# TEN YEARS OF WINTER: THE COLD DECADE AND ENVIRONMENTAL CONSCIOUSNESS IN THE EARLY 19TH CENTURY

by

MICHAEL SEAN MUNGER

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Student: Michael Sean Munger

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This dissertation has been accepted and approved in partial fulfillment of the requirements for the Doctor of Philosophy degree in the Department of History by:

| | |
|---|---|
| Matthew Dennis | Chair |
| Lindsay Braun | Core Member |
| Marsha Weisiger | Core Member |
| Mark Carey | Institutional Representative |

and

| | |
|---|---|
| Scott L. Pratt | Dean of the Graduate School |

Original approval signatures are on file with the University of Oregon Graduate School.

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DISSERTATION ABSTRACT

Michael Sean Munger

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Two volcanic eruptions in 1809 and 1815 shrouded the earth in sulfur dioxide and triggered a series of weather and climate anomalies manifesting themselves between 1810 and 1819, a period that scientists have termed the “Cold Decade.” People who lived during the Cold Decade appreciated its anomalies through direct experience, and they employed a number of cognitive and analytical tools to try to construct the environmental worlds in which they lived.

Environmental consciousness in the early 19th century commonly operated on two interrelated layers. The first was local, encompassing what people saw and experienced around them in their day-to-day lives, communities and localities, including the weather above them and outside their windows and the environmental characteristics they knew and felt they understood. The second was a broader layer, less known and often less knowable, encompassing the world outside of the local which included climate, the region, the planet, the heavens and the cosmos. Many people during the Cold Decade tried to explore and conquer that broader layer—to pull it closer, to define it, in some cases to tame or harness it—and people’s efforts to do this, while different depending on

who they were and their life situations, had real-world consequences not merely in the Cold Decade itself but in the modernizing world that subsequently emerged.

This dissertation examines Cold Decade environmental consciousness in five groups of people, most in the United States but some in Europe and other parts of the world: *weather watchers,* who kept detailed records on weather phenomena and used this data to discern patterns and theories of climate and weather prediction; *diarists*, ordinary people who recorded and remarked upon weather and climate phenomena in their journals, and who explored the broader layer by knowing weather and climate through personal experience; *doctors,* who leveraged weather and climate knowledge for the benefit of their patients; *arguers,* who conducted an intellectual debate about whether the Earth's climate was growing warmer or colder; and *travelers*, people who sought to understand the broader layer through travel and geography.

CURRICULUM VITAE

NAME OF AUTHOR: Michael Sean Munger

GRADUATE AND UNDERGRADUATE SCHOOLS ATTENDED:

University of Oregon, Eugene
Tulane Law School, New Orleans
University of New Mexico, Albuquerque
Portland State University, Portland

DEGREES AWARDED:

Doctor of Philosophy, History, 2017, University of Oregon
Master of Arts, History, 2012, University of Oregon
Juris Doctor, 1998, Tulane Law School
Bachelor of Arts, History, 1993, University of Oregon

AREAS OF SPECIAL INTEREST:

Environmental History
History of the U.S. Early Republic

PROFESSIONAL EXPERIENCE:

Attorney, Schwabe, Williamson & Wyatt, Portland, Oregon, 2006-2009

Contract Attorney, Law Practice of Sean Munger, Beaverton Oregon, 2004-2006

Attorney, Tonkon Torp LLP, Portland, Oregon, 1998-2004

GRANTS, AWARDS, AND HONORS:

Graduate Teaching Fellowship, History, 2010 to Present

Graduate Teaching Fellowship, Ethnic Studies, 2016

Cushing Academy Fellowship, Massachusetts Historical Society, 2014-2015

Dibner Research Fellowship in the History of Science, Huntington Library, 2014

Thomas T. Turner Memorial Award, Department of History, 2012

PUBLICATIONS:

Munger, Sean. "1816: 'The Mighty Operations of Nature': Societal Effects of the Year Without a Summer." *Madison Historical Review* 10 (2013): Article 3.

Munger, Sean. "Bill Clinton Bugged My Brain!: Delusional Claims in Federal Courts." *Tulane Law Review* 72, no. 5 (May 1998): 1809-1852.

Munger, Sean. "Smith v. Houston Oilers, Inc.: State Law Claims Intercepted in the End Zone." *Tulane Law Review* 71, no. 4 (March 1997): 1351-1373.

Munger, Sean. "The Weather Watchers: Amateur Climatologists and Environmental Consciousness, 1810-1820." *History of Meteorology* 7 (2015): 14-24.

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# CHAPTER I

## "SOME VIOLENT EFFORT OF NATURE FROM THE EARTH"

On the last day of April 1812 the British warship *HMS Ringdove*, a *Cruizer*-class brig-sloop commanded by Captain William Dowers, sat at anchor in Kingston Bay, Saint Vincent, in the British West Indies. On the morning of that day Captain Dowers recorded, "Light airs and hazy weather," and then he began to notice columns of smoke rising above a peak at the northern extremity of the island. This was the mountain known as Soufrière, one of various Caribbean peaks known by this name, French for "sulfur vent." It rained hard in the evening. After midnight Dowers ordered the *Ringdove* to raise anchor and get underway. Then:

> [H]eard a confused loud noise, which at first was thought to be the surf on the beach; it soon increased, and resembled the noise made by the wheels of a heavy loaded waggon, passing rapidly over a bridge. At 1:15 AM abreast of Bucarnent Bay, the noise resembled a dreadful squall of wind, approaching with terrible violence from a distance. Shortened sail, and prepared for it. At 1:20 heard something falling on the water, like large drops of rain; in a few moments afterwards a thick cloud suddenly descended—it fell calm—and stones, from the size of a sparrow's egg to grape-shot, fell on the deck.[1]

The volcano had exploded. The sound wave reached the *Ringdove*, "dreadfully loud," and the ship was suddenly enveloped in a cloud of total darkness. The eerie effect was caused by a mixture of airborne sand and ashes ejected from the volcano. As the sea roared around Saint Vincent *Ringdove* continued sailing through the night.

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[1] "Account via a Letter by Capt. William Dowers," *The Naval Chronicle for 1813, Containing a General and Biographical History of the Royal Navy of the United Kingdom* XXIX (January-June 1813), 284.

> [T]he atmosphere over the N.W. point of the island appears as if illuminated by an immense blaze of fire; vivid zig-zag lightning, perfectly blue, dancing about, in all the various forms of beautiful fire-works, and by its constant light, enables us to see an immense column of smoke, ascending to the height of 5 or 6 miles perpendicular; it then appears to explode, and rolls off in grand and majestic, thick, plumy clouds. The forked lightning occasionally appears to dart through this immense tube of smoke or vapour, and intermingling with its electric matter, seems to seat the heavens in a blaze of fire. At this time we were 5 or 6 miles from Layou, and near 30 from Souffriere.[2]

For the next two days *Ringdove* sailed in and around the zone of the eruption, and Captain Dowers wrote down its effects. The ash-sand mixture continued to rain down on the deck for several hours. It coated the ship's ropes and rigging to such a degree that the vessel was almost incapable of being steered. The *Ringdove*'s compass, affected by magnetic properties of the raining fallout, read three points off true north. The ship's crew found it difficult to breathe. After this trial the sky cleared briefly, the sun breaking through them "like a blue ball of fire." But on the evening of May 1 the ship sailed into another cloud, this one Dowers described as a "sulphurous vapour."

> A fine powder, resembling a mixture of antimony and sulphur, continues falling from the clouds, and insinuates itself into the eyes, ears, and every part of the clothes (making every person on board look like millers). It fills the lay of the ropes, and chokes all the blocks…The sulphuric powder has turned the paint work black and glossy, and every kind of metal substance has changed colour.[3]

In the morning Dowers set his crew to work shoveling the powder off the deck and dumping it over the side. The sea remained "confused and agitated." In the late

[2] Ibid., 284.

[3] Ibid., 285.

morning a breeze finally alleviated the choking miasma, but the air still stank—the captain described it as smelling like bilge water—and the crew observed great masses of splintered trees and pieces of broken wood floating on the water. "Volcanic ashes are floating in long streams from east to west," he noted, "looking like the patches of gulf weed generally seen in crossing the Atlantic." At last Dowers set the ship on course for Martinique. The compasses shortly returned to normal.[4]

For the indigenous people of Saint Vincent the Soufrière volcano had an anchoring and sanctifying effect on the development of their identity, symbolizing the rugged uncultivated beauty of the north of the island, and the 1812 event—one of three major eruptions between the end of the 18th and the end of the 20th century—was one part of its cultural power.[5] Not many people were killed by the eruption, although the ashes blanketed not only Saint Vincent but the island of Barbados, 80 miles away. The sound of the blast was heard at Nevis and Antigua. British troops stationed there thought it was the roar of cannon in some great naval engagement with the French fleet, and they prepared for a possible invasion. The Caribbean as a whole seemed rent with seismic and volcanic agitation. Hundreds of earthquakes preceded the Soufrière blast, and just a month earlier a very large quake had leveled the city of Caracas.[6]

Captain Dowers and his crew, being in the right place at the right time, had witnessed something extraordinary and dramatic. And yet, while remarkable for the

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4 Ibid., 285-86.

5 Virginia Heyer Young, *Becoming West Indian: Culture, Self, and Nation in St. Vincent* (Washington, D.C.: Smithsonian Institution Press, 1993), 10.

6 Alan Burns, *History of the British West Indies* (London: George Allen & Unwin Ltd., 1954), 30, 604-05.

eloquence of its language and the vividness of its descriptions, his account reads exactly as one might expect from a British sea captain in the early years of the 19th century, part of a cultural and military elite knitting the world together through trade, exploration and war, interpreting far-flung landscapes and environmental occurrences through a European lens. But looking closely at his report one notices that it is more than simply a chronicle of a volcanic eruption. The word *weather* appears in the first line. Dowers speaks in terms of breezes, winds, seas, clouds, lightning, the appearance of the sun. The words and phrases he uses seem more focused on the sky than the mountain: *forked lightning, heavens, electric fire, clouds, haze, fog, gloomy looking weather, the atmosphere strongly impregnated.* Toward the end of his account a particularly telling phrase appears: *torn by some violent effort of nature from the earth*.[7] What we see in Dowers's chronicle, then, is not simply a description of an environmental event, but evidence of a remarkably holistic environmental consciousness, in which a mountain belching lava and fire is inseparable from what the air, sky and ocean are doing around it.

Without knowing it, Dowers was describing something else too: the very engine of a global environmental change, already well underway by 1812, that transformed his world in ways both dramatic and subtle. He was one voice of many from which we can reconstruct how this world was changing, and what the people who lived in it thought about it during this unique window of time.

[7] Dowers, 285.

# CHAPTER II

# THE LAYERS OF THE WORLD

The environmental consciousness of the early 19th century envisioned the world existing in two distinct layers: a local layer, representing peoples' immediate surroundings and their everyday experience of climate and weather, and a broader layer, encompassing everything beyond the local, up to and including the heavens and the cosmos. This environmental consciousness is especially discernible, and its real-world effects especially notable, during a period of temporary climate change that occurred between 1809 and 1820 called the "Cold Decade." This dissertation and its primary argument regarding the layers of the environmental world is intended as an intellectual environmental history, a story of the world-building that occurred primarily in the heads of people—most of them studied here were Americans or Europeans—but which engaged and reacted to the unique climate and weather events they experienced in a wide variety of contexts.

I will return to, and flesh out in greater detail, the central argument regarding the layers of the world in a moment. But first, it is crucial to understand the world that was being considered in this way, and to understand what the Cold Decade was and how it stands as a uniquely interesting time in recent environmental history.

## The Cold Decade

Captain Dowers of the *Ringdove* was witnessing the eruption of Soufrière in the spring of 1812, but the scene he described must have closely resembled a much more important, and much more mysterious, event that affected the lives of millions in many parts of the world. The visions of the Soufrière eruption that Dowers presents—a rumbling peak, a mountain spitting fire, smoky skies raining foul-smelling dust—undoubtedly occurred somewhere else in the world in the late winter of 1809 and probably with much greater violence and intensity, but if any Westerners were there to see it their accounts have been lost. This mysterious eruption, lost to history but recovered by modern science, marks the opening chapter of a period of temporary global climate change that itself tells an important story about how the people of the early 19th century viewed the planet on which they lived.

"Mountain X" has jealously guarded its identity for 200 years, but its existence was established in the early years of the present century. That a large volcanic eruption, stratospheric in magnitude—meaning, powerful enough to inject particulate matter, especially sulfur dioxide ($SO_2$), into the stratosphere in sufficient quantity to affect global climate—was suspected initially from climatologists' study of temperature data from ships sailing the Indian Ocean and southwest Pacific, which indicated significant temperature declines around 1809-1811. Initially the eruption was thought to have occurred in 1808.[1] Further scientific research involving the study of volcanic fallout found in ice cores in Greenland and Antarctica determined that one large eruption had occurred in the tropics, and it happened most likely in February 1809.[2] The eruption had

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1 Michael Chenoweth, "Two major cooling episodes derived from global marine air temperature, AD 1807-1827," *Geophysical Research Letters* 28, No. 15 (1 August 2001): 2963.

2 Jihong Cole-Dai, David Ferris, et. al., "Cold decade (AD 1810-1819) caused by Tambora (1815) and another (1809) stratospheric volcanic eruption," *Geophysical Research Letters* 36, L22703 (2009): 5. The climatologists who conducted this study chemically analyzed a particular isotope found in the ice cores. They effectively ruled out that the fallout could have come from two or more smaller eruptions at roughly the same time.

to be quite powerful, and it had to be in the tropics, to account for the global distribution of $SO_2$ and related fallout. The exact identity of Mountain X remains a mystery, perhaps to be solved by the discovery of an obscure account of an eruption in records of indigenous peoples, as the culprit for the 1257 eruption that may have helped trigger the Little Ice Age was discovered, in 2013, in the medieval account of Indonesian kings known as the Babad Lombok chronicle.[3]

We do not know which volcano Mountain X was, but we know what it did. The $SO_2$ circulating in the atmosphere after a stratospheric volcanic eruption absorbs and backscatters solar radiation coming from the Sun, thus resulting in cooling of the lower atmosphere, manifesting itself in cooler weather at the Earth's surface. The effect can last for years.[4] In the case of the 1810s, the global cooling triggered by the Mountain X eruption was prolonged and exacerbated by another and much larger eruption, that of Mt. Tambora, on the island of Sumbawa (now in Indonesia) on April 10, 1815. That Tambora caused the Year Without Summer weather anomalies was argued first in American science by William Jackson Humphreys in 1913, but he based his research on work that had been done in Germany as far back as 1901.[5] The two eruptions together account for a prolonged period of cold temperatures unmatched in the past 500 years. The span of this temporary global climate change, from 1810 to 1819, has been labeled by scientists the

3 Franck Lavigne, Jean-Philippe Degeai et. al, "Source of the Great A.D. 1257 Mystery Eruption Unveiled, Samalas Volcano, Rinjani Volcanic Complex, Indonesia," *Proceedings of the National Academy of Sciences* 110, No. 42 (October 15, 2013): 16746.

4 Michael R. Rampino, Stephen Self and Richard B. Stothers, "Volcanic Winters," *Annual Review of Earth & Planetary Sciences* 16 (1988): 76.

5 William J. Humphreys, "Volcanic Dust and Other Factors in the Production of Climate Changes, and Their Possible Relation to Ice Ages," *Journal of the Franklin Institute* 176 (August 1913): 131, 137.

Cold Decade.[6] Because 1809, the year Mountain X erupted, marked the beginning of this extraordinary phenomenon, which lasted until 1820, the first full year that temperatures returned to "normal," the term "Cold Decade" should be understood to mean the years 1809-1820 inclusive.

The Cold Decade was more than just a statistical event, occurring in the sterile world of data and charts compiled by people who were not even born when it happened. The real Americans and Europeans who *did* live through the Cold Decade experienced and recorded a plethora of events they regarded as unusual and extreme. From a chilling "Cold Friday" in New Hampshire when mercury plunged to 12° below zero,[7] remembered as the measuring stick for winter extremes for years to come,[8] to the snowstorms in Natchez, Mississippi and New Orleans in March 1818 that challenged the memory of "the oldest inhabitants of the place,"[9] from a Christmas Eve gale that ravaged Long Island during the ascendancy of the century's first Great Comet[10] to a weeks-long hard freeze that transformed the River Thames into a skating rink and resulted in the last Frost Fair in the history of Great Britain,[11] people experienced the Cold Decade directly,

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6 Cole-Dai et al., 1.

7 David M. Ludlum, *Early American Winters 1604-1820* (Boston: American Meteorological Society, 1966), 179.

8 Susan Heath, Diary, Vol. II, January 30, 1813, Massachusetts Historical Society, Boston.

9 Ludlum, 205 (quoting *Mississippi Republican*, Natchez, MS, March 5, 1818).

10 Isaiah Thomas, Diary, Vol. 6, September 16, December 24-25, 1811, American Antiquarian Society, Worcester, MA. This version of Thomas's diary is heretofore referred to as [unpublished version].

11 *Frostiana: Or a History of the River Thames in a Frozen State; with an Account of the Late Severe Frost; and the Wonderful Effects of Frost, Snow, Ice and Cold, in England, and in Different Parts of the World; Interspersed with Various Amusing Anecdotes* (London: G. Davis, 1814), *passim*.

viscerally and unmistakably. At the temporal and experiential center of the Cold Decade were the anomalies of 1816, the "Year Without Summer," a series of cold spells, storms and killing frosts that many people, especially Americans from the Northeast, recalled to the end of their lives.[12] It is from the Year Without Summer that popular and literary culture derived the famous legend of the creation of Mary Shelley's *Frankenstein*, hatched by British literati while sequestered in a Swiss villa by cold and gloomy summer weather.[13] The *Frankenstein* creation story resonates in our own time, continually recreated in horror films and literary homages.[14] The Year Without Summer has a Facebook page.[15] It is clear that the Cold Decade left deep fingerprints in science, memory, literature, thought and popular culture.

