destiny and Jacksonian democratic capitalism had

¹¹⁵ William W. Campbell to Benjamin I. Wheeler, January 6th, 1906. Series 2, Box 39, Folder 5. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

¹¹⁶ Ibid.

¹¹⁷ William W. Campbell, “Increased Water Supply on Mount Hamilton,” March 25th, 1907. Series 2, Box 39, Folder 5. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

¹¹⁸ Ibid.

¹¹⁹ William W. Campbell, “The Water Supply,” December 26th, 1908. Series 2, Box 39, Folder 5. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

¹²⁰ William W. Campbell to E.E. Lawrence, April 19th, 1909; William W. Campbell to E.E. Lawrence, August 2nd, 1909; William W. Campbell, “Important Notice,” January 2nd, 1911, William W. Campbell, “Important Notice,” January 3rd, 1911, William W. Campbell to Benjamin I. Wheeler, “Important Notice,” January 2nd, 1912. Series 2, Box 39, Folder 5. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

dominated ideals of the egalitarian settler state. The gold rush brought industrial mining and corporate organization: capital investment, wage labor, and the professionalization of management and engineering.¹²¹ Hydraulic mining allowed corporations to carve away rock from mountains using highly pressurized water, in order to then sift the pulverized rock (and soil) for gold. Mining corporations used hydraulic mining until 1884, when the California legislature banned it due to disastrous effects on the environment and agriculture, in part because runoff from mining deposited sediment into surface and groundwater sources.¹²²

This technology would come to be important for the observatory's water management system. Corporate mining spurred a number of ancillary industries that produced nozzles, hoses, iron pipes, gooseneck swivels and knuckle joints, metal crafting, and hydraulic motors and pumps.¹²³ These technologies also supported larger projects for "impounding and diverting water" for agricultural (irrigation) and urban use.¹²⁴ These technologies were motivated and produced by the extractive colonial practice of mining and the industrial landscape of resource exploitation. They were also fundamental to the development of both the Californian state at large, and the maintenance of colonies such as Mount Hamilton. The pump that siphoned spring water into the Kepler reservoir was a vestige of the hydraulic mining and water diversion techniques that had lowered the water table and filled streams with sediment.

Hydraulic mining, damming and other hydrological reformations, monocropping, and overfishing all contributed to the ecological degradation of California. These effects necessitated reactionary environmental management systems; cycles of exploitation and conservation followed settler-colonial epistemes of civilization and wilderness.

¹²¹ Limbaugh, "Making Old Tools Work Better," 32.

¹²² Ibid., 35.

¹²³ Ibid., 35-6.

¹²⁴ Ibid., 33-4.

One solitary morning in the late months of 1917, Director Campbell was driving to his Mount Hamilton office when a bullet crashed through the front of his wind shield just as he was reaching the observatory.¹²⁵ It flew past his neck and lodged in the seat where his wife would have been that day if she had not stayed home.¹²⁶ It was not the first such incident. For a few years, deer and other game hunters fired bullets near observatory buildings and residences, and occasionally started forest fires.¹²⁷ As Campbell noted, the fact that the road twisted and wound its way to the summit in such tight turns meant that “shooting from the road or from points within 500 yards on either side of the road [was] a dangerous proceeding.” Hunters were likely to hit the observatory no matter where they aimed.¹²⁸ This danger was present since at least 1913, but the incident in 1918 was the final straw. Campbell began to advocate in earnest for protections against the use of firearms on the mountain. The answer was to come in the form of the California Fish and Game Commission.

The California Fish and Game Commission began in 1870 as the Board of Fish Commissioners. It provided for the “restoration and preservation of fish in California waters.”¹²⁹ Just one year earlier, it established the first game refuge in the country at Lake Merritt in Oakland, and the commission became the nation’s first wildlife conservation agency.¹³⁰ At first, the commission focused on building and requiring fish ladders and hatching houses to correct the

¹²⁵ William W. Campbell to Mr. Westerfield, December 20th, 1918. Series 2, Box 21, Folder 1. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

¹²⁶ Ibid.

¹²⁷ William W. Campbell to Fish and Game Commission, September 22nd, 1913. Series 2, Box 21, Folder 1. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

¹²⁸ William W. Campbell to Mr. Westerfield, December 20th, 1918. Lick Observatory Records.

¹²⁹ “About the California Fish and Game Commission.”