The weather and climate events of the years 1809-1820 did not occur in an intellectual or conceptual vacuum. They acted upon, and were interpreted through, people's preexisting environmental consciousness. The events that people saw, experienced, interpreted and talked about fit within, reaffirmed or challenged—sometimes simultaneously—their views of the world and how it worked. The Cold Decade was an exercise in world-building. This world-building happened in newspapers, on the pages of people's diaries, in gardens and front rooms where thermometers and

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12 *See, e.g.,* Chauncey Jerome and Lockwood Barr, *History of the American Clock Business for the Past Sixty Years and Life of Chauncey Jerome* (New Haven, CT: F.C. Dayton, Jr., 1860), 31-32.

13 Mary Wollstonecraft Shelley, *Frankenstein, or The Modern Prometheus, The Original Two-Volume Novel of 1816-1817 from the Bodleian Library Manuscripts* (Oxford: Bodleian Library, 2008), 439.

14 *Gothic*, directed by Ken Russell (Virgin Vision Productions, 1986); *Haunted Summer*, directed by Ivan Passer (Cannon Film Distributors, 1988); Chuck Palahniuk, *Haunted* (New York: Doubleday, 2005).

15 < https://www.facebook.com/pages/Year-Without-a-Summer/132195540152311> (visited October 27, 2015).

barometers hung and were systematically checked, in churches, aboard ships, in hospitals and sick-rooms, in frontier camps, drawing rooms and cellars. It was done by housewives, midwives, teenagers, old people, Presidents, explorers, British colonial governors, composers, phrenologists, printers and soldiers. It happened in New York, London, St. Petersburg, South Africa, Kentucky, the South Atlantic Ocean Tangier and many other places. But most of all this world-building went on in people's heads. How the people of the Cold Decade constructed the environmental worlds in which they lived, and how they sought to better understand, explain and conquer them, is the subject of this work.

## The Argument

This dissertation argues that environmental consciousness in the early 19th century commonly operated on two interrelated conceptual layers. The first one was local, encompassing what people saw and experienced around them in their day-to-day lives, communities and localities, including the weather above them and outside their windows, the landscape (natural and built) on which they lived, and the natural rhythms and environmental characteristics they knew and felt they understood. The second was a broader, more distant layer, less known and sometimes less knowable, encompassing the world outside of the local, which included climate, the region, the planet, even the heavens or cosmos. Many people during the Cold Decade expressed and acted upon a desire to explore and understand that broader layer—to pull it closer, to define it, in some cases to tame or conquer it—and people's efforts to do this, while different depending on who they were and their life situations, had real-world consequences not merely in the Cold Decade itself but in the modernizing world that subsequently emerged.

This work is an intellectual environmental history with a practical component. It is primarily a history of thought and ideas about weather and climate during a specific and fairly brief period of time, but it is also about how these ideas were connected to material realities and translated into practice in the real worlds in which people lived. Those worlds differed depending on who was constructing them, but people's efforts to pull closer, define and control the broader layer formed the practical side of their worldviews. How people conceived of the layers—the "world-building"—is the *thinking* component of Cold Decade environmental consciousness. Whatever people did to reach out and pull the broader layer closer is the *doing* component, the practice of it. The two are closely linked.

## Whose Environmental Consciousness?

I have referred to the environmental consciousness of *people*, and stated my intention to examine what *people* thought and how they acted upon what they thought. To which people, specifically, do I refer?

This dissertation argues that some form of this dual-layered environmental consciousness was very commonly held in the Atlantic world, across situational, socioeconomic and gender boundaries. It is not my argument that it was universal; it is not my argument that it is exclusive, i.e., that we cannot conceive of some other potential analytical tool through which to view environmental worldviews. It *is* my argument that it was common. I will demonstrate that, and explore the various permutations of this dual-layered environmental consciousness, by examining how it worked within five groups of people, mostly Americans, but also some Europeans who shared these worldviews. I have divided these subjects into five basic groups. It is necessary to understand who these five groups were before addressing how each of them manifested this dual-layered environmental consciousness and what real-world consequences came from their constructions. In each case it was a process of starting from the local layer, the understood world, and pulling in the broader layer to define it, understand it and perhaps control it. Each group saw the broader layer in different terms, asked different questions about it and approached it from a different angle. Therefore we must ask: who comprises each group, what did they do, why did they take the approach they did, and what were its consequences?

The first group is the *weather watchers*. These were people, usually educated upper-class men, who expended considerable time and energy making, recording and interpreting weather data with a set of basic tools, such as thermometers, barometers, hygrometers and wind gauges. Weather watchers generally did not identify themselves as professional scientists, nor were they regarded as such by peers—in other words, they were amateurs—yet they often searched for broad patterns in their data and used it to construct scientific-sounding theories about how they thought weather and climate worked. Observers and recorders of weather phenomena have been studied by historians, usually within the context of how they affected the development of the scientific disciplines of meteorology or climatology, and the term “weather watchers” or “storm watchers" has often been applied to them.[16] My use of the term "weather watchers" is generally evocative of these approaches, but with an important boundary: I define weather watchers largely by what they did—which was to observe and record the weather for a significant period of time and in some fashion—and not by how they were viewed by others. What weather watchers did, rather than how they were viewed, is important because it demonstrates a connection to the popular practice of science in society as a whole, rather than focusing upon a small elite possessing scientific cachet, whether deserved or not, in literary and intellectual circles to which few common people could gain admittance.

The weather watchers, being enthusiastic observers of the weather and climate, sought to categorize, theorize, measure, explain and tame the broader layer by classifying it and especially by finding patterns within it. Weather watchers were students of science, if not "real" scientists as we would conceive of such today, and so they took a scientific and methodological approach. They did this because they believed above all in the predictability, rationality and empirical knowability of the natural world. They believed it was capable of being reduced to a set of theories and rules, which, if properly understood and applied, might have significant applications in weather and climate prediction and all the benefits those were presumed to bring. The weather watchers' engagement with the broader layer mattered because it helped address, at least in part, a growing demand among the public for meteorological and climate understanding—a demand spurred to a significant degree by the weather and climate anomalies of the Cold Decade.

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16 *See, e.g.*, John D. Cox, *Storm Watchers: The Turbulent History of Weather Prediction from Franklin's Kite to El Niño* (Hoboken, NJ: John Wiley & Sons, 2002), David Day, *The Weather Watchers: 100 Years of the Bureau of Meteorology* (Melbourne: Melbourne University Publishing, 2007).

The second group is the *diarists*. Membership in this group is easy to define: anyone who kept a diary or journal during the Cold Decade, and recorded in it weather events or thoughts on climate, is relevant for study. As many people from various walks of life kept diaries and felt the need to record weather and climate material, this group is naturally quite broad. The diarist group includes elderly men and young women, farmers and sailors, doctors, clergymen, attorneys and students. Diarists must of course have been literate, and they must have had the means, opportunity and time to keep some form of systematic first-person record. A key element of diaries in this category, however, is that an author considered to be in this group must have kept a diary for some reason *other* than the sole purpose of recording weather data—put another way, their diaries must contain substantive narrative material other than raw weather observations. Ship's logs that noted weather and wind conditions as a matter of course, for example, are not considered diaries, at least not without some significant narration.

A diarists' story is a personal one, and in many ways the most difficult to evaluate. People who recorded weather and climate events in their journals were exploring the broader layer on a very personal level. They sought to define and understand this layer by bringing it into their daily lives, by exploring it firsthand, conquering it through personal intimacy. They took this approach because weather and climate events, especially during the Cold Decade, were an important part of their lives. For some of the diarists, especially the religious women of New England, the broader layer was inseparable from God, and knowing that layer was a way to be closer to the divine. The diarists' engagement with the broader environmental layer was important because it enabled them to memorialize the events of their own lives and give them meaning by placing them in a larger context. This is to some degree inseparable from the larger question of why people chose to keep diaries at all; as we will see, this is a particularly difficult question to answer.

The third group is the *doctors*. I use that term largely as shorthand for persons who considered themselves to be primarily or significantly in the occupation of providing health care to patients, whether or not they had any specific qualifications or credentials. Chapter VIII frequently employs the term "medical professionals" as a catch-all. The majority of the people in this category who have left written records pertaining to weather and climate during the Cold Decade were physicians, many of them formally trained through medical apprenticeship, such as the doctors who formed the Medical Society of South Carolina in Charleston,[17] but a country midwife would be a good example of a medical professional who is not a doctor.[18] Doctors linked medicine and healing to the environment and the weather in the early 19th century in unique ways, which is why assessing the weather chronicling of medical professionals is particularly revealing about the shifting contours of environmental consciousness.

In at least one way, the medical professionals' motivation is much simpler to understand. Doctors and health care providers sought to manipulate and understand the broader layer so they could tame it and use it for the benefit of their patients' health. They sought to glean from the broader layer practical understanding that they expected would

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17 Robert Croom Aldredge, *Weather Observers and Observations at Charleston, South Carolina*, reprinted from the *Historical Appendix of the Year Book of the City of Charleston for the Year 1940* (Charleston, SC, 1940), 226-31.

18 *See, e.g.,* Laurel Thatcher Ulrich, *A Midwife's Tale: The Life of Martha Ballard, Based on Her Diary, 1785-1812* (New York: Alfred A. Knopf, 1990).

be useful for treating or preventing disease. Medical professionals did this because in their occupational and personal missions to heal the sick, they recognized climate and other components of the broader layer as a tool that could help them practice medicine more effectively. The doctors' engagement with the broader layer mattered because it helped to bring their patients—and themselves—into a closer relationship with their physical environment. In addition to advancing medical knowledge, their efforts, like those of the weather watchers, also had significant implications for the science of meteorology.

The fourth group is what I call the *arguers*. This is a comparatively small group of men in the United States and Europe who participated during the Cold Decade in a long-standing transatlantic argument, which began long before 1809, about whether the climate of the Earth was changing more or less permanently in a warming direction (global warming) or a cooling direction (global cooling). This argument, as we will see, was rooted in social and intellectual identity, especially in the United States, and it was conducted by people with a certain educational background that enabled them to argue from a more or less common pool of source materials and shared assumptions. To be an arguer subject to study in this dissertation, a person must have expressed in writing an opinion on global warming or global cooling—while not necessarily endorsing one theory over another—during the period 1809-1820, or have had pre-1809 opinions on the matter cited or discussed by others within the decade.

The arguers naturally wanted to win their arguments, but achieving a rhetorical victory (even assuming they could define what "victory" meant or how it could be measured) is not what makes them relevant to the study of the Cold Decade. People who participated in the debate about climate change were interested in the future, which they saw almost exclusively from the standpoint of the past. The arguers wanted to understand the long-term climate future of Earth and exert some sort of mastery over the broader layer by predicting correctly the trajectory of global climate. The arguers believed that their common base of knowledge and their cultural position provided the proper vantage point from which to understand the workings of the Earth as a whole—they had this in common with the weather watchers—and the arguers had a particular interest in their worldview being validated. While the arguers never reached a conclusive verdict among themselves about global warming versus global cooling, their engagement with the broader layer mattered because it helped to prepare the ground, scientifically and intellectually, for the climate discoveries of the later 19$^{th}$ and 20$^{th}$ centuries, principally anthropogenic global warming.

The fifth and final group is the *travelers*. These are, quite simply, people who traveled from one place to another within the Cold Decade and made some significant expression about the climate and weather of a particular place, whether declaratory (explaining what the climate was like or what the weather did) or comparative (comparing climate or weather from place to place). The travelers subject to my study could be sailors aboard ships, diplomats posted to foreign shores, explorers charting and documenting new frontiers, or boosters seeking to encourage emigration to new areas, particularly in the American West. Travelers are relevant to this analysis because, as we will see, their view of the environment was a less parochial one, characterized not by a single climate rooted to a single place, but broader, informed by personal experience of various parts of the world. The possibilities for observing environmental consciousness and world-building within this group are particularly attractive.

With the possible exception of some of the diarists, the travelers were probably the most unaware of what they were doing and how their environmental consciousness functioned. They sought to understand the broader layer through travel and geography: a spatial, experiential form of knowing, in contrast to the more theoretical forms of knowing exhibited by the weather watchers and arguers. The travelers compared climates, and in some cases they sought to free people from being at the mercy of one climate only. Through their own travels they provided, consciously or not, examples for others who might seek to escape one environment and enter a more favorable one. The travelers' engagement with the broader layer was an exercise in empire-building. It helped to settle new frontiers and advance the project of physical dominion over the environment, principally in the United States but to some degree in other parts of the world too. Travelers helped define frontiers and empires, such as distant reaches of the British Empire, which helped to build expansionist and colonialist identities at home. It is also through the experience of the travelers that we may observe that the Cold Decade phenomena were truly global.

These groups were neither monolithic nor exclusive. The boundaries between them were permeable. Many medical professionals during the 1810s also kept systematic weather observations, thus qualifying them as weather watchers; Thomas Jefferson, profiled in the chapter on weather watchers, had definite opinions on climate change, which made him an arguer as well. The real delineation between these groups can be seen in the ways they constructed their dual-layered environmental consciousness, but even this delineation did not exclude a person from constructing his or her worlds in more than one way. As this analysis is primarily an attempt to explain a quest for knowledge or understanding about the Earth's environment, it is unrealistic to expect that the people who sought this understanding would seize upon one method of achieving it to the exclusion of all other possibilities. These categories, like the layers themselves, are intended to be analytical tools for us in the present, not judgments on individuals in the past.

While each of these groups had a different means of reaching out and touching the broader environmental layer, the commonality among them is the desire and the attempt at definition of an environment that stretched beyond their local concerns. The collective and cumulative lessons we draw from them can help us understand how the tools they used to touch the broader layer—changing and developing science, technology, new political dimensions, empire-building, growing awareness of the environment—were beginning to coalesce into their modern forms. The five groups together place us on the ground in a wide array of intellectual and social realms, from religious societies and the home to military camps, hospitals, sailing (and steam) ships, large cities and rural communities, the halls of power and political influence, and distant wilderness locations as yet poorly understood by Westerners, in which a wide range of intellectual attitudes, tools and world-views are represented. Consequently, study of these five groups gives us a broad window into environmental thought in the Western world in the 1810s, in a wide variety of contexts.

In geographic scope, this work will examine the dual-layered environmental consciousness of the Cold Decade primarily among Americans, the majority of whom lived in New England and the Mid-Atlantic states.[19] That said, geography and connections to other parts of the world were a crucial part of this environmental consciousness, part of which encompassed a global dimension. Discussions of climate and weather often hinged upon connections and comparisons between America and Europe, as we will see with the arguers, and travel among different regions and different climates is a key factor in the analysis of the travelers. America's hinterlands and frontiers also played an important part in understanding weather and climate, as we see with travelers and medical professionals. Because weather and climate themselves respect no national and few regional boundaries, it is unrealistic to limit this study specifically to one nation or region; conversely, while the Cold Decade clearly was experienced globally, discussion of environmental worldviews outside the United States and Europe must be, as a practical matter, limited.

### The History

The historiographical landscape in which this work operates is lightly-trodden as of now. To my knowledge, no historian has explored the Cold Decade as a whole; indeed the term and concept appears only in scientific literature.[20] Until fairly recently, even the

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[19] Native American sources, while highly desirable, do not lend themselves easily to inclusion in this study, principally because most Native American records of weather and climate events, transmitted primarily through oral tradition, cannot be dated specifically as falling within the Cold Decade. Some are highly suggestive: for example, stories recorded by ethnographers among Athapaskank (usually written "Athabaskan") women in northwestern Canada include references to a year sometime in the 19th century where summer never came. However, given the ages of the women interviewed and counting the generations they were probably referring to, this episode does not seem to have occurred earlier than the middle of the century. Julie Cruikshank, *Athapaskank Women: Lives and Legends* (Ottawa: National Museum of Canada, 1979), 164-67.

[20] Cole-Dai et al., *passim*.

most visible and dramatic part of the Cold Decade, the Year Without Summer (1816), has tended to appear either as a sort of narrative digression in serious histories, dismissed without much substantive discussion,[21] or else as the stand-alone subject of popular histories whose primary mission is to explain what happened rather than connect the events to any real sort of broader conceptual whole.[22] More recently, the Year Without Summer itself has begun to attract attention as a subject worthy of historical attention—the Society for the History of the Early Republic, for instance, included a panel on the Year Without Summer in its summer 2016 annual meeting[23]—but, beyond essentially noticing that the anomalies occurred, the focus has been upon reconstructing timelines of specific weather events from historical records of that time, usually by means of a historian working in tandem with a non-historian to interpret scientific or geographical data.[24] I am, so far as I know, the first historian to devote a work of significant length to

[21] *See, e.g.*, C. Edward Skeen, *1816: America Rising* (Lexington, KY: University Press of Kentucky, 2003), 1-15; Daniel Walker Howe, *What Hath God Wrought: The Transformation of America, 1815-1848* (Oxford: Oxford University Press, 2007), 39.

[22] *See, e.g.,* Henry Stommel & Elizabeth Stommel, *Volcano Weather: The Story of 1816, The Year Without a Summer* (Newport, RI: Seven Seas Press, 1983), William K. Klingaman and Nicholas P. Klingaman, *1816: The Year Without Summer and the Volcano that Darkened the World and Changed History* (New York: St. Martin's Press, 2013), Gillen D'Arcy Wood, *Tambora: The Eruption that Changed the World* (Princeton: Princeton University Press, 2014).

[23] No papers have, to date, been published from this panel. Of its three presenters, one (Sherry Johnson of Florida International University) concluded she could find no significant effects of Year Without Summer anomalies in economic records of trade between the Caribbean and North America; another (Sam White of Ohio State University) considered the Year Without Summer on a broad "macro" level as a small part of the general climate trend known as the Little Ice Age; and only the third (myself) delved into eyewitness accounts of weather anomalies, in the context of almanacs and consideration of astronomy and the heavens in environmental consciousness of the time—a theme that will weave its way through this dissertation. Nonetheless, the inclusion of the Year Without Summer panel marks the fact that historians of the Early Republic have at least noticed that the Year Without Summer anomalies occurred; it remains to be seen whether they will accord it any significant historical attention.

[24] *See, e.g.,* Lucy Veale and Georgina H. Endfield, "Situating 1816, the 'Year Without Summer,' in the UK," *The Geographical Journal* 2016 (doi 10.1111). Klingaman's book *1816: A Year Without Summer*

the subject of how observers and participants in Cold Decade weather and climate anomalies conceptualized what was happening in the world around them.

In doing so, my dissertation contributes to a field in which there are significant gaps. The environmental history of the early American republic is, admittedly, lagging behind environmental scholarship in other periods of U.S. history. American environmental history is today much concerned with the fusion of the old rigid categories of "nature" and "culture"—an approach Paul S. Sutter terms "hybridity"—along with its traditional emphasis upon environmental management by the state.[25] Climate history in general tends toward reconstructing past climates, describing the role of climate in large-scale catastrophes like the Mayan collapse or similar episodes, or understanding the social and political uses of climate and climate change knowledge, particularly in situations involving colonialism and/or contact with indigenous peoples.[26] Focusing more narrowly, the history of weather and meteorology tends to focus on the impacts of scientific and technological developments and the emergence of research disciplines and institutions.[27] I intend for this dissertation to lie significantly outside all of these

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is a popular history co-written with his son, a meteorologist, who provided a scientific meteorological analysis of specific weather events discovered in the historical record.

[25] Paul S. Sutter, "The World with Us: The State of American Environmental History," *Journal of American History* 100, no. 1 (June 2013): 99-105.

[26] Mark Carey, "Climate and History: A Critical Review of Historical Climatology and Climate Change Historiography," *WIREs Climate Change* 3 (2012): 233-49.

[27] *See, e.g.,* James Rodger Fleming, *Meteorology in America, 1800-1870* (Baltimore: Johns Hopkins University Press, 1990), Vladimir Janković, *Reading the Skies: A Cultural History of English Weather, 1650-1820* (Chicago: University of Chicago Press, 1990).

traditional approaches, though certain aspects of my analysis can be said to touch, in some cases only slightly, subjects that have been covered within these realms.[28]

Dealing as it does principally with the construction of worlds in people's minds and human understanding of climate and weather, this dissertation does generally treat nature and the environment within the realm of human culture—an approach that is consistent with the work of other scholars, like Karen Ordahl Kupperman, in focusing upon climate in colonial America.[29] My work is also part of a shift in environmental historiography that defines climate as a concept not purely in terms of "local" or "global," but which seeks to leverage both conceptions and find connections between them.[30] I argue explicitly that Americans and Europeans of the early 19th century saw the

[28] For example, this dissertation does engage, principally in Chapter VIII, with the environmental dimensions of sickness and disease, which is a theme in modern American environmental history. Sutter, 110. In constructing how medical professionals viewed the dual-layered environment, my analysis is similar in many ways to that of Conevery Bolton Valençius and her investigation of how the bodies of white American settlers responded to and were integrated into frontier environments in which they settled, dealt with in *The Health of the Country: How American Settlers Understood Themselves and Their Land* (New York: Basic Books, 2002). In terms of meteorology, dealt with principally in Chapter IV, my analysis converges with threads in the history of meteorology and climatology as sciences, which are well-documented by James Rodger Fleming in *Meteorology in America* and by Vladimir Janković in *Reading the Skies*. I would consider my approach to be a continuation of these currents with regard to these subjects.

[29] Joyce Chaplin notes, "In analyzing climate as a concept, early Americanists consulted human-generated records, and those records were mostly about human perceptions rather than natural events." Joyce E. Chaplin, "Ogres and Omnivores: Early American Historians and Climate History," *The William and Mary Quarterly* 72, no. 1 (January 2015): 27 (referencing Karen Ordahl Kupperman, "Climate and Mastery of the Wilderness in Seventeenth-Century New England," in *Seventeenth-Century Nw England*, ed. David D. Hall and David Grayson Allen (Boston, 1984), 3-37). I am not, however, very interested for its own sake in the traditional concern among early American climate historians involving the "dispute of the New World," meaning the comparison of New World climates with those in Europe—an obsession of Thomas Jefferson, among others. Comparisons of climates do enter into this dissertation in Chapter X ("The Arguers") and to some degree in the background of Jefferson as a weather watcher (Chapter IV), but the traditional "dispute of the New World" lives mostly in the historiography of fairly early European encounters with New World climates. Chaplin, 26. This dissertation, focusing on a single decade in the early 19th century, need not enter this thicket, but I am aware that it exists.

[30] Ibid., 26-27. Although again concerned with an earlier period (mid-18th century), Fredrik Albritton Jonsson's work on the climate observations of Swedish naturalist Pehr Kalm is a good example of this.

climate and weather environment as *both* local *and* global, or even cosmic. Thus, one conceptual contribution I seek to make is to emphasize that the thinking of people in this period of time was essentially dynamic, functioning on multiple levels, and not rooted to one or another set of rigid assumptions about the scope of the environment around them.

Judged against Sutter's elucidation of the "two core tasks" of environmental history, this dissertation serves both. The first is to "bring environmental causation into historical narration."[31] Clearly, a series of events, ideas and intellectual responses set in motion by the eruption of volcanoes distant from the vast majority of humans who experienced their effects is literally highlighting an episode of purely environmental causation resulting in human response. That the non-human environment has "agency" in the story of the Cold Decade is so obvious that it does not require really any argument to make the point. The second task, in Sutter's words, is to "document the environmental consequences of historical change in descriptive and normative ways." Sutter frames this task, complicated by his concept of "hybridity," in essentially moral terms—environmental historians have a moral duty to help save the environments they study.[32] This dissertation does that also, but in a more subtle way. As I will argue very briefly in the next section, and much more completely in the conclusion (Chapter XIV), one of the chief benefits of studying the Cold Decade is the perspective it can give us on our modern crisis of anthropogenic global warming, even though—and especially *because*—the Cold

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Frederik Albritton Jonsson, "Climate Change and the Retreat of the Atlantic: The Cameralist Context of Pehr Kalm's Voyage to North America, 1748-51," *The William and Mary Quarterly* 72, no. 1 (January 2015): 99-126.

31 Sutter, 97.

32 Ibid., 99.

Decade was a period of climate change that did not involve human causation in any way. As there is no task before the human race more urgent or important than engaging with the consequences of global warming, this dissertation contributes to a vital and important environmental understanding, even though it does not involve pollution, conservation, the effects of capitalist economics or government policy, or many other subjects upon which more traditional environmental histories have tended to focus.

Why the Cold Decade?

While my argument in this dissertation concerns the existence, structure and importance of a widely-held environmental worldview, it is *not* my claim that this worldview was entirely unique to the 1810s, nor that it was any sort of radical break from attitudes that had existed prior to the decade and, to some extent at least, after its end. It *is* my claim that the Cold Decade provides a historical opportunity to study and appreciate this environmental consciousness under conditions that show its contours with particular clarity. There is a reason why weather and climate events feature so prominently in Cold Decade narratives and sources—because these events were important in the lives of those who created them—but there are several other reasons why the second decade of the 19th century warrants scrutiny.

First, the Cold Decade was a period of temporary global climate change unmatched in the past 500 years.[33] As such, it is the latest and most well-documented episode of global climate change up until our modern episode of anthropogenic global warming, and because it is easy to place in time and of relatively short duration—unlike,

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33 Cole-Dai et al., 1.

for example, the Little Ice Age or the Medieval Warm Period, whose temporal boundaries are difficult to agree upon and potentially span centuries[34]—it lends itself well to study through documentary sources. The Cold Decade was the first and so far the only significant episode of global cooling that has occurred in an era of mass media such as newspapers, in a world where more or less modern nation-states existed, and most importantly, it is the only cooling episode that has occurred since the advent of post-Enlightenment science. These factors make the Cold Decade a unique laboratory in which to study the environmental consciousness of ordinary people during a period of climatic stress and in societal circumstances that at least approach modernity, however one wishes to define it. Historians who study climate and climate change do not have a great number of examples to choose from in which empirical instruments like thermometers and barometers were in common use in various countries, in which weather and climate news was reported in newspapers, and in which significant numbers of ordinary people were literate enough to keep diaries and other records in regular or semi-regular fashion.

Secondly, the Cold Decade was the last episode of significant global climate change that occurred before the Industrial Revolution—in other words, the last one that was not primarily manmade. This has an important implication for the study of environmental attitudes and consciousness. While some people in the 1810s did believe that human activity was responsible for or at least contributing to climate change on a

[34] Emmanuel Le Roy Ladurie, *Times of Feast, Times of Famine: A History of Climate Since the Year 1000* (Garden City, NJ: Doubleday, 1971), 7-22.

broader time-scale,[35] they did not generally believe that human activity was causing the weather and climate anomalies of the decade, which were almost universally assumed to be natural phenomena, however unusual.[36] By contrast our environmental attitudes today, especially toward global warming, are inseparable from matters involving human culpability in environmental crisis and its implications for future human welfare. The Cold Decade presents an opportunity to study environmental consciousness in a period of climate change without culpability and human causation playing any significant role in personal or cultural responses.

Third, the 1810s proved to be a unique transitional period in the history of science, including that of meteorology. The Early Modern tradition of natural philosophers seeking to divine "natural laws" from observable phenomenon had, by the early 19th century, been transformed by Enlightenment ideas of rationality and systematic empirical investigation.[37] Bodies devoted to scientific research were in the 1810s still largely voluntary associations of enthusiastic amateurs, but in many ways they were beginning to resemble permanent and professional research-oriented scientific institutions. Britain's Askesian Society was an example: a group of upper-class men meeting in a member's home, discussing amongst themselves scientific issues and research papers, but whose meetings functioned as a sort of peer-review process that led

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35 *See, e.g.,* Hugh Williamson, *Observations on the Climate in Different Parts of America, Compared with the climate in corresponding parts of the other continent. To which are added remarks on the different complexions of the human race; with some account of the aborigines of America. Being an introductory discourse to the history of North-Carolina* (New York, 1811), 9-10.

36 For a rare contrary view—though possibly in jest—*see Daily National Intelligencer*, September 3, 1816, 2.

37 Fleming, *Meteorology*, 1-5; Janković, 154-67.

to the publication of those papers in journals widely read by other self-identified scientists.[38] The Cold Decade was a period when Early Modern conceptions of weather study, which persisted into the 18th century, were finally giving way to concerns with empiricism, scientific rigor and systematization. This was, for example, the period when "meteorology" began to divorce itself from the study of "meteors," meaning celestial and astronomical occurrences, and to focus upon atmospheric phenomena.[39] It was also a period in which practitioners of weather study were beginning to come to a consensus that systematic empirical observation of weather events was the key to developing meteorology as a real science.[40]

That being the case, however, celestial and astronomical events were still very much a part of common thinking about weather and climate, both among those who fancied themselves as scientists[41] and in the milieu of what historian Conevery Bolton Valençius terms "vernacular science,"[42] a kind of grass-roots, popularly understood conception of scientific and environmental knowledge which found its clearest and most

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[38] Luke Howard to Johann Wolfgang von Goethe, February 22, 1822, in Luke Howard, *Luke Howard (1772-1864) His Correspondence with Goethe and his Continental Journey of 1816*, ed. D.F.S. Scott (London: William Sessions Limited, 1976), 3.

[39] Janković, 154-56.

[40] Fleming, *Meteorology*, 12.

[41] Luke Howard, *The Climate of London, Deduced from Meteorological Observations Made in the Metropolis and at Various Places Around it* (London: Harvery & Darton, 1833), I:155-183.

[42] Conevery Bolton Valençius, *The Lost History of the New Madrid Earthquakes* (Chicago: University of Chicago Press, 2013), 175-77.

vivid expression in the farmer's almanacs of the period.[43] Science in the 1810s, therefore, was a curious mix of empiricism, professionalism, systematized investigation, superstition, folklore and amateurism. As science in general and meteorology in particular was just about to be transformed, beginning in a mere twenty-five years, by the innovation of the telegraph—which historian Katharine Anderson argues was a key feature in the development of weather forecasting, the *sine qua non* of modern meteorology[44]—the Cold Decade is a strategic place to look to discern what science was and what people thought of it on the verge of this change.

Fourth, the Cold Decade was a period of technological innovation, the vanguard of the Industrial Revolution, which had the potential to render travel, communications and livelihoods significantly less at the mercy of weather and climate conditions than they previously had been. In 1809, at the beginning of the Cold Decade, while on a voyage from New York to Philadelphia the steamship *Phoenix* ventured out of protected coastal waters and into the open ocean, the first time a steam-propelled vessel had done so. In 1819, at the end of the Cold Decade, the ship *Savannah* completed the first transatlantic voyage that was accomplished in part with steam power, utilizing a paddlewheel powered by a steam engine for approximately 80 hours of an eight-day voyage from Savannah to Liverpool.[45] While ocean travel was by no means freed from dependence upon winds and weather, several important steps toward this liberation

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[43] *See, e.g.*, *The Physician's Almanac for the Year of Our Lord 1817* (Boston: Tileston & Parmenter, 1816).

[44] Katharine Anderson, *Predicting the Weather: Victorians and the Science of Meteorology* (Chicago: University of Chicago Press, 2005), 1-7.

[45] William Armstrong Fairburn, *Merchant Sail* (Center Lovell, ME: 1945-55), II:1314-15.

occurred during the Cold Decade. Within twenty years the Industrial Revolution would begin to wreak significant changes upon the physical environment and the way in which people made their living, from water-powered textile factories to city manufacturing jobs competing with the traditional agricultural sector. These changes could not help but profoundly alter people's relationships to weather and climate. The Cold Decade is the last moment of environmental consciousness before these changes truly began in earnest. If one wanted to study how the Industrial Revolution changed our thinking about weather and climate, the Cold Decade would be a necessary starting point for that inquiry because it shows the attitudes that existed at the beginning of that process of change. These points regarding the importance of the Cold Decade will be discussed more fully in the conclusion.

As unusual as many people perceived the events of the Cold Decade to be, and as much transition as can be observed in the period, especially in science, the conceptions and environmental worldviews of the 1810s had significant continuities with both the past and what was soon to come, though probably less of the latter. The activities of the weather watchers were not qualitatively different from Enlightenment observers of weather phenomena such as John Locke or Petrus van Musschenbroek, though their conceptual ideas of why they were doing it were probably different.[46] The arguers were participants in a largely literary and academic debate on the nature of climate and climate change that had opened in France in 1719 with the work of Abbé Jean-Baptiste Du Bos,

[46] Sean Munger, "The Weather Watchers: Amateur Climatologists and Environmental Consciousness, 1810-1820," *History of Meteorology* 7 (2015): 14-24, 15.

and whose roots stretched back to the writings of medieval philosophers.[47] The way American doctors practiced medicine in the 1810s was consistent with the miasma theory of disease that gained tremendous currency in the United States during and shortly after the American Revolution, principally due to the influence of the new nation's most prominent physician, Benjamin Rush.[48] It is not my intention to minimize or ignore these continuities, but it *is* my intention to argue that the Cold Decade is a particularly opportune window through which to view the traditions they represent.

In fact, in some ways the Cold Decade is, chronologically, the last moment in which to study these traditions and attitudes, because many of them began to change over the succeeding decades. Meteorology was transformed by the telegraph and the advent of forecasting, as I have already mentioned; these factors largely terminated, for example, the arguers' long-standing contest about global warming versus global cooling, as we will see in Chapter X. Later in the 19th century miasma theory gave way to germ theory; in the 20th century the discovery and growing understanding of anthropogenic greenhouse gas warming would inject an element of human causation into climate discourse that would ultimately dominate environmental thinking. One cannot consider the continuities that the environmental consciousness of the Cold Decade had with pre-1810 attitudes without noticing how quickly and completely they began to change in the decades after 1820. From all of these factors a picture emerges of the Cold Decade being an especially significant moment to study environmental consciousness: both its continuities with the

47 James Rodger Fleming, *Historical Perspectives on Climate Change* (New York: Oxford University Press, 1998), 11-19.

48 Aldredge, 230-32.

past, and its features that were teetering on the verge of (or careening obliviously toward a collision with) fundamental change, mark it as worthy of serious historical investigation.

## Larger Meanings: Catastrophes of the Present and the Past

This study is not relevant solely in the realm of historical understanding. Studying conceptions of the environment during a period of temporary climate change in the past is relevant to making sense of our own attitudes toward modern anthropogenic global warming. Those of us living in the $21^{st}$ century are constantly constructing and reconstructing the environmental worlds around us in terms that we can relate to. Imagine a middle-class suburban American couple choosing to buy a Prius instead of a diesel-powered pickup truck for their own personal transportation due to concerns about climate change. This decision is evidence that the couple have constructed their world in a way that makes a broader conception of the planetary environment relevant to their personal family decision to buy a vehicle. In a sense they have traveled between the local layer of their world—the vehicle sitting in their garage—and the broader layer, where the realities of anthropogenic global warming implicate personal responsibility and morality. How was this world-construction, this exploring and traveling-between-layers, done in the past, before human factors overshadowed the natural influences altering the world's climate? Understanding that is crucial to understanding how our current period of climate change compares to or contrasts with climate changes attributable to natural cycles, which itself is crucial to crafting our personal, national and societal responses to the problems of anthropogenic global warming.

Furthermore, there is something instructive in how Americans and Europeans in the early 19th century viewed weather, climate and the Earth, a lesson that we can take from them. The environmental consciousness popular during the Cold Decade was holistic in the sense of how people saw disparate events as related to each other, all part of a unified system in which an occurrence in one part of the world had a noticeable effect somewhere else. There are many examples of this thinking from the Cold Decade. A representative one, found in a newspaper editorial from the Year Without Summer, hypothesized that the great Lisbon earthquake of 1755 was somehow the beginning of a great process of change within the Earth which manifested itself among other things in the weather anomalies of 1816.[49] Put another way, when viewing weather and climate, the people of the Cold Decade could see the forest for the trees. This view is somewhat alien to our 21st-century conception of science, which relies upon a vast universe of hyper-specialized disciplines steered by credentialed experts in very narrow subjects, a conception that has been influenced heavily by the explosive development of technology. When experts from numerous disciplines agree upon the general direction of a trend, such as greenhouse gas warming, it is the fact of their consensus that impresses us and moves us to consideration and action.[50] If we considered the Earth and its atmosphere in a more holistic and unified way, instead of peering at it through the compound eye of compartmentalized institutional science, we might be quicker to appreciate the changes in related ecosystems and indeed the global nature of our current environmental problems.

[49] *Camden Gazette* (Camden, SC), September 12, 1816, 1.

[50] This is one reason why modern global warming deniers are so enamored with arguments asserting "there is no consensus" among scientists that the Earth is warming due to human activity.