¹³⁰ “Department of Fish and Game celebrates 130 years of serving California;” “About the California Fish and Game Commission.”

disruption to fish habitats and ecosystems by dams and water diversion projects.¹³¹ By 1878, however, the commission's authority expanded to game. Over the next three decades, game conservation became an important part of its work.¹³² In 1909, its name was formally changed to the Fish and Game Commission, and it had a robust force of at least 73 wardens, along with the authority to issue hunting licenses and set bag limits.¹³³

The observatory leadership had a friendly relationship with the commission, having hosted wardens on the summit in previous years. The relationship between the observatory and the commission is just one example of the loose divisions and strong comraderies between astronomers, conservators, real estate developers, preachers, and others that shaped the observatory – as well as the broader development of California. On December 30th, 1918, Campbell wrote to the secretary of the commission reporting the shooting and asking for advice on the problem.¹³⁴ This led to discussions between him, the commission, and the University of California Board of Regents about legal action to protect the mountain. At the approval of the Regents, the university's attorney, Warren Olney, drew up a bill prohibiting hunting within three miles of the observatory.¹³⁵ However, Campbell objected strongly to that proposal, since the three-mile radius would include many private properties.¹³⁶

One alternative to prohibiting shooting within a certain distance was to designate the property as a game refuge. Olney argued for the former, pointing out that prohibiting shooting

¹³¹ “Department of Fish and Game celebrates 130 years of serving California,”

¹³² “Department of Fish and Game celebrates 130 years of serving California;” “About the California Fish and Game Commission,”

¹³³ *Ibid.*

¹³⁴ William W. Campbell to Mr. Westerfield, December 20th, 1918. Lick Observatory Records.

¹³⁵ Warren Olney Jr. to William W. Campbell, January 15th, 1919; “An Act Forbidding the Shooting or Firing of a Rifle Within Three Miles of Lick Observatory, of the University of California.” Series 2, Box 21, Folder 1. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

¹³⁶ William W. Campbell to Warren Olney Jr., January 17th, 1919. Series 2, Box 21, Folder 1. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

would not make gun possession unlawful, allowing residents and workers to carry guns freely through the summit; that this law would include a stretch of a nearby ranch that was extremely close to the main telescope; and that it would be easy to modify the original bill to simply reduce the radius of prohibition.¹³⁷ However, Campbell strongly believed that the latter was more desirable, largely because he did not want to include any lands outside the reservation, and did not want responsibility for enforcing such regulations.¹³⁸ His only hesitation was that making the reservation a game refuge might require fencing, but that fear was allayed by the Fish and Game Commission, which assured him that there was no such stipulation.¹³⁹

At long last, in February 1919, Campbell had his way: Olney's bill was dropped, and the fate of the observatory land was decided in the general bill of the Fish and Game Commission, which was passed by the California Senate that spring. The reservation had become the preserve.¹⁴⁰

Throughout his correspondence with Olney, President Wheeler, the Fish and Game Commission, and others concerned with the implementation of a game refuge, Campbell referred to the observatory land as a "reservation" and the summit community as a "colony." The consciousness of the reservation was embedded in the American imagination of wilderness and borders in the nineteenth century, when both Indian reservations and nature preserves were created out of the same settler-colonial logics.¹⁴¹ Campbell constructed the notion of the

¹³⁷ Warren Olney Jr. to William W. Campbell, January 18th, 1919. Series 2, Box 21, Folder 1. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

¹³⁸ William W. Campbell to Warren Olney, Jr., February 11th, 1919. Series 2, Box 21, Folder 1. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

¹³⁹ William W. Campbell to Mr. Westerfield, California Fish and Game Commission, February 17th, 1919. Series 2, Box 21, Folder 1. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

¹⁴⁰ H. C. Jones to William W. Campbell, April 23rd, 1919. Series 2, Box 21, Folder 1. Lick Observatory Records, Special Collections and Archives, McHenry Library, University of California, Santa Cruz.

¹⁴¹ Spence, *Dispossessing the Wilderness*, 3.

observatory as land to be protected against hunters in order to leverage the legal system of game preserves for its protection. When he chose to view it as a small town--heroically flourishing on the summit of a mountain, in which resources and engineering expertise should be invested-- it was a "colony." These overlapping identities encapsulated the tensions of repurposing land, while protecting its "natural" qualities against human management. In the quest for protections against physical violence, the leaders of the observatory had sought to protect an exploited space by appealing to its natural value. Together, the two cases of game refuge and water supply illustrate how the observatory acted as a colony, attempting to control its physical environment through competing practices of exploitation and conservation.

Afterword

By February 1919, the observatory had been operational for over 30 years. In some ways, the project had begun with James Lick's arrival in California, 70 years before. And in some ways, it had begun with the establishment of the Mission Santa Clara in 1769, exactly 150 years earlier. The observatory was a product of the social, political, and economic conditions created by exploitation and violence. Wealth accumulation was predicated first on unfree labor and then on resource extraction, and many California Indians were murdered or relocated from the lands that the observatory and its benefactors would come to inhabit. It was not the legacy of a passionate astronomer who became extraordinarily wealthy, but rather of an extraordinarily wealthy man who was influenced by example of scientific patronage and a few chance relationships. The land for the observatory was acquired through legal and bureaucratic infrastructures of dispossession, ownership, and distribution, and the observatory's founding and early operations were shaped by settler-colonial logics of land management, extraction, conservation, and development.