Our advancements in institutional science since the 19th century have greatly increased our society's appreciation for minute scientific detail, but it may have dulled our senses when it comes to recognizing broader changes.[51]

The span of time between 1809 and 1820 was a period of cataclysm, catastrophe, instability and unprecedented environmental upheaval. It manifested itself in violent, explosive and unmistakable events, like Dowers's account of the Soufrière eruption, or a similar account by a Briton of the February 1814 eruption of Mt. Mayon in the Philippines which describes ten days of darkness and a rain of volcanic ash falling 12 yards deep on nearby islands.[52] It touched people's lives and livelihoods during ten thousand cold nights, like the ones in late August 1816 in Massachusetts that killed ripening crops with hoar frost.[53] It came in the form of drought, like the severe dearth of rain in County Armagh, Ireland in the spring of 1817 when the ground was so hard it had to be broken with mallets and the act of drawing plows through the stiff earth was so exhausting for horses that some dropped dead in the fields.[54] These things happened, and yet people still went about their daily business as they always had, noticing what the weather and climate was doing, perhaps not always understanding, but adapting as best

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51 Conevery Bolton Valençius makes a similar argument regarding the specialization and professionalization of science blinding experts to more experiential ways of understanding natural phenomenon, by studying the example of the development of seismology in the late 19th and early 20th centuries. Valençius, *Lost History*, 252-59.

52 "Volcanic Eruption," *The Naval Chronicle for 1815: Containing a General and Biographical History of the Royal Navy of the United Kingdom* XXXIII (Jan.-June 1815): 287-88.

53 *Boston Independent Chronicle*, August 26, 1816, 2.

54 William Lodge Kidd, Journal 1806-1818, Vol. 13, April 20, 1817, Huntington Library Manuscript Collection, Huntington Library, San Marino, CA.

they could. None exhibits this dogged determination greater than the account of a Wakefield, New Hampshire farmer, describing a neighbor by the name of Allen who began to plow his fields the day after a considerable snowfall toward the end of May 1818.[55] The human world did not stop for the anomalies of the Cold Decade. It could only adapt to them.

The Cold Decade, then, presents a curious mix of the momentous and the mundane, dramatic episodes like the blast of volcanoes and slightly incongruous ones like New England farmers plowing spring fields amidst snow flurries. It happened at the break of dawn of our modern industrial scientific world, a moment of pause as one conception of Western society began to metamorphose into another. Sometimes the events of the Cold Decade fit well into people's constructions of the world they lived in. At other times their worldviews required significant revision and recalibration to make sense of them. But people were always trying to understand, to define and exert some measure of control over the broader layer, always seeking to pull it closer to the local layer they knew and understood. This dissertation is the story of how some people made that attempt, what resulted from it and why it matters—not merely to those who lived through these events, but to we who live two centuries later.

[55] Clark Diary 1817-1829, Vol. 2, May 1818, American Antiquarian Society, Worcester, MA.

# CHAPTER III

## "A MORE SUDDEN AND VIOLENT CHANGE"

In New England, the first winter of the Cold Decade appeared at first unusually mild. The people of Massachusetts, New Hampshire, Vermont and similar environs tended to measure winters in terms of how many days in a given winter they could travel from place to place by sleigh, and how rough the ride was. In 1809-10 there had been few such days, if any, in most places. On Thursday, January 18, 1810, farmers near Portsmouth, New Hampshire were said to be plowing their fields and a thermometer in the vicinity recorded an afternoon temperature of 42° Fahrenheit. A light rain fell that evening. Then, suddenly and ominously, a bitterly cold wind began to blow from the south and the temperature plunged. By dawn it was seven degrees below zero, a startling 49-degree decline in less than twelve hours.[1]

The coming of the sudden Arctic front, and the event that would be marked in New England memory for years to come as the "Cold Friday" of January 19, 1810, was documented in Portsmouth by one Charles Peirce, who wrote down the readings of his thermometer. The mercury continued to plunge throughout Friday, reaching –13° at three o'clock in the afternoon and sinking even lower by the next morning. Other observers and recorders of weather phenomena were equally busy, and their records told much the same story: a thermometer in Brunswick, Maine registered a 51-degree change between noon on January 18 to the morning of January 19; another thermometer at Middlebury, Vermont hit –13.5°; barometers were also striking in the low 29-inch range, indicating

[1] Ludlum, 179.

severe low pressure as the gale tore through most of New England.[2] A weather watcher in Cheshire County, New Hampshire later told a newspaper:

> [A]t 11 o'clock on the morning of the 18th inst. the thermometer in a N.W. room, no fire in the adjoining rooms, stood at 51° above 0—at 10 o'clock on the morning of the 19th day, 8° below 0—at 11 o'clock 12° below—63° difference in temperature.[3]

In some parts of New England, the plunging temperature and howling gale were not the only environmental enemies to contend with. At Worcester, Massachusetts, retired publisher Isaiah Thomas recorded the cold weekend in conjunction with an ongoing outbreak of disease:

> [January 20, 1810]. Thermometer 10 degrees below 0. The cold was extreme from one end of the United States to the other, Lee remarks in the Newspaper. The wind so forcible as in some places to unroof houses—some barns were blown down, & Boston harbor frozen over. Several persons died with the spotted fever at Dana in this country.[4]

Many people across the region perceived the cold and wind as extreme, so much that finding a match with past events in the memories of old-timers were largely impossible. A Massachusetts farmer wrote that Friday the 19th was "extremely cold, as scarcely ever known."[5] Leonard Hill of East Bridgewater, Massachusetts, a weather watcher who kept meticulous weather records for an astonishing 63 years, wrote: "The

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2 Ibid., 179-80.

3 Ibid., 180 (quoting *New Hampshire Sentinel* (Keene, NH), January 27, 1810).

4 Thomas, Diary [unpublished version], January 20, 1810, American Antiquarian Society, Worcester, MA.

5 John Eliot, John Eliot Annotated Almanacs 1779-1813, January 19, 1810, Massachusetts Historical Society, Boston, MA.

last twelve days [of January 1810] coldest ever known in New England. Number of people frozen to death. Four in Plymouth County."[6] The *Essex Register* of Salem, Massachusetts noted, "The extraordinary contrast between the fine weather of the season, and the violence of this wind and cold, induced many to consider it as a more sudden and violent change than had been recorded in the history of our atmosphere."[7]

It is impossible to know how many people died in the cold snap. Many observers, like Leonard Hill, reported hearing of local deaths but a regional or national total is hard to estimate. A story from Sanbornton, New Hampshire involving three young children who froze to death after the wind ripped the roof off their house was originally published in the *New-Hampshire Patriot* in February and was reproduced in other papers so often—and unusually so for a story of a non-political event—that today it would be considered to have "gone viral." The tale of the Ellsworth children's deaths became a sort of folklore in New England, repeated amongst families who huddled together on other cold nights for years afterwards.[8]

Indeed it is the impression in New England's collective memory that marks the Cold Friday as an especially noteworthy event in American weather history. The meteorological nature of the cold air mass and its wide geographic distribution resulted in unusually homogenous readings in all parts of New England, meaning that nearly

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6 Leonard Hill, *Meteorological and Chronological Register, Comprising a Record of the Weather, With Especial Reference to the Position of the Wind, and the Moon on the Occasion of Sudden Changes, Untimely Frosts &c., From a Personal Diary of the Author from 1806 to 1869* (Plymouth, MA: Moses Bates, 1869), 25.

7 *Essex Register* (Salem, MA), January 24, 1810, 2.

8 Ludlum, 181, 268.

everyone in the region experienced the same thing at the same time.[9] This widespread shared experience provided a common basic benchmark against which New Englanders could measure future extreme cold weather events. This they did. When another cold snap struck much of the area seven years later, Robert B. Thomas's *Farmer's Almanac* remarked that "it was ascertained to be several degrees colder than the Cold Friday [of 1810]."[10] Susan Heath, a pious teenager from Brookline, Massachusetts, compared a cold day in January 1813 to "the cold Friday two or three years ago," and four years later during the 1817 event she noted, "The weather was a few degrees colder than the Cold Friday so long celebrated as an extraordinary day."[11] As late as the 1850s Cold Friday still surfaced in retrospectives on the severest weather events of the 19th century.[12]

Ordinary people perceived the 1817 freeze as more severe than Cold Friday, but newspapers often printed specific data to prove it. The *Providence Gazette and Country Journal* asserted that the mercury fell to –10° F, or "9 degrees colder than the *cold Friday*, January 19, 1810,"[13] while the *Boston Daily Advertiser* printed a letter from one J. Farrar declaring February 14, 1817 as the coldest day of the past quarter century—an assertion supported by a table of temperature readings Farrar took on seven of the coldest

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9 Ibid., 180.

10 Robert B. Thomas, *The Farmer's Almanac, Calculated on a New and Improved Plan, for the Year of Our Lord 1818* (Boston: West & Richardson, 1817).

11 Susan Heath Diary 1812-1874, Vol. II, January 30, 1813, Massachusetts Historical Society, Boston, MA; Ibid., Vol. VI, February 14, 1817.

12 Ludlum, 180 (quoting J.H. Lefroy, "On the winter of 1851-52 in Canada," *The Upper Canada Medical Journal*, 1-2 (May 1852), 47-48).

13 *Providence Gazette and Country Journal* (Providence, RI), February 22, 1817, 3.

days (as he experienced them) stretching back to 1792. Five of the seven, including January 19, 1810, were during the Cold Decade.[14]

While certainly the severity of the January 1810 cold weather event was evident without any sort of empirical measurement to back it up, the fact that observers like Farrar, Charles Peirce, Isaiah Thomas and Leonard Hill *had* the data to support a common perception about the weather is an important one. These men of New England did not merely rush to check their thermometers when a weather event of perceived uniqueness occurred. They kept readings more or less every day, some recording their observations in elaborate and formal terms, others more loosely and sporadically. This was a common enough pastime in Europe and early America, but it is during the second decade of the 19th century—the era of strange weather ushered in by New England's Cold Friday—that the activities of the weather watchers showed most starkly the way people conceived of the planetary environment around and above them, and what that world-building meant.

[14] J. Farrar, "Letter to the Editor," *Boston Daily Advertiser*, February 18, 1817, 2.

# CHAPTER IV

# THE WEATHER WATCHERS

During the Cold Decade many people across the United States, Europe and other parts of the world were watching the skies. Though sky-study and the observation of weather has been a part of the human experience for literally all of its history, the practice of weather watching began to change significantly in the 16th century and especially the 17th century with the coming of technological devices, principally the barometer and thermometer.[1] By the beginning of the 19th century these devices and others were commonly used by ordinary people, who were not necessarily identified (by themselves or others) as scientists, to quantify and record the goings-on in the atmosphere around them. Weather watching had a long tradition; between 1809 and 1820, however, there was an especially spectacular show to watch.

Certain people who watched the skies left behind a telling and instructive record that gives us a glimpse into environmental consciousness during the Cold Decade. It is these people whom I term, for purposes of this study, “weather-watchers”: individuals, usually white men of middle- or upper-class education and socioeconomic status, who kept systematic written records of weather over a significant period of time, using technological means as well as direct observation, and who expressed some sort of thoughts, theories or interpretations of what they recorded. They generally did not self-identify, nor were they usually viewed by others, including historians, as professional

[1] W.E. Knowles Middleton, *The History of the Barometer* (Baltimore: The Johns Hopkins University Press, 1964), 19-32, 55-82, 338-43.

scientists. The term “weather watchers” or “storm watchers” is often applied to observers of weather phenomena, whether or not they self-identified as scientific or meteorological professionals.[2] My use of the term “weather watchers” in this study is generally evocative of these approaches, with a few important boundaries. What I term weather watchers are people defined largely by what they did—observe and record the weather for a significant period of time and in some systematic fashion, however imperfectly—and not by the status they held or how they were viewed by others. I emphasize the performative aspect as a boundary to distance the subjects of this study from the idea of a scientific elite that suggests professionalism. In discussing any scientific endeavor in the 1810s, an era before specialized scientific institutions in general, where one draws the line between “amateur” and “professional” scientists is largely arbitrary, but deemphasizing the perception of weather watchers as scientists places them in a context in which the ways they were representative of the larger population is easier to observe. The expression of thoughts and theories on weather data, at least some form of interpretation or rumination, is another key boundary. Thermometers and barometers hung on the walls of countless American and European homes between 1809 and 1820 and many people wrote down weather conditions on a daily basis, but it is the interpretation and the parsing of meaning of what these observations told their owners that demonstrate the anatomy of environmental thinking in this period.

The weather watchers of the Cold Decade, as I define them, exemplify the conception of the environment as existing in two distinct layers, the local and the broader. Being enthusiastic observers and record-keepers of weather and climate events, the

[2] *See, e.g.,* Cox.

weather watchers, whose observations began on the local level, sought to categorize, theorize, measure, explain and tame the broader layer by extrapolating from their local observations systems, theories or implications that purported to explain how weather and climate worked—often on a planetary scale. They did this because, though not really members of a professional scientific class as we conceive of it today, they shared scientific conceptions of the predictability, rationality and empirical knowability of the natural world, fully congruous with the intellectual traditions of Enlightenment science. The weather watchers generally believed the world was capable of being reduced to a set of theories which, if understood and applied correctly, might have significant applications for weather and climate prediction. They believed the potential benefits of these theories were virtually self-evident. The weather watchers' attempts to engage and define the broader level of the environment had real-world consequences because it helped address, however incompletely or unsuccessfully, a growing demand among the public for meteorological and climate understanding. This demand was spurred to a significant degree by the weather and climate anomalies of the Cold Decade, and may have been amplified by cultural and political developments that occurred at the same time.

Weather watchers were certainly not unique to the Cold Decade. Setting aside weather study occurring before the development of instrumentation, observers and recorders of weather phenomena were quite active, for example, in Britain and on the European continent from the middle of the $17^{th}$ century and through the Enlightenment. Many of the Enlightenment-era weather watchers, however—like John Locke or Petrus van Musschenbroek—tended to be natural philosophers who sought weather data specifically as a means to illustrate the functioning of broader natural laws.[3] The Cold Decade was different in two respects relevant to the context in which weather watchers operated. First, meteorology was in a transitional phase in the 1810s, moving from the traditional qualitative and descriptive approach of the Early Modern period toward a new emphasis, first advocated by science writers at the end of the 18th century, on quantitative measurement and the understanding of empirical data.[4] If the general intellectual trajectory of classic Enlightenment weather watchers was to start from the broad (natural laws) and filter down to the local (weather conditions that demonstrated them), the weather watchers of the 1810s went in the opposite direction: they started with the local (the weather around them) and gradually moved to understanding the broad (the patterns they thought they perceived in their weather data, or the reasons they kept it).

The second significant difference between the classic Enlightenment weather watchers and those of the 1810s has to do with the audience they were addressing. Weather and meteorological observation prior to the early 19th century had been a subject largely confined to the purview of an intellectual elite. Some weather watchers of the 1810s, like Thomas Jefferson, were clearly seen as members of this elite, but unlike previous observers the weather watchers of the early 19th century had a new potential audience: the public. George Mackenzie, for example, was never seen as part of the scientific establishment and he explicitly intended his theories for the benefit of the public, as we will see; he worked alone, as many weather watchers did, and had little use

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3 Lorraine Daston, "Unruly Weather: Natural Law Confronts Natural Variability," in *Natural Law and the Laws of Early Modern Europe*, ed. Lorraine Daston and Michael Stolleis (Burlington: Ashgate, 2008), 233, 237-40.

4 Janković, 158-64.

for the opinions of others who might (with a stretch) be termed colleagues.[5] Thus, the Cold Decade offered the first real chance for weather and climate to break out of the realm of elite discourse and become subjects of interest to the general public. The events of the 1810s themselves were in part responsible for this new potential audience.

The best way to understand the weather watchers and their understanding of environmental consciousness is to examine some case studies, profiling practitioners of this unique art and attempt to understand why they did so. The four case studies presented here—Thomas Jefferson, George Mackenzie, Luke Howard and Thomas Ignatius Maria Forster—exemplify the tradition of weather watchers in the 1810s, and the written records they left behind provide a unique, clear and compelling testament to why they did what they did and what greater goals they hoped their labors would serve. As our first entrée into the realm of the dual-layered environmental consciousness as it operated on the ground (or in the skies) during the Cold Decade, the personal experiences of these particular weather watchers can tell us much about how they and their peers sought to explore, define and understand the broader environmental layer, and the consequences of their attempts to engage it.

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5 In our own day, insular experts working alone is recognized as one of the hallmark characteristics of pseudoscience. Gregory N. Derry, *What Science Is and How it Works* (Princeton, NJ: Princeton University Press, 1999), 162. In the early 19th century the procedure of peer review was loose, rudimentary and by no means universal, but many writers and thinkers in natural sciences did tend to engage each other in an attempt to reach some form of consensus via comparative conversation about ideas. *See, e.g.,* "Polar Ice, and a North-West Passage," *Edinburgh Review* XXX, no. LIX (1818) (compiling a potpourri of theories and book reviews on a given scientific subject, in this case, the characteristics of polar ice). It would clearly be anachronistic to label the kind of Cold Decade weather watchers profiled in this chapter as "pseudoscientists," while regarding more esteemed and careful scientific lights—Alexander von Humboldt comes to mind—as "true scientists," but, that having been said, some of the intellectual practices of the weather watchers have certain commonalities with persons we would today regard as practitioners of pseudoscience.

Profile: Thomas Jefferson

On March 12, 1809, eight days after the inauguration of his successor as President of the United States, Thomas Jefferson left Washington, D.C. on horseback with two slaves in tow. The weather was snowy and disagreeable. The journey back to Monticello, just under a hundred miles as the crow flies, took four days, considerably longer than usual. Jefferson's frequent long absences from Washington and national affairs in the final years of his second term were a sign of his eagerness to return to his plantation and the pastoral life he imagined for himself as a gentleman farmer.[6] With James Madison now safely ensconced in the President's house—and the political, commercial and foreign policy problems occasioned by rising tensions with an increasingly belligerent Great Britain now Madison's responsibility—the world of Jefferson's day-to-day concern was shrinking back to the predominantly local boundaries with which he preferred to define it. Yet his ever-observant mind and insatiable curiosity continued to project beyond these boundaries, particularly where matters of climate and environment were concerned.

Jefferson left the Presidency deeply in debt, as he had been most of his adult life. His marriage to Martha Wayles in 1772 brought property and slaves—including the Hemings family with whom he would be so intimately and famously involved—but also a crushing $4,000 share of her father's debts which continued to plague him long after her death and almost until his own. Debt was a hereditary condition of Virginia tobacco farmers, which Jefferson readily acknowledged; he and the other planters were in a

[6] Thomas Jefferson, Weather Book, 33, Massachusetts Historical Society, Boston, MA; Andrew Burstein & Nancy Isenberg, *Madison and Jefferson* (New York: Random House, 2010), 471.

relationship akin to feudal vassalage with the British merchants who bought and moved their crops.[7] Jefferson's own profligate spending habits made matters much worse. His bill for wine alone during his Presidential years exceeded $9,200.[8] Before leaving Washington he had borrowed another $8,000 to pay off bills incurred during his administrations. Now without remuneration for public office, crops from his plantations were his only feasible prospect of income.[9] Consequently, the climate and environmental conditions affecting his crops were deeply intertwined with Jefferson's financial security and indeed his sense of identity. Viewing himself as a gentleman farmer, surrounded by books, accoutrements of science and other Enlightenment pursuits as well as by the family, both white and enslaved, that he now had to provide for, Jefferson's world was now largely dependent upon the physical environment it occupied. The day-to-day conditions of this environment were never far from his mind or his pen.

Early in his presidency, on November 1, 1802, Jefferson began recording daily weather readings and conditions in a small diary. He typically took readings from a household thermometer at sunrise and again at three o'clock in the afternoon, to which he added notations of the direction of the wind and often a short statement of the weather on the day in question. Frequently he also recorded agricultural and horticultural events such as the blossoming of flowers or, quite particularly, the days of the year on which

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7 Barbara McEwan, *Thomas Jefferson: Farmer* (Jefferson, NC: McFarland & Co., 1991), 42.

8 Thomas Jefferson, *Jefferson's Memorandum Books: Accounts, with Legal Records and Miscellany, 1767-1826*, ed. James A. Bear, Jr. and Lucia C. Stanton (Princeton: Princeton University Press, 1997) II:1115-17.

9 Fawn M. Brodie, *Thomas Jefferson, An Intimate History* (New York: W.W. Norton & Company, 1974), 430.

particular commodities became available. For instance, he noted that crabs appeared at market in Alexandria for the first time in 1803 on June 5, though their appearance was rumored two weeks earlier. He wrote down in his weather book nearly every weather event that had a significant effect on his crops or garden yields, such as frosts, unusual rains or drought conditions.[10] Taken as a whole, his weather book crystallized into a record not only of the environmental history of Monticello and his various other farms—most notably Poplar Forest, his retreat—but also its economic history.

Jefferson had the misfortune to return home to his plantation and his smaller day-to-day world just as the decade-long upheavals in the world's climate began. If the eruption of Mountain X had occurred by the time he left Washington, its effect on the climate had not yet begun in earnest. His remarks on the weather in the first seasons of his retirement were not significantly inconsistent with those of previous years. Late in the spring of 1809 he purchased a rain gauge, with which he fussed incessantly in his quest for observational accuracy. He recorded precipitation out to the fourth decimal point and wrote almost apologetic notes upon realizing the gauge leaked when not attended to.[11] The rain gauge became the beloved object of Jefferson's passion for scientific gadgets and an outlet for his fastidious compulsion to memorialize the physical world around him.

The weather diary that Jefferson began in 1802 was far from his first foray into weather watching. Jefferson's interest in weather and climate stretched back nearly three decades. His intellectual interest in the subject was sparked by the scientific contributions

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10 Jefferson, Weather Book, *passim*.

11 Ibid.

of French naturalist Georges Louis Leclerc, better known as the Comte de Buffon, the publication of whose mammoth 44-volume treatise *Histoire Naturelle* began in 1749 and was not completed until Jefferson was President. Buffon was regarded as one of the great scientists of his age and Jefferson no doubt became well-acquainted with his work early on, as most learned Americans did.[12] One of Buffon's many theories involved a comparison of the climates of the New World and the old, which explicitly involved a value judgment: Europe's animals and people were larger and better-developed than those of America, which was a direct result of their respective climates. Buffon argued that the New World's fauna was stunted and degenerate, "Nature [was] weaker, less active," and "inert."[13] By the late 1770s Jefferson, then deeply embroiled in the political and ideological project of the American Revolution, was eager to refute Buffon's theories of climate inferiority, and he began amassing both data and cooperative allies to help build a scientific case against the Frenchman. Among these allies was James Madison. In the spring of 1784 Jefferson wrote to Madison encouraging him to keep a weather diary at his Virginia estate, Montpelier, noting temperature in the morning and evening, wind direction and general weather conditions.[14] Even before this, in 1778, Madison and

12 Edwin T. Martin, *Thomas Jefferson: Scientist* (New York: Henry Schuman, 1952), 150-53.

13 Daniel Druckenbrod, Michael E. Mann, et al., "Late-Eighteenth Century Precipitation Reconstructions from James Madison's Montpelier Plantation," *Bulletin of the American Meteorological Society* 84 (2003), 58 (quoting Buffon, G.L.L, Comte de, *Histoire Naturelle, Générale et Particulière* VI (Paris: Cadell and Davies, 1812), 237).

14 Ibid., 57-58.

Jefferson had cooperated in making the first simultaneous meteorological observations in America, from Monticello and Williamsburg, for a period of about six weeks.[15]

Jefferson's climatological quarrel with Buffon led indirectly to his own inauguration into the fairly small circle of American scientific elites. Sparked partly by the quest for data to refute Buffon's theories and partly by an inquiry from French diplomat François Marbois into the climate of each of the new 13 United States, Jefferson began collecting observations on his native state, which were ultimately published in 1785 as his famous *Notes on the State of Virginia.*[16] The publication resulted in Jefferson receiving worldwide attention as a scientific thinker and writer in addition to a political and ideological figure.[17] On the last day of that same year, 1785, Jefferson finally met his rival face-to-face for dinner. The meeting, and the nature of the rivalry for the next two years, focused their attention mostly on natural specimens. In 1787 famously Jefferson presented Buffon with the preserved skeleton of a moose, which helped convince the Frenchman that his theories might be wrong. Buffon promised to make corrections to his *Histoire* in the next edition but died before he could do so.[18] Jefferson's victory over

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15 Fleming, *Meteorology,* 9.

16 Druckenbrod, 58-59. Jefferson was originally reluctant to publish his notes for political reasons, because he included within them statements on the eventual abolition of slavery in Virginia. This reluctance seems to have faded by the time he arrived in Paris as American minister. He first published a limited excerpt of his notes in Paris, mainly to distribute to his friends so they could advise him on whether to publish the entire work. They—mainly Madison—did, and his book received wide publication, in America and Europe, shortly thereafter. Ibid., 59-60.

17 Martin, 140.

18 Druckenbrod, 60. The moose and other animal specimens that Jefferson had shipped to France from America—at considerable expense—were relevant to Buffon's climate theories because the latter often insisted that certain American animals were simply pygmy versions of European ones. For instance, Buffon maintained that the mammoth was an inferior version of the Eurasian elephant. The issue was the size and scale of fauna. Martin, 187-89.

Buffon—if it can be called that—was rooted in science, but the stakes were political, at least for Jefferson. If the New World had an "inferior" climate to that of the old, the new United States could never be the equal of any European nation in its stature, clout or accomplishments. Buffon's theories were not merely a threat to scientific truth but to a significant ideological underpinning of the American Revolution, that being the idea that an independent American nation could (and should) stand on its own without the tutelage of Britain or other European powers.

Though evidently conceived at first as a weapon against Buffon, *Notes on the State of Virginia* exposes some of the subtler aspects of Jefferson's environmental thinking, chief among them that climate was changing. "A change in our climate," he wrote, "is taking place very sensibly," and he went on to discuss his perception that the harshness of both summers and winters in Virginia had been moderated since earlier Colonial times—a proposition for which Jefferson could credit as evidence only the memories and testimony of the elderly as to what past seasons were like.[19] Jefferson's continued belief in climate change is evident in a letter he wrote in December 1809 to Nathaniel Chapman, a Philadelphia physician, student of Benjamin Rush, and fellow (with Jefferson and Madison) of the American Philosophical Society. "[T]he change which has taken place in our climate is one of those facts which all men of years are sensible of, & yet none can prove by regular evidence," he told Chapman. "They can only appeal to each other's general observation for the fact." After describing his own recollections of the depths of snow in long-ago Virginia winters, Jefferson drew from his

[19] Jefferson, "Notes on the State of Virginia" (1785), in *The Portable Thomas Jefferson*, ed. Merrill D. Peterson (New York: Penguin Books, 1975), 119-21.

weather diary comparisons on the depth of snowfall in a few of the winters he had chronicled while President—notably 1802-03 and 1808-09—but noted that his own meteorological record-keeping was potentially compromised in its usefulness to answering a larger question about what was happening to climate by the gaps occasioned by the distractions of his long periods of public service.[20]

Why, if Buffon had been "defeated," and who was long since dead in any event, did Jefferson continue to keep his weather data as meticulously as he had before? The key passage from Jefferson's weather diary disclosed Jefferson's aspiration that his observations might have some scientific use, and also elucidated a justification for his efforts. He wrote:

> It is a common opinion that the climates of the several states of our Union, have undergone sensible change since the dates of their first settlements; that the degrees of both cold and heat are moderated. The same opinion prevails as to Europe; and facts gleaned from history give reason to believe that since the time of Augustus Caesar, the climate of Italy for example has changed regularly, at the rate of 1° of Fahrenheit's thermometer for every century. May we not hope that the methods invented in later times for measuring with accuracy the degrees of heat and cold, and the observations which have been, and will be made and preserved will at length ascertain this curious fact in physical history?[21]

Jefferson's views on climate change were doubtless influenced by those of his friend Hugh Williamson, noted North Carolina physician, fellow revolutionary and, like Jefferson, a dabbler in Earth sciences. In 1770 Williamson presented to the American Philosophical Society a paper in which he argued that the likely cause of climate change

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20 Thomas Jefferson to Nathaniel Chapman, December 11, 1809, *The Papers of Thomas Jefferson: Retirement Series*, ed. J. Jefferson Looney (Princeton: Princeton University Press, 2005) II:71.

21 Jefferson, Weather Book, 83.

in North America was human activity, especially deforestation and development associated with agriculture. He repeated his theory in his 1811 book *Observations on the Climate in Different Parts of America, Compared with the Climate in Corresponding Parts of the Other Continent* (meaning Europe). Williamson envisioned his book on climate as the preface to a work on North Carolina that was that state's equivalent to Jefferson's *Notes on the State of Virginia*, and his climate argument did Jefferson's ruminations on climate change one better by adding a specifically anthropogenic dimension:

> As the surface of the country is cleared, a greater quantity of heat is reflected; the air becomes warmer, and the north-west winds are checked in their progress. It is generally admitted, that in Massachusetts and New-Hampshire, the quantity of snow that fell, during the winter, fifty years ago, was more than double of what has fallen, in any winter, for several years past….The face of cultivated lands, in the summer season, is frequently warmer than the surface of the ocean, in the same latitude…[22]

Jefferson seems to have been less concerned than Williamson with the agency of climate change—and clearly believed it possessed a global dimension, where Williamson's primary interest was the condition of North America—but he definitely approved of Williamson's climatology. In the letter to Nathaniel Chapman, written two years before *Observations on the Climate* was published, Jefferson made reference to the earlier climate change work done by Williamson for the American Philosophical Society. Jefferson and Williamson were correspondents and friends for three decades, and shared various scientific interests, including a fascination with paleontology and natural history. When Williamson died in 1819 Jefferson publicly praised his scientific erudition and

[22] Williamson, 9-10; George Sheldon, *Hugh Williamson: Physician, Patriot and Founding Father* (Amherst, NY: Humanity Books, 2010), 54-55.

recommended his writings to the public. Their theories of climate change—the moderation of seasons, decrease in snow cover and cold events, and likely anthropogenic in causation—were, if not completely congruent, closely aligned.[23]

The key passage in Jefferson's weather book is evidence both of his environmental consciousness and how he sought to act upon it. The specific data in the weather diary concerns conditions in Jefferson's immediate surroundings, Monticello and Poplar Forest, but his interest in weather and climate events transcended local conditions. In his summation he referenced climate change in both the United States and in Europe. For him there was obviously a connection between these realms: what happened in Virginia was part and parcel of a larger process that, if one had enough points of data to look at, could be observed on a national or even global scale. This was the construction of the layers, local and broad. The statement in the summation expressing hope that "methods invented in later times" could quantify and prove the theory of climate change was more than just an idle hope. Jefferson's own history of weather watching indicates that he thought the activity of recording weather data was germane to a larger scientific end. While compared to other weather watchers—like Mackenzie or Forster—Jefferson can be said to have taken only a small step toward fashioning his data into some sort of explanatory tool for larger climate processes, he did seem to think the keeping of such records and particularly the calibration and summation of them were of scientific use.

How Jefferson ordered his scientific thinking has been a subject of historiographical debate. Robert A. Ferguson argued, principally on the basis of *Notes on*

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[23] Thomas Jefferson to David Bailie Warden, March 21, 1815, *The Papers of Thomas Jefferson: Retirement Series*, ed. J. Jefferson Looney (Princeton: Princeton University Press, 2011) VIII:604 n.; Sheldon, 252-53.

*the State of Virginia*, that Jefferson's thinking was not truly in line with concepts of natural history prevalent in the late 18th century, and that his approach was more informed by law and legal thinking than science or natural history—citing principally Jefferson's "admission[s] of an incomplete answer" to various scientific questions as evidence of his disengagement with natural history.[24] Pamela Regis disputed this, arguing that Jefferson employed a dual conceptualization of nature, informed in part by law and also by natural history as it was understood at the time.[25] Essentially this debate seems to be about whether Jefferson thought more like a scientist, or more like a lawyer. With regard to his survey of weather and climate, I see little evidence of legal thinking on Jefferson's part, but his engagement with science and natural history seems consistent with the approach he took in *Notes on the State of Virginia*—indeed, his weather book is a direct continuation of processes and inquires he began there. Yet in weather matters, as with other subjects of natural history he covered in *Notes*, Jefferson readily admitted gaps in knowledge or information. These admissions are, Regis argued, consistent with the contemporary responsible practice of natural history.[26]

Thus Jefferson's weather watching cannot be dismissed simply as one of the many intellectual dalliances that occupied his restless Enlightenment-oriented mind. Jefferson cared about winds, rains and atmospheric disturbances because his crops and

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[24] Pamela Regis, *Describing Early America: Bartram, Jefferson, Crèvecoeur, and the Rhetoric of Natural History* (DeKalb, IL: Northern Illinois University Press, 1992), 85 (quoting Robert A. Ferguson, *Law and Letters in American Culture* (Cambridge, MA: Harvard University Press, 1984)).

[25] Ibid., 85-86.

[26] "A responsible practitioner of natural history admitted ignorance rather than supplying erroneous information." Ibid., 85.

livelihood depended on them. But he kept readings in his weather book also because he hoped that such data could help prove as scientific fact the global climate change he was convinced for the majority of his life was occurring. Lurking behind this desire was perhaps a bit of vanity: though he was certainly a weather watcher, Jefferson may have wished also to have a hand in unlocking the secrets of climate's inscrutable patterns.

Judging from the weather book the first full year of Jefferson's retirement brought with it challenges and comforts, but environmentally it seems to have been unremarkable. As had happened with Washington after his retirement to Mt. Vernon, streams of visitors called upon him at Monticello, some staying for weeks, chipping away at Jefferson's privacy and his always-precarious financial situation. He began to escape the public fishbowl of Monticello by retreating to the newer estate at Poplar Forest ninety miles away. He may also have used the less public plantation at Poplar Forest to apprentice his children by Sally Hemings, to whom he had promised their freedom, for trades they would need in their post-emancipation lives. His weather diary continued to fill with records from both Poplar Forest and Monticello.[27]

The summer of 1810 was notably cool in Virginia. Typically frost sometimes appeared as late as May or as early as mid-September. In 1810, frosty nights lingered into June, and then reappeared in the deep summer. Though evidently not seen at Monticello or Poplar Forest, Jefferson recorded news of frost at Amherst and Buckingham, Virginia on August 29. The frosts that began to creep through Jefferson's grain and tobacco fields

[27] Brodie, 431; Annette Gordon-Reed, *The Hemingses of Monticello: An American Family* (New York: W.W. Norton & Co., 2008), 615-18.

in September heralded a winter that, several months later, he noted as unusually harsh. "We have had a wretched winter for the farmer," he wrote to Madison on March 11, 1811. "[G]reat consumption of food by the cattle and little weather for preparing the ensuing crop." He noted there had been seven snowstorms that winter up to that date, the worst of them depositing 15 inches of snow in Richmond. Frosts persisted into May.[28]

Several anomalous seasons followed, and Jefferson paid attention to disturbances both above and below ground. A series of earthquakes beginning in December 1811 centered around New Madrid, in Missouri territory, were the center of newspaper accounts and conversation all over America, and earth tremors were generally believed to be linked somehow to weather and atmospheric phenomena.[29] Madison wrote his friend in February 1812 complaining of "a hard winter and much ice," and then noted that "the re-iterations of earthquakes continue to be reported from various quarters…There was one here [Montpelier] this morning…rather stronger than any preceding one."[30] Still, the oddities of the 1812 season, which included snow on the Blue Ridge mountains in May, were overshadowed by manmade calamities. When Madison signed the declaration of war against Great Britain in late June, the resulting loss of access to British markets—always shaky and intermittent in the embargo and trade wars that preceded the actual hostilities—further imperiled Jefferson's financial situation. Previously he had hoped that

[28] Jefferson, Weather Book, 43-44; Thomas Jefferson to James Madison, March 8, 1811, *The Papers of Thomas Jefferson: Retirement Series*, ed. J. Jefferson Looney (Princeton: Princeton University Press, 2005), III:437.

[29] *See, e.g.,* "Observations on Earthquakes," *The Port-Folio*, May 1812, American Periodicals 421.