In the 20th century, astronomy started to take new forms. The Harvard College Observatory established the Arequipa Observatory in Peru, where colonial hierarchies of power and production were enforced in astronomical work.¹⁴² In 1903, the Lick Observatory sent the Mills Expedition to Chile in order to make astronomical observations from the southern hemisphere, and when the project was completed in 1928, they sold their equipment to the nascent astronomy program at the Catholic University of Chile.¹⁴³ These outposts represented an imperial form of astronomical colonialism. After the Second World War, "Big Science" (large-

¹⁴² McGrath, "You Take Our Stars."

¹⁴³ *Ibid.*, 81.

scaled collaborative multinational institutional scientific endeavors) took over.¹⁴⁴ One such example are the telescopes on Mauna Kea, a dormant Hawaiian volcano that is regarded as the center of creation for kānaka maoli, Native Hawaiians. In *Instruments of Science or Conquest? Neocolonialism and Modern American Astronomy*, Leandra Swanner argues that the telescopes atop Mauna Kea can be understood as “neocolonial science” – where science has become the active agent of colonization.¹⁴⁵ What, if anything, can the Lick Observatory tell us about neocolonial astronomy?

The relationship between American astronomy and colonialism, is not a post-World-War-II phenomenon or a discursive construct, but rather a historical pattern embedded in the earliest astronomical work in the United States. It has been expressed in both different types of astronomical endeavors and different types of colonialism, but the project of creating astronomy as a profession and institution in the United States has always been formed by the systems of power, enfranchisement, and disenfranchisement in which it has been situated. There are clear differences between the Lick Observatory and Mauna Kea. The Lick Observatory has become a fixture in the landscape, a fact of life in a state that was completely reconfigured by settler colonialism. On Mauna Kea, both attempted further construction and visible Indigenous resistance persist. Furthermore, the contexts of their development are completely different: one in the 19th-century American West, the other in a postwar and contemporary state that is still considered by many to be the illegally occupied Kingdom of Hawai’i.

However, there are also deep resonances between the two projects. Both rely or relied on infrastructures of land control; in Hawai’i, the Board of Land and Natural Resources and Department of Land and Natural Resources, who granted the lease, embody and legitimize a

¹⁴⁴ Galison and Hevly, *Big Science*.

¹⁴⁵ Swanner, “Instruments of Science or Conquest? Neocolonialism and Modern American Astronomy,” 293.

colonial government that has given itself power to lease sacred lands through colonial systems of ownership and profit.¹⁵² In addition, narratives of scientific ambition and ecological purity have been levied in both situations by different groups for their own purposes. For the Lick Observatory, settler-colonial epistemologies of science as control and conquest were uncontested; the narrative of science as exploration and dominance was co-produced with ideologies of expansionism and nation-building. In Hawai'i, by contrast, astronomers have attempted to link settler astronomy to a genealogy of kānaka maoli science and frame telescope on Mauna Kea as a continuation of existing relationships between Native Hawaiians and the cosmos.¹⁵³ Similarly, notions of conservation and environmental protection were invoked at the Lick Observatory to protect astronomers and their property from game hunters. On Mauna Kea, those discourses are invoked to argue against the construction of additional telescopes that would endanger the ecology of the mountain summit.¹⁵⁴

It is clear that narratives about scientific progress and heritage and protection of land and environment have been flexible discourses employed – consciously or not – for different ends, but in both cases helped negotiate the underlying power dynamics around epistemic validity and land use and rights. In Hawai'i, those negotiations are sanctioned by kānaka maoli land protectors who put their bodies on the line on the Mauna Kea summit. At the Lick Observatory, by the time there was a county road, there was no one to stand along it.

The Lick Observatory speaks not only to new modes of colonial astronomy, but also to the larger project of understanding how institutions of science and higher education have

¹⁵² Swanner, "Instruments of Science or Conquest? Neocolonialism and Modern American Astronomy," 299; Salazar, "Multicultural Settler Colonialism and Indigenous Struggle in Hawai'i: The Politics of Astronomy on Mauna a Wākea."

¹⁵³ Swanner, "Instruments of Science or Conquest? Neocolonialism and Modern American Astronomy."

¹⁵⁴ Ibid.

benefited from and perpetuated structures of oppression. Already, conversations are taking place around the nation about what the histories of universities and slavery mean for universities today. The names of slaveholders are stricken from buildings and statues are replaced by memorials. But these acts can also obscure the deeper entanglements in economic and social systems that cannot be solved by a simple change in name. And just like slavery, settler colonialism is not one event, time period, or a set of players and actions. It is a structure – an ongoing structure that we continue to participate in – and that begs the question: how can we decolonize institutions that are inherently predicated on colonialism?

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