[30] James Madison to Thomas Jefferson, February 7, 1812, *The Papers of Thomas Jefferson: Retirement Series*, ed. J. Jefferson Looney (Princeton: Princeton University Press, 2007), IV:480.

the 1812 tobacco and wheat crops would enable him to overcome his debts at last. War and the environmental havoc of the Cold Decade ensured otherwise.[31]

Drought was the disaster that seemed the most calamitous. The year 1813 saw no rain at Monticello from April to September except a small shower in May, and Jefferson, who frequently compared present seasons to a catalogue of weather superlatives he recalled, believed this drought was the worst since 1755. His desiccated wheat and corn crops came in at a third of their ordinary volume. He had to sell his wheat flour, bottled up by the wartime blockade, to local farmers at a fraction of its usual price. To William Short, a friend and frequent creditor, he recalled the 1755 drought where many died of famine. "The wheat was killed by the drought as dead as the leaves of the trees now are," he wrote in November 1813.[32] Madison too suffered from the drought at Montpelier, describing "the prospect in our Corn fields becoming desperate."[33]

Desperation was exactly the condition to which Jefferson was reduced over the following year. With parched fields, short crops that could not be sold overseas and little hope of crawling out of debt on agricultural produce alone, one of Jefferson's intellectual assets offered a temporary lifeline: his books. After the British ravaged Washington, D.C. in August 1814, destroying various public buildings including the President's mansion, Jefferson offered his private library of about 6,000 volumes as a replacement for the

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[31] Burstein, 504.

[32] Thomas Jefferson to Patrick Gibson, October 6, 1813, *The Papers of Thomas Jefferson: Retirement Series*, ed. J. Jefferson Looney (Princeton: Princeton University Press, 2009), VI:544, Thomas Jefferson to William Short, November 9, 1813, *The Papers of Thomas Jefferson: Retirement Series*, ed. J. Jefferson Looney (Princeton: Princeton University Press, 2009), VI:605.

[33] James Madison to James Monroe, August 16, 1813, *The Papers of James Madison, Presidential Series*, ed. Angela Kreider (Charlottesville, VA: University of Virginia Press, 2008), VI:531.

Library of Congress. Once the requisite political wrangling was done he realized $23,950 on the sale, considerably lower than the books would have fetched at auction. Almost all the money went to William Short and another creditor. And still his profligate ways continued. He began buying books again almost as soon as his shelves were empty.[34]

The war was over, but the privations of the Cold Decade were about to reach their climax, granting Jefferson little relief. Along with nearly everyone who turned their gaze skyward in the strange year of 1816 Jefferson watched the weather anomalies with almost rapt astonishment. To the repeated scourge of drought was added unseasonable cold, killing frosts and strange storms and cold snaps. As he went about his now habitual measurements with the rain gauge and thermometer Jefferson, as always, compared the season to past anomalies in his own memory and those of his neighbors—and found this year in a class by itself. "We have had the most extraordinary year of drought & cold ever known in the history of America," he proclaimed to Albert Gallatin in September 1816, probably intending no hyperbole. The summer had brought less than a third of its usual amount of rainfall, and frosts in every summer months, including especially severe ones in August, wreaked havoc on his wheat, corn and tobacco. As with 1813, the horrors of 1755 were foremost in his mind. "My anxieties on this subject are the greater, because I remember the deaths which the drought of 1755, in Virginia, produced from the want of food." Perhaps his only comfort was that his experience at Monticello was by no means exceptional. Jefferson's friend and sometime diplomat Thomas Appleton concurred that the season of 1816 "has been the most extraordinary one, Remember'd by the oldest & most observing farmer." The high temperature for the summer was 75 degrees

[34] Brodie, 430-31.

Fahrenheit; wheat was "middling," corn was "blasted" and "the greatest part of our grapes have dropp'd from the vines…[s]o that our wine will be dear, and of a very different quality."[35]

The end of the extraordinary year 1816 found many people who watched weather and climate taking stock of what had happened as well as measures to try to explain it. In December 1816, Jefferson received a circular from the Philadelphia Society for Promoting Agriculture, of which he was a member, asking the public to provide the Society with "facts relating to Agriculture and Horticulture…through the extraordinary season of 1816, and particularly the effects of Frost on vegetation." Specifically, the Society wanted to know how frost affected leaves and crops, and whether insects that preyed on plants were more or less numerous during the anomalous season. Jefferson's reply, if any, is not recorded, but he would have had plenty of data to give them if he wished. He recorded local frosts at least ten times in the spring and summer months of 1816, the most severe of which happened on August 22 and 29, killing potatoes and squash; damage to corn and tobacco was not far behind. He was also watching weather anomalies beyond Monticello and Virginia. He recorded the extraordinary Northeast snowstorm of June 6-7, noting "snow in Canada & Vermont 12. to 18. i. deep," probably gleaned from newspaper accounts. He also wrote down that there was snow in Vermont in August just before the terrible frosts in Virginia and elsewhere. There is no doubt these

[35] Thomas Jefferson to Albert Gallatin, September 8, 1816, *The Papers of Thomas Jefferson: Retirement Series*, ed. J. Jefferson Looney (Princeton: Princeton University Press, 2013), X:379; Thomas Appleton to Thomas Jefferson, September 27, 1816, *The Papers of Thomas Jefferson: Retirement Series*, ed. J. Jefferson Looney (Princeton: Princeton University Press, 2013), X:411-12.

events concerned him, both as a farmer trying to make a living and a scientific observer of environmental phenomena.[36]

Something—perhaps the Philadelphia Society circular, perhaps the severity of the weather anomalies, or his advancing age—spurred Jefferson to action at the end of 1816 and the beginning of 1817. He made the final daily entries in his weather book on December 31, 1816, having kept then more or less faithfully for the past fourteen years. He then made attempts to synthesize the data he had collected into some form that he hoped would be usable for the study of climate change. He drew a table of the average number of days in each month in which particular winds prevailed, spanning 3,905 observations between January 1810 and December 1816. His purposes in doing so pushed in several expansive directions, such as understanding of health and disease. "It will be for physicians," he wrote, "to observe the coincidences of the diseases of each season with the particular winds then prevalent, the quantities of heat, rain, etc." Another table, culling down the observations of his beloved rain gauge, reported mathematical averages of the frequency of rainy days and the amount of rain received in the season; he also tallied cloudy versus "what astronomers call observing days in the week" for the purposes of seeing celestial events. On these summation pages, most likely written in the early days of 1817, Jefferson was offering his own observations as examples of "estimate[s] of the climate"—essentially, how to model climate behavior based on a number of empirical indices.

[36] Philadelphia Society for Promoting Agriculture to Thomas Jefferson, November 13, 1816, *The Papers of Thomas Jefferson: Retirement Series*, ed. J. Jefferson Looney (Princeton: Princeton University Press, 2013), X:526; Jefferson, Weather Book, 77-80. Jefferson was not a voracious reader of newspapers; in fact he read only one, the *Richmond Enquirer.* During the spring and summer of 1816, this paper frequently carried articles on weather anomalies and commentary on the season in general, which Jefferson doubtless saw. *See, e.g., Richmond Enquirer* (Richmond, VA), September 28, 1816, 3.

> [A]nother estimate of the climate…may otherwise be made from the advance of spring as manifested by animal & vegetable subjects, the earliest harvest day, of their 1st appearance…the natural season of the vegetables is here noted, and not the artificial one produced by hotbeds, glasses, etc. which…would not be a test of [nature] separately…Another index of climate may be sought in the temperature of the waters issuing in the deepest of the reservoirs…"[37]

Jefferson ultimately did not contribute his weather book to the Philadelphia Society, or provide it to anyone else for the purpose of utilizing his research. His failure to do this seems puzzling at first glance, but it is indicative of a responsible approach, in terms of natural historical method, as identified by Pamela Regis: an acknowlegement of incomplete information and gaps in knowledge that still remained to be filled.[38] Perhaps after browsing his 14 years of data Jefferson felt in the final analysis that it wasn't worth much, as he wrote to Nathaniel Chapman in 1809. Maybe he simply assumed that any scientific data the weather book could provide was best left to the cataloguers and biographers who would no doubt mine his famous papers after his death. Or perhaps he intended to but simply never got around to it.

Jefferson's efforts, however incomplete, to quantify climate change and lay the groundwork for a scientific understanding of it represented his attempt to reach out and grab the broader environmental layer, to pull it closer and tame it through the application of science and reason—a classic Enlightenment idea wholly consistent with Jefferson's character. Among the weather watchers profiled in this chapter he was the least proactive, satisfying himself with observing, recording and calibrating, and expressing some general

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[37] Jefferson, Weather Book, 82-84.

[38] Regis, 85.

thoughts of the utility of these actions. In this respect he seems more like the traditional Enlightenment-era weather watchers who did little with their observations other than the intellectual exercise of trying to connect them, often unsuccessfully, to larger theories of natural laws.[39] Yet there are more subtle connections between Jefferson's weather and climate interests and the newer breed of weather watchers that were arising during the Cold Decade. It should be kept in mind that Jefferson was at this time in retirement, regarding his active participation on the stage of national and intellectual affairs—with one major exception, the University of Virginia—as largely concluded. Jefferson is useful therefore as a sort of bridge figure, connecting prior intellectual and scientific traditions to modern practice that was relatively new in the 1810s.

It is these connections that represent the real-world consequences of Jefferson's engagement with the broader environmental layer. One of these connections, as I have noted before, was with James Madison, a fellow weather-watcher who shared Jefferson's enthusiasm for the subject in the 1780s. Another and more important one, which also involved Madison and was more firmly rooted to the Cold Decade, was with Josiah Meigs, former professor of mathematics, natural philosophy and astronomy at Yale, and President of the newly-created Franklin College in Athens, Georgia, which was eventually to become the University of Georgia. Meigs was a dedicated Democratic-Republican from staunchly Federalist New England. Jefferson seems to have known his family but not Meigs himself, though certainly he knew him by reputation. Jefferson wrote to Madison in the fall of 1812 that "[I] have always heard him highly spoken of as

[39] Daston, 237-40.

a man of science."[40] After Meigs left Franklin College he wrote to Jefferson asking him for a recommendation to the President for a federal job. Jefferson obliged and ultimately Madison appointed Meigs Surveyor General for the Northwest Territory, working out of Ohio.[41] A friendly correspondence sprang up between Jefferson and Meigs, with the latter promising to visit Jefferson at Monticello in the summer of 1815, though it is unknown whether the meeting actually took place.[42]

Meigs was himself a weather watcher, and one of the newer breed of weather watchers who was advancing the field of meteorology during the Cold Decade. He had begun keeping weather readings while practicing law in Bermuda in the early 1790s, but by the latter half of the Cold Decade—when he was commissioner of the General Land Office and in a position of authority—he was ready to take the step Jefferson never did, which was to translate a pattern of observation into scientific action. Meigs advocated a federal policy whereby employees of federal Land Offices in various parts of the United States would keep uniform and systematic meteorological observations, very similar to the ones Meigs himself had been keeping for years, ultimately to be compiled into "Meteorological Registers" which, as I will show, were becoming much more popular and common in the 1810s. Meigs first proposed this scheme to an influential member of

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40 Thomas Jefferson to James Madison, Monticello, October 2, 1812, in *The Papers of Thomas Jefferson: Retirement Series,* ed. J. Jefferson Looney (Princeton: Princeton University Press, 2008), V:372.

41 Thomas Jefferson to Josiah Meigs, Monticello, October 27, 1812, *The Papers of Thomas Jefferson: Retirement Series,* ed. J. Jefferson Looney (Princeton: Princeton University Press 2008), V:417.

42 Josiah Meigs to Thomas Jefferson, Washington, D.C., February 16, 1815, *The Papers of Thomas Jefferson: Retirement Series,* ed. J. Jefferson Looney (Princeton: Princeton University Press, 2011), VIII:273.

Congress in February 1817.[43] Congress did not pass the resolution he wanted, but Meigs tried to get the observation regime going himself, issuing a circular to all Land Offices in April 1817 requesting the keeping of meteorological records and providing blank forms for the purpose. Though participation was voluntary, many offices did keep records and provide them to Meigs. Occasionally he published some of the results, and weather/climate historian James Rodger Fleming regards Meigs's Land Office regime as a significant step in the development of American meteorology.[44]

The subject of Meigs's weather watching was known and shared by James Madison, Jefferson's frequent correspondent. Sometime in 1818 Meigs forwarded copies of some of his observations to Madison, by then retired at Montpelier. Madison wrote back to Meigs complimenting the work, and noting:

> Experiment and comparison are the two eyes of Philosophy, and the use you are making of them, promises a more than curious light on some of the laws & phenomena, of our climate. If your correspondents could be relied on for industry & accuracy, your table might be enriched by observations on other features of it.[45]

Another important correspondent in the circle was Daniel Drake, a physician, geographer and nearly full-time booster of the state of Ohio. In 1815 Drake, who will be profiled more fully in Chapter XII, published his *Natural and Statistical View, or Picture of Cincinnati and the Miami Country*, which contained significant material on weather

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43 William M. Meigs, *Life of Josiah Meigs* (Philadelphia: Private Printing, 1887), 82-84.

44 Fleming, *Meteorology*, 17-19.

45 James Madison to Josiah Meigs, October 3, 1818, *The Papers of James Madison, Retirement Series*, ed. David B. Mattern (Charlottesville, VA: University of Virginia Press, 2009), I:364.

and climate of the Ohio Valley region. Meigs, a close friend of Drake, forwarded a copy of this book to Thomas Jefferson in March 1816, who read and greatly enjoyed it.[46] It was to Drake that Meigs boasted in 1817 of the potential of his Land Office meteorological plan: "[W]e may in a course of years know more than we shall be able to know [about weather] on any other plan."[47]

I stress these connections—Williamson to Jefferson to Madison to Meigs to Drake—because from them emerges a picture of a "pool" of environmental thinking and practice, from which each of them drew something a little different but within which there is significant conceptual commonality. This is not to say that all of these men had identical conceptions of how climate and the environment worked, but the reader will notice that each of them appears in this dissertation in a different role: Jefferson, Madison and Meigs were weather watchers, Williamson was an arguer, Drake a doctor and a traveler. Most of them could fit in multiple categories. Jefferson was the largest fish in this pool, being the most publicly prominent and, thanks to *Notes on the State of Virginia*, the most scientifically well-respected. His environmental consciousness was shared and mirrored in many ways by the others with whom he corresponded and worked. His synthesis of his own weather data, and his views on what was needed to prove the theories of climate change that he shared with Williamson and others, represented his

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[46] Josiah Meigs to Thomas Jefferson, Washington, D.C., March 1, 1816, in *The Papers of Thomas Jefferson: Retirement Series,* ed. J. Jefferson Looney (Princeton: Princeton University Press, 2012) IX:526; Thomas Jefferson to Josiah Meigs, April 7, 1816, *The Papers of Thomas Jefferson: Retirement Series*, ed. J. Jefferson Looney (Princeton: Princeton University Press, 2012), IX:647.

[47] Fleming, *Meteorology*, 17.

attempt to reach out and tame the broader layer, but it was primarily for others like Meigs to translate that effort into action.

The final years of the Cold Decade brought little succor to Jefferson, environmentally or financially. The winter of 1816-17 was harsh, and in many places climate anomalies during 1817 were every bit as severe and strange, and sometimes more so, than the previous year. The price of tobacco spiked in 1816, hitting a high of nineteen cents a pound, but then declined for the rest of the decade. He held out hopes that each succeeding year's crops would be better but he still could not climb out of debt. Two projects, personal and professional, brightened his moods. The first was the famous correspondence with John Adams, begun in early 1812 at the request of their mutual friend Benjamin Rush. The second was his work to establish the University of Virginia, a process that engaged Jefferson's interest in education, Enlightenment thought, administration, politics and architecture.[48]

By this time Jefferson's weather-watching activities were tapering off and much of his correspondence concerned reminiscences with Adams and business involving the university. Yet his own financial prospects continued to decline. Following the environmental ravages of the Cold Decade, the final ignominy was man-made: the Panic of 1819 which saw the failure of most Virginia banks and permanently ended any hope that Jefferson would get out of debt in the short remainder of his lifetime. In that year,

[48] McEwan, 49; Brodie, 455; Burstein, 566-73.

now aged seventy-six, Jefferson turned over responsibility for his financial affairs to his grandson, Thomas Jefferson Randolph.[49]

Jefferson survived for only a few years beyond the end of the Cold Decade, and by the end of his life watching the weather was no longer a priority. His indelible debts and worsening physical illnesses ultimately consumed him. By 1824 Monticello was shabby and tattered from want of funds to repair and maintain it and from the constant traffic of hundreds of visitors. The interior rooms had not been repainted since Jefferson was in the White House; much of the furniture was junky and unusable. The slaves, particularly those related to him by blood or marriage, nervously awaited the end, probably suspecting that their master's death would result in a posthumous feeding frenzy of his creditors that might displace them from the little mountain on which they'd lived most of their lives.[50]

In one of the most famous coincidences in American history, Jefferson breathed his last on July 4, 1826, the fiftieth anniversary of the Declaration of Independence, and the same day on which John Adams died. Curiously, for all the multitudes of romantic repetitions of the famous double-deathbed story, virtually none contain any reference to the weather at Monticello on that day. Most likely it was warm and humid, simply because Virginia usually is in early July, and as was Jefferson's practice the windows of

[49] Brodie, 455-57.

[50] Merrill D. Peterson, *Thomas Jefferson: A Reference Biography* (New York: Charles Scribner's Sons, 1986), 443; Gordon-Reed, 645-51.

his bedroom were probably open to admit the breezes toward the bed in the alcove where he died. The day of his funeral, July 5, was said to be rainy.[51]

Profile: George Mackenzie

On November 1, 1802, exactly the same day on which Thomas Jefferson began keeping his own weather diary in Virginia, an eccentric Scotsman also commenced taking systematic weather observations and writing them down. It happened at a farm called Cyderhall, near Dornoch, in the county of Caithness in the far north of Scotland. The observer, George Mackenzie, was then a tacksman—a leaseholder of an estate, treated as a sort of minor nobleman—and earned his living by farming at Cyderhall. It is not known when his interest in meteorology began, but certainly by 1802, when he was 25, it was developed enough to motivate him to become, like Jefferson, a weather watcher and almost obsessive chronicler of atmospheric events.[52]

The choice of date was significant. Mackenzie would later argue that November 1 was the date on which the weather was the most "equal," meaning "the only day which divides the east and west wind, exactly equal upon both seasons." As his work progressed over the years he would later come to regard November 1 as the beginning of the

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[51] Paul Wilstach, *Jefferson and Monticello* (New York: Doubleday, Page & Co., 1925), 210; Virginia Scharff, *The Women Jefferson Loved* (New York: HarperCollins, 2010), 375; for traditional "romantic" accounts of Jefferson's death, *see* Henry Randall, *The Life of Thomas Jefferson* (New York: Derby & Jackson, 1858), III:545. Likely the weather is not addressed because the most usual account of Jefferson's death watch, that of his physician Dr. Robley Dunglison—the source of Jefferson's quote "Is it the Fourth?," ubiquitous in every account of his death—does not mention the weather.

[52] George Mackenzie, *The System of the Weather of the British Islands; Discovered in 1816 and 1817 From a Journal Commencing November 1802* (Edinburgh: William Aitken, 1818), 3-5; Gordon Goodwin, "George Mackenzie," *Oxford Dictionary of National Biography* <http://www.oxforddnb.com/view/article/17584> (visited February 28, 2017).

"weather year." Indeed he believed so strongly in the significance of the date that he declared "the elements were originally set in motion about this day. Chronologers, therefore, have been wonderfully near the truth, in giving 23d October as the probable date of creation."[53]

Mackenzie continued keeping his weather observations through the years, noting particularly wind speed and direction, the length of rains, and temperature. At some point he entered into a legal dispute with the factor managing Cyderhall and decided to give up farming. As the Napoleonic Wars were then raging, he joined a local militia, the Caithness Volunteers, and in May 1809 was commissioned as a lieutenant in the Royal Perthshire Militia. He retained this position until the militia was disbanded after the wars, being retained on staff with a pension. He then settled more or less permanently in Perth. He continued to keep readings at the various places in which he was stationed, usually Perth or Edinburgh, but also Plymouth, Leith, Dover and occasionally London. His observations formed a rich record of weather in the British Isles during the early years of the 19th century. He began writing a hefty tome about the weather in Britain, evidently consisting mostly of his opinions and observations drawn from his records. Then, in the final stages of completion of his manuscript, came the strange wet summer of 1816, which imparted upon George Mackenzie the discovery that he believed both defined his life and would secure his place in the history of science.[54]

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[53] Mackenzie, *System*, 6.

[54] Ibid., *passim*; Robert Fittis, *Illustrations of the History & Antiquities of Perthshire* (Perth, UK: Constitutional Office, 1874), 115-16.

Mackenzie, who spent most of that summer in Perth, now had nearly fourteen years of observations upon which to ruminate, but the weather anomalies at the climax of the Cold Decade befuddled him. "Summer 1816 came," he wrote, "and…its character was such, that [I] could not resist making an attempt to find out the cause of such severe changes." With newspapers and popular culture full of talk of potential causes—everything from sunspots to the divine judgment of God—he had plenty of candidates to choose from. Discarding external factors, Mackenzie believed the explanation lay somewhere in the data that he had already observed. He convinced himself that the weather contained observable cycles, different perhaps in their exact manifestations from year to year, but similar enough to be predictive of future weather—if only such patterns could be discerned.[55] A year later, on July 12, 1817, after poring over his wind data, Mackenzie believed he discovered the answer: the directions of the winds and the counts of the days on which they blew from each quarter formed a 54-year cycle, same the world over. This answer came to him in a sudden and emotional flash of insight, a true Eureka moment that he saw as an exclamation point in the history of science:

> When the 54-year-course of the lots of the winds was discovered, it so overcame the author that he instantly left his work, and scampered over the country for three days like a person bereft of his wits…The feat of the discovery of the cycle was accomplished in the Fair City of Perth, which will ever be distinguished on this account…[N]ot only will Perth be this distinguished [but] the British Empire itself will deem it no small honour to have the problem of the weather solved within its bounds.[56]

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55 Mackenzie, *System*, 3-5.

56 Fittis, 91 (quoting George Mackenzie, *Elements of the Cycles of the Winds, Weather, and Prices of Corn* (London: Newbery, 1846)).

Now convinced that he had divined a world-shaking answer to "the problem of the weather," Mackenzie set immediately to work revising his weather manuscript to explicate and deliver into the hands of an eager public the 54-year cycle he claimed to have discovered. The result, published in Edinburgh in 1818, was a book entitled *The System of the Weather of the British Islands; Discovered in 1816 and 1817 from A Journal Commencing November 1802*. The "System," as Mackenzie referred to it, was an infallible method of predicting long-term weather trends. Modesty seldom tempered Mackenzie's estimation of its importance, and his lofty pronouncements of his own discovery were frequently couched in nationalistic terms. "[The System] will not only distinguish Britain among nations," he proclaimed in the closing pages of the book, "but it will also excite the admiration and gratitude of the rest of the world, towards this favoured country, through all succeeding time."[57] To Mackenzie it was self-evident that the System he'd divined not only solved the enigma of the Cold Decade anomalies, but constituted the central feature of an entire branch of science which today we might call climatology.

Mackenzie's System was far from simple or obvious. In fact it was virtually incomprehensible to anyone but him. He admitted as much: in a later discussion of the System he warned somewhat condescendingly that it could not be understood "without a degree of attention which casual readers are seldom inclined to bestow."[58] The original 1818 version was rife with graphs and charts, and virtually all of Mackenzie's assertions depended heavily upon averages and mathematical calculations of weather days. He

57 Mackenzie, *System*, 224.

58 Fittis, 117.

believed, not unreasonably, that the key to unlocking patterns of climate lay in the study of winds.

Mackenzie classified each day in the weather year, which lasted from November 1 to October 31, according to the prevailing directions of its winds. If a wind blew east consistently during a day, he classified that as a day of east wind; if west, it was a day of west wind; if he recorded both east and west winds over the course of a day, or if at any time the winds shifted to northerly or southerly winds, he classified it as a "variable day." His years of data told him that each year had an average of 216 days of westerly winds and 135 days of easterly winds. The ratio of these averages was Mackenzie's ultimate baseline, and each individual year was measured against it, resulting in its declaration as an "excess" or "deficiency." A year with more easterly than westerly winds than the baseline ratio called for was an *Excess East* and a *Deficiency West*; the reverse, an *Excess West* and *Deficiency East*. He also counted the number of successive years in which there were excesses and deficiencies, so, two years in a row of prevailing east winds on average would be a *Double Deficiency West*. Mackenzie also counted days of rain. Less than three hours of rain in a day marked it as a "short rain," between three and seven hours a "moderate" rain, and more than seven a "heavy" rain day. From these classifications evolved the curious vocabulary Mackenzie used throughout his work, in which he repeats phrases like "wet cold summer," "mild wet winter" and "extreme dry" (used as a noun, as in, *winter 1803-04 is an extreme dry*). He also spoke of "storms," which usually meant wind excesses that lasted several years in succession; winter 1812, for instance, was the "second winter of a storm."[59]

[59] Mackenzie, *System*, b-xxv, 10, 69, 71-72.

To Mackenzie the most important feature of his System, and the one on which he expected to be judged favorably by history, was the repeatability of the 54-year cycle. Double deficiencies and excesses, storms, extreme wets and mild drys followed in a pattern as predictable as the phases of the moon. Of this he seemed certain: "[T]he weather of one 54 years, is the same as the weather of the next 54 years, or any other 54 years corresponding in the order of the series." Yet this did not mean that every individual point-source weather observation would correspond exactly to the same point-source observation taken exactly 54 years later—that, for example, because an unusual snowstorm occurred in Vermont on June 7, 1816, the System thus prognosticated that a snowstorm could be expected in the same place on June 7, 1870. The excess and deficiencies of the winds would naturally vary during an individual year, breaking any correlation between specific times and places. Put another way, he argued that the average weather patterns for the year 1816 as a whole, measured as he did in terms of excess/deficiency, dry/wet and mild/severe, would correspond to those for 1870 as a whole. "It must therefore become desirable," Mackenzie wrote, "to ascertain how far one revolution of the system of the weather corresponds with another in every particular." He expected that future weather observations would work out this wrinkle.[60]

This point—that weather patterns should be judged against each other on an annual aggregate as opposed to specific local conditions—is an important one, because it demonstrated the key feature of Mackenzie's contribution: the synthesis of *weather* into *climate*. Mindful that weather conditions are always fickle, Mackenzie sought to elevate

[60] Ibid., xxv, 5-6; David Brewster, "An Account of the System of the Weather of the British Islands, Discovered by Lieut. George Mackenzie," *Blackwood's Edinburgh Magazine* IV (October 1818-March 1819): 86.

his System beyond a purely local and temporal experience to one that relied on aggregates, averages and trends. He was confident that the system worked, but only when one was thinking bigger than the atmospheric conditions over a single farm field on a single day:

> It is to be observed…that every year to come of one revolution of the System given by the averages, being new cases, the utmost exactness of determining the weather is not to be expected, but only the general result; and it may happen at times, when the state of the wind is quite unusual, that it will be somewhat difficult to anticipate the consequence.[61]

Less logical, but equally illustrative of Mackenzie's synthesis of weather into climate, was his response to the potential objection that the weather observations from which he divined his System were taken at various places around the British Isles in an inconsistent pattern, or similarly that, even if reliable for explaining the weather in Scotland, the System might not be of much use in determining climate patterns in, say, the Bay of Bengal. Mackenzie boldly argued that the System was the same all over the world, which would naturally mean that the location where point source data was taken is irrelevant.[62] He reached this conclusion with no evidentiary support, nor did he attempt to explicate his reasoning why climate models from Caithness and Perth, Scotland were sufficiently representative of the global climate; but again, in thinking broadly instead of locally, Mackenzie demonstrated the same sort of dualistic environmental worldview of weather and climate that undergirded Jefferson's contemporaneous weather-watching efforts in Virginia. A simple Scottish tacksman bringing in his crops at Cyderhall would

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[61] Mackenzie, *System*, xxv.

[62] Ibid., 5-6.

naturally be concerned with the environmental conditions that would most affect his fields, but Mackenzie sought to demonstrate that weather readings taken on this local scale—the small world of the farmer—had a direct relationship to a truly global system, the larger world of climate.

Mackenzie's example therefore demonstrates the dual-layered environmental worldview in action. The point-source weather readings with which Mackenzie obsessed himself came from the local layer of Cyderhall, Scotland or the British Isles. His synthesis of his readings into a grand System was his attempt to reach out and pull in the broader layer, and quite literally to define and tame it through the application of ratios and patterns. Mackenzie believed that local conditions were quite literally mirrored in macrocosm the world over, and his failure to articulate any evidence why this was so is itself evidence of how strongly he held this environmental worldview. It is a position he asserted mainly on faith. Jefferson at least expressed doubts and recognized the paucity of empirical evidence to prove his theories of climate change. Mackenzie had no doubts whatsoever as to how his construction of planetary weather and climate functioned, and especially that he alone had divined its patterns and unlocked its secrets where all others had failed.

What were Mackenzie's motivations for his effort to explain and tame the broader layer? If the blustery hyperbole of his book can be taken at face value, he seems to have wanted to solve the "problem of the weather" and go down in history. Part of his motivation was to explain the strange anomalies of the Year Without Summer, which links Mackenzie's environmental consciousness to the Cold Decade in a uniquely explicit way. Beyond this, however, one must ask the question why Mackenzie felt there was a “problem” that needed a comprehensive resolution. He felt there was a significant gap in human understanding of weather and climate processes: a void that more traditionally-recognized scientists were failing to address. In *The System of the Weather* Mackenzie did not directly address scientists, other weather watchers or anyone else who might have been studying meteorological phenomena—other than, as we have seen, to demand their recognition of his genius—nor did he make an argument that his own competence in weather watching was superior to anyone else’s. But it is clear he believed there was a public demand for better understanding of weather and climate, and that demand had not been met by the discoveries and progress made up until 1817.

Mackenzie carefully chronicled the weather anomalies of the Cold Decade. The middle portion of *System of the Weather of the British Islands* is full of his year-by-year observations, noting the character of the seasons and weather events within them that he found particularly significant. Like other weather watchers his gaze was not limited to meteorological phenomena but also took in celestial events, crop yields and earthquakes, assuming that all were intertwined. “The thunder appeared in December,” he wrote of the winter of 1810 in Edinburgh, “and was particularly severe…and other electric appearances alarming. The signs are always numerous and significant when great changes are about to take place.” Eighteen-twelve, the second severe winter of what he called a multi-year storm, demonstrated to him “the perfect consistency of the weather; it never contradicts itself.” He would later write that the summers of 1812 and 1816, both abnormally cold, resembled each other. He continually watched the Aurora Borealis, believing they portended both cold snaps and wind changes. A rare earthquake, occurring in Perth in August 1816, occasioned an unusually detailed description of the event itself, full of heaving floors and tottering candlesticks. He took special care to note the wind, rain and barometric readings during the day following the tremor.[63]

Retrospectively applying his System to 1816, the most severe manifestations within the Cold Decade, Mackenzie claimed that it would have been entirely predictable in advance. He recorded the summer of 1815 as "wet, mild, calm, cloudy." According to the System:

> [A] wet summer is always followed by a frosty winter, consequently the summer after will be cold, which is a never failing effect in a winter storm. The excess east indicates another wet summer, which, with the threatened cold, and great comminution of the elements, will make it a remarkable season.[64]

That the strangeness of the conditions of 1816 and 1817 were pivotal to Mackenzie in his quest to discover the System is plain. It seems that in the late summer of 1816, while he was completing his original book on the weather, he regarded that year as especially telling: "The latter years [1815-16] are exactly opposite in character, in every particular, to the years at commencement of Journal [1802], which shows that an entire revolution has taken place in the seasons." Yet in a footnote to this statement Mackenzie admitted that it was written "before the exact order and rules of the revolution of the wind and…seasons was discovered." Of the harsh winter of 1816-17, Mackenzie stated, "The calculations which led to the discovery of the System, were undertaken at the

63 Ibid., 69, 76, 83, 96, 100-01.

64 Ibid., 92.

commencement of this season, in consequence of the extraordinary summer preceding."[65] Though he was already thinking in terms of cycles and "revolutions" prior to the exceptional summer, his discovery of the exact 54-year System that he regarded as his great accomplishment was a direct response to the severity of the anomalies he observed during that year.

As the effects of volcanic climate change began to diminish in the final years of the decade Mackenzie seemed to perceive a gradual return to what others—but perhaps not Mackenzie himself—might term normality. In 1818 he wrote, "As last year has been termed the link between the stormy and settled weather, the present season forms the same connection between the cold and the mild." Frost that winter was slightly above average, but did not approach the peaks in cold winters. As his book was published in 1818 it lacks observations for the final two years of the Cold Decade. Mackenzie wrote a summation of climate trends for the entirety of the period of his observations since 1802. Eighteen-nine, the beginning of the Cold Decade, fell in the second year of what he termed the "Second mild Course." A "Second Cold Course, and Winter Storm, two Years"—a stormy, cold period—began in November 1810 and continued through summer 1812. This was followed by "Third mild Course, three Years" (winter 1812-winter 1815), consisting of one frosty winter and two wet summers. The peak of the anomalies he termed "Third cold Period, two Years," lasting from spring 1815 to summer 1817. Of the decade he judged 1817 to be the coldest year he observed.[66]

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65 Ibid., 101-09.

66 Ibid., 128-32. In a subsequent (1821) edition of *The System of the Weather of the British Islands*, which does include data post-1818, Mackenzie characterized the period after 1818 as a "Mild Course" lasting several years. George Mackenzie, *The System of the Weather of the British Islands* (Perth, UK: R. Morison, 1821), 143.

Curiously, Mackenzie made no significant effort to support his claims about the System by reaching into the past. It was true that no proof of the System could be found in past weather records unless daily readings of wind direction and duration were detailed enough to enable comparison via Mackenzie's exacting mathematical ratios of easterlies to westerlies. But if, as he claimed, "the weather of one 54 years, is the same as the weather of the next 54 years," it is difficult to understand what stopped him from pursuing anecdotal examples—of which early 19th century weather-watchers were exceedingly fond—that might give at least colorable support to this claim. If, for example, 1817 was the coldest summer of the 54-year cycle then in progress, one would expect that the summers of 1763, 1709, 1655, 1601, 1547, etc. would also be remarkably cold. Records of this nature were not difficult to find, especially in Europe, even going back to the Middle Ages; often whether a particular season was abnormally warm or cold was the only extant record of distant years.[67] Though not conclusive by any means, anecdotal mentions of cold summers or harsh winters could have lent a patina of credibility to the System, especially if Mackenzie could point to similarities of seasons within 54-year windows. If he ever attempted to find such records, however, no trace made it into his finished works.

Instead, Mackenzie was content to sit and wait for future developments to prove him right. He anticipated not only that future weather watchers would collect the data on wind speed and duration that would validate the System—though he admitted "it will take ages to come"—but also that his discovery would eliminate uncertainty about many

[67] Short informal records of this nature were kept many places in Europe, especially areas of wine cultivation. A notable example was Baden, Germany, whose seasonal weather records going back to the 11th century were compiled together in the 20th. *See, e.g.,* Karl Müller, *Geschichte des Badischen Weinbaus* (Schauenberg, Germany: Lahr im Baden, 1953).

aspects of the physical world, and in fact usher in a new era of peace and friendship among nations. He also believed the public owed him gratitude and accolades for having taken the trouble to discern the System "deduced from a laborious and even painful calculation."[68] What Mackenzie lacked in modesty he made up for in self-assurance. Jefferson, who began keeping his own weather records the very day that Mackenzie began his "laborious" observations at Cyderhall, was self-deprecating about the potential value of his work; Mackenzie sang his own praises from the rooftops in a confident baritone. Despite the sense from surviving accounts that Mackenzie cut a vaguely ridiculous figure on the streets of Perth, especially in his later years, one cannot read *The System of the Weather of the British Islands* and be left with any doubt that Mackenzie genuinely believed in the absolute infallibility of what he thought he'd discovered, and he patiently waited for the world to acknowledge it.

The consequences of Mackenzie's attempt to pull in, explain and tame the broader environmental layer were doubtless not what he expected. Critical and public reaction to *The System of the Weather of the British Islands* was ultimately dismissive, although there were promising signs at first. David Brewster, noted Scottish physicist and scientific historian, took on the tome in *Blackwood's Edinburgh Magazine*, a periodical that often covered scientific subjects, in the fall of 1818. More of a summary of the confusing System than an analytical evaluation, Brewster competently provided a capsule description of the System that was considerably more concise and understandable than Mackenzie's own turgid prose. Because the System could not be proven for another 54

[68] Mackenzie, *System*, 224; Fittis, 118.

years—and because it was not as simple as comparing the weather in one specific place to the weather in the same place 54 years previously—Brewster concluded somewhat reservedly that "diligent and careful observation" of future weather was the only way to know whether Mackenzie was right, and recommended that the discovery be "candidly and carefully examined."[69] The subsequent (1821) version of Mackenzie's book, revised and updated, was presented favorably to the English Board of Agriculture and the French Academy of Sciences; the latter reportedly charged Alexander von Humboldt to write a report on it. Nothing ever came of these brief accolades, and if Humboldt ever read the book, no written comment from him regarding it has survived.[70]

Other reviewers did not reach so far as Brewster in trying to find something positive to say. An anonymous reviewer in *The British Critic* was sarcastic and blunt about finding the System to be utterly nonsensical: "As we are very far from understanding either the conclusions at which [Mackenzie] has arrived, or the steps which he has trodden in his passage to them, our readers would probably be more perplexed than we ourselves, if we attempted to explain them." This sentiment ultimately proved the dominant reaction to the System. Needless to say, this reaction was something less than the coronation as the Isaac Newton of climatology that Mackenzie evidently expected.[71]

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69 Brewster, 84-87.

70 James Woods, *Elements and Influence of the Weather: Defence of the Cycle of the Seasons, Including a Brief Memoir of the Late Lieutenant George Mackenzie, of the Perth Royal Militia, with a Synopsis of His Discoveries in Atmospheric Phenomena* (London: Hodson & Sons, 1861), 5-7.

71 "Art. VII, The System of the Weather of the British Islands," *The British Critic, New Series* XVII (January-June 1822): 511; Woods, 8-9.

Mackenzie's significance, and why he mattered to the development of meteorological science on the ground, is much less about the direct influence of his own work—which was negligible—but rather his status as a particularly egregious example of a group who operated upon the fringes of science, retarding—in the views of some—rather than advancing the cause. Well-meaning as they may have been, the weather watchers were, in the view of many scientific writers, not helping matters. In a lengthy article in 1818, dealing with several weather- and climate-related issues, the scientific magazine *Edinburgh Review* seemed to be speaking directly of weather watchers, and particularly those like Mackenzie who spun from their data elaborate webs of unsupported theory. The anonymous author of the article lamented:

> Every person possessing a slight tincture of physical science, conceives himself qualified to speculate concerning the phenomena of weather, in which he feels a deep interest; and hence, a very flimsy and spurious kind of philosophy, however trifling and despicable it may appear in the eyes of the few who are accustomed to think more profoundly, has gained currency among certain classes of men, and engendered no small share of conceit. Meteorology is a complex science, depending on so many subordinate principles, that require the union of accurate theory, with a range of nice and various observations, as to have advanced very slowly towards perfection.[72]

In this passage the *Edinburgh Review* was not merely chiding overeager weather watchers and their Systems. The implicit argument was one in favor of institutionalization, or at least some form of gate-keeping function. It is also an explicit recognition of what Mackenzie recognized implicitly: a void existed in the understanding of this important science, and where learned professionals found themselves stymied by meteorology's complexities—unlike physics or other better-studied branches of science,

[72] Brewster, 5.

weather conditions could not be reproduced in a laboratory—the void in understanding was eagerly filled by unqualified amateurs who were doing the science no real good. Anyone with a barometer, a rain gauge and a thermometer could consider himself a meteorologist. As cogent as this argument was, however, the *Edinburgh Review* ignored the reality of meteorology as a science: in a discipline lacking institutions and credentials, everyone who practiced it was, by definition, an amateur. This point should be kept in mind later in this chapter, in which I will address in greater depth the issue of the void in meteorological understanding and how it related to growing public demand for meteorological data and analysis during the Cold Decade.

Mackenzie and others like him, therefore, provided a negative example for more well-regarded scientific researchers to avoid. As meteorology continued through its transition, especially during the Cold Decade, the gadflies like Mackenzie were probably impossible to avoid, and that they would arise from the class of enthusiastic weather watchers armed with basic instruments of measurement seems inevitable. Mackenzie stands as an especially clear and well-documented example of how weather watchers constructed their environmental worlds, and also a common way in which people of the early 19th century sought to understand and tame the broader environmental layer.

Despite the cold public and scientific reception to his work, Mackenzie was undaunted either in his enthusiasm or his certainty that the System worked. He continued taking weather readings and circulated in Perth various “Reports” and “Manuals” of the weather. By the late 1820s he had taken to utilizing the System to its fullest natural effect by predicting the weather for a specific year. His *Manual of the Weather for the Year*

*1830*, published in 1829, was less an almanac than an attempted proof of the System, stating in detail the weather the System predicted for each month of the year with primary attention given to the direction and intensity of the winds. Turning from analysis to prophecy gained Mackenzie no new advocates. The *Dublin Literary Gazette* was unkind in its review, which began with a frank admission that the reviewer "[did] not altogether understand" the System. But as Mackenzie had at last been specific with a prediction which did not take 54 years to validate, the reviewer, judging the quality of the System's forecast for the month of January 1830 against the actual weather for that month, remarked, "[W]e rather apprehend that he has not been so successful in the practical results, or at least in developing them to others, as he seems to anticipate."[73]

Even in the face of this humiliation Mackenzie soldiered on. His next obsession was to prove the System's economic value. If it could predict the weather with exacting accuracy, it could be of use in predicting the price fluctuation of agricultural commodities; this was the subject of his next and most well-known work, *Elements of the Cycles of Winds, Weather, and Prices of Corn*, published in 1843. For this study Mackenzie collected data on the price of grain going back to the year 1202 and mapped its cyclical rises and declines, which—naturally—he argued proved the 54-year cycle of the winds beyond any shadow of doubt. In this effort Mackenzie became less of a weather watcher and more of a statistician or economic historian. Indeed the 1843 book was his only work that attracted any significant professional cachet, and ironically it came not from meteorologists or climatologists but economists interested in what

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[73] Review of *Manual of the Weather for the Year 1830*, by George Mackenzie, *Dublin Literary Gazette* 4 (January 1830): 61, 68.

ultimately became known as the "physical economy." While the System was thoroughly discredited, Mackenzie finally did discover something worth noting: that economic cycles of agrarian-based societies did correlate to some measurable degree with climate conditions.[74]

In his final years Mackenzie seems to have been viewed by the citizens of Perth as an endearing old eccentric. He promenaded up and down High Street daily, wearing a long blue coat and double green spectacles, evidently recreating his glory days in the Royal Perthshire Militia. Never married and with no children, to the bitter end Mackenzie devoted himself to the obsession of his life. Rumored to sleep but two hours a day, he continued marking down weather observations in a set of seven volumes until deep into his final illness. He died in the spring of 1856 and was buried under a large headstone which included a hand pointing to the moon, flanked by a comet and a telescope. His epitaph—which from its tone sounds as if it was written by Mackenzie himself—reads:

> In Memory of Lieutenant George Mackenzie, of the Royal Perth Militia, Died 13th May, 1856, Aged 79. Who, with unwearied attention, a great share of original genius, and energy of mind, devoted upwards of half-a-century of an inobtrusive and irreproachable life, to the advancement of philosophical investigation, producing among a variety of periodical essays, valuable treatises on the "Cycle of the Seasons," and the "Elements of the Weather," forming an entirely new "System of Meteorology," from which future generations may profit.[75]

[74] Judy E. Klein, *Statistical Visions in Time: A History of Time Series Analysis, 1662-1938* (Cambridge, UK: Cambridge University Press, 1997), 113-15. Climate historians are still arguing about conclusions drawn from this correlation today, for instance, with regard to the Little Ice Age; a recent challenge to the orthodoxy of the concept was made by two economic historians from Ireland who relied significantly upon an analysis of grain price data. Morgan Kelly and Cormac Ó Gráda, "Debating the Little Ice Age," *Journal of Interdisciplinary History* 45, no. 1 (Summer 2014), 57-68.

[75] Fittis, 114-21.

Profile: Luke Howard

Among the weather-watchers of the Cold Decade, the one who came the closest to a professional was the learned Briton called Luke Howard. A chemist by trade, he owned a large firm that manufactured pharmaceutical chemicals for industry and retail druggists. Successful as he was at this trade, his true passion, like George Mackenzie, was the observation and investigation of weather phenomena. The sky, its appearances and changes had fascinated him since childhood. At age ten, in 1783, Howard vividly remembered what he called the *haze* of that year, which later he understood was caused by particulate matter from a volcanic eruption.[76] He was also fascinated by the aurora borealis and a comet that summer, which he termed a "meteor." Howard was not schooled in science as a child but believed he had unusual acumen as an observer of natural phenomena.[77]

The link between Howard's professional trade and his scientific pursuits was written in blood—literally. In his early twenties, while attending the chemical business in London, he fell off a stepladder while holding a jar of arsenic. The broken jar glass severed an artery in Howard's wrist and arsenic seeped into the wound. The ministrations of doctors spared his life but he was laid up in convalescence for a considerable time afterward. To amuse himself during recovery he began observing nature, pollen and

[76] This was the series of eruptions of Laki and Grímsvötn, Iceland, which began in June 1783.

[77] Luke Howard to Johann Wolfgang von Goethe, February 22, 1822, *Luke Howard (1772-1864) His Correspondence with Goethe and his Continental Journey of 1816*, ed. D.F.S. Scott (London: William Sessions Limited, 1976), 2-3.

flowers at first, sometimes under a microscope. Then he turned to sky-study that had so fascinated him as a child. The result was his legacy to history.[78]

Howard's business partner was William Allen, fellow Quaker, pharmaceutical tycoon, and fiery anti-slavery activist. Science was also one of Allen's many interests, and in 1796 he founded the Askesian Society, of which Howard was a member. Under the rules of the society each member had to bring an essay to the biweekly meeting, at Allen's house, for discussion. Those who violated the rule were fined. In 1802 one of the papers Howard presented was the simply-titled "Essay on Clouds." In it Howard broke down clouds into various categories, named from Greek root words. The chief categories were *nimbus, stratus* and *cumulus*, but clouds often had characteristics of multiple categories, necessitating subcategories like *cumulonimbus* and *cumulostratus*. Howard's essay setting forth his nomenclature of clouds was first published in *Tilloch's Philosophical Magazine*, and over the next decade reappeared in many different revisions and guises, from natural history journals to encyclopedias.[79]

Howard's singular contribution to meteorology was the classification of clouds, but by the dawn of the Cold Decade he was thinking much bigger. He too kept meticulous weather observations, and, like Mackenzie in Scotland, Howard began to search for patterns and cycles in weather events. A voracious consumer of newspapers, he also noted items in the media that referred to weather phenomena and related matters. In its early stages Howard's weather-watching seems to have been more of a hobby than

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[78] Ibid., 2-3.

[79] Ibid., 3; Luke Howard, "The Natural History of Clouds," *A Journal of Natural Philosophy, Chemistry, and the Arts* XXX (September 1811): 35-62, 35.

either an art or a scientific crusade. That changed in early 1814—after Howard had already noted the passage of several strange seasons and curious weather events—upon the death of his friend Alexander Cumming.[80]

Cumming, a Scottish watchmaker, was one of the most revered horologists in Britain during the 18th century. He sat on the royal committee that passed judgment on John Harrison's marine chronometer, the device that solved the age-old problem of determining longitude at sea. He also created various machines for King George III. In 1765 Cumming built and gave his sovereign a barometric clock equipped with a pen that recorded atmospheric pressure readings over time on a slow circular scale: the first real barograph. The next year Cumming developed a slightly modified version of the barograph clock for his own use. He began keeping monthly readings in January 1765, but the machine seems to have malfunctioned about four years later. By the time Cumming met Luke Howard, toward the end of the former's life, the clock was long out of use. Cumming died at Pentonville, England on March 8, 1814. Howard purchased the barograph clock from Cumming's estate and set about putting it in working order.[81]

Cumming's barograph clock transformed Howard's study of weather, which eventually became his study of climate. The device, which he spoke of in almost reverent tones, produced art as much as scientific data. It rendered the daily rise and fall of mercury on colossal ring-shaped graphs, each one taking a year to complete. The wavy

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[80] Luke Howard, *Barometrographia: Twenty Years' Variation of the Barometer in the Climate of Britain, Exhibited in Autographic Curves, with the Attendant Winds and Weather, and Copious Notes Illustrative of the Subject* (London: Richard & John E. Taylor, 1847), introductory page, final page; Cox, 13-15.

[81] Howard, *Barometrographia*, penultimate printed page.

oscillations of atmospheric pressure danced lazily across the page in eye-catching arcs. Years later, after Howard had created more than thirty of the graphs, he employed an artist to shade the waves with watercolors, wrote copy in the center of the circles (summarizing the year in question) and compiled them, together with remarks on wind and precipitation trends that he also recorded, in a lavish folio he called *Barometrographia.* The data itself formed the backbone of Howard's groundbreaking multi-volume study, *The Climate of London*, originally published in 1818. An expanded and revised edition appeared in 1830.[82] Together these works formed both a record of Howard's long study of weather and the atmosphere, and an important early body of work in the discipline of climatology.

Though Howard wrote most of *Barometrographia* and *The Climate of London* in the tones of a passive gentleman-naturalist observer common to amateur science in the early 19th century, his aspirations to explain climate in terms of patterns and systems were clear. The system he explicated in *The Climate of London* was much less ritualistic and mathematical than George Mackenzie's, but Howard arrived at a result that was at least functionally similar. He suggested that climate patterns fell into a 17-year cycle, with average temperature of seasons being the prime correlating factor. The touchstone that triggered Howard's recognition of this Cycle was exactly the same as Mackenzie's: the anomalies of the year 1816.

> The year 1816, which was the coldest of the Cycle, appears to have had its parallels in 1799 and 1782; and now there is every reason to conclude, from present appearances, that the warm temperatures of 1806 will re-appear in 1823; which will probably be the warmest, and 1833 the coldest,

[82] Ibid., *passim*; Howard, *Climate*.

> *upon the whole year*, of a Cycle of seventeen years, beginning with 1817.[83]

In simpler terms, Howard noted 1816 as the most extreme year of those he chronicled in the creation of *The Climate of London*, and the easiest way to recognize the Cycle was to look backwards in the past for similarly cold years. He also asserted that the Moon had considerable influence on terrestrial climate, affecting rain patterns, barometric fluctuations and temperatures, and that this was also a factor in the 1816 extremes. Breaking down mean temperature readings according to phases of the Moon, he declared that the orbit of the Moon during 1816 "appears to have had *a wet and dry side*, as regards the Moon's influence on…our climate."[84] That Howard would assume a celestial influence upon Earth's climate was surprising neither for him personally, given his formative experiences watching the skies, nor for the general state of scientific thinking of the time, which tended to view terrestrial and heavenly phenomena as part of a holistic system, similar in some respects to ecology. Nevertheless, he refrained from placing any one factor at the determinative center of his Cycle, as Mackenzie had done with his tallies of wind direction. Consequently, Howard's Cycle is much vaguer than Mackenzie's System.

Howard equivocated about the Cycle. In *The Climate of London* he supposed it to be a 17-year revolution, but also frankly admitted that he could be wrong and that only future observations could determine if there was any validity to the concept. His thoughts

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[83] Ibid., I:43-44.

[84] Ibid., I:55, 183.

on the Cycle survived into the 1833 reprint of the work. By 1840 he seems to have changed his mind, asserting that the cycle was not seventeen years, but nine; within two years he published a paper setting forth yet another permutation of the Cycle, this one at eighteen years. There is, however, no mention of the Cycle in *Barometrographia*, published in 1847. Although the Cycle preoccupied him for at least two decades, he never staked his credibility wholly upon it; the argument is a minor aspect of *The Climate of London*, and in any event Howard's historical reputation as the classifier of clouds was never tainted by it.[85]

Whether climate could be classified into a Cycle or System was one of the great obsessions of climatology during the Cold Decade; the other was the question of climate change and its causes. Howard was eager to have his feelings known on this point. In the introduction to *The Climate of London* he wrote:

> The result of my experience is, on the whole, unfavourable to the opinion of a permanent change having taken place…in the Climate of this country. Our recollection of the weather, even at the distance of a few years, being very imperfect, we are apt to suppose that the Seasons are not what they formerly were; while, in fact, they are only going through a series of changes, such as we may have heretofore already witnessed, and forgotten….Otherwise considering that the changes consequent on the clearing of woods, culture, and drainage, with some other less obvious effects of an increased Population, have probably by this time contributed their utmost to its improvement, I should venture to suppose, that our Climate is likely to remain for ages what it now is."[86]

While he was not as rigid in his dismissal of the possibility of climate change as Mackenzie's blinkered view—though Howard did suggest that what humans perceive as

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[85] Cox, 15.

[86] Howard, *Climate*, I:xxxiv.

climate change might only be the oscillations of the 17-year Cycle—Howard's opinion that human beings had already affected the climate the most they would ever be able to was his only substantive judgment on climate change in *The Climate of London*. Howard also limited his assessment of climate trends to the area of London only, and did not assert that his understanding of it had specific application anywhere else in the world, though one would assume Howard, if he were studying the climate of a different place, might at least be tempted to search for repetitions of discernible features in 17-year intervals. Howard, then, was largely a scientific conservative. Yet even he could not resist the temptation to peer into the multitudes of weather observations he'd collected and try to discern a Cycle or System, a magic talismanic formula that would transform chaotic local weather into ordered, well-explained and ultimately predictable climate. This was a far jump from the simple classification of cloud types for which he is primarily remembered.

Howard's transformation of the barograph clock readings into a Cycle, and also into the works of art that appear in *Barometrographia*, represent his attempt to reach out and define the broader environmental layer. The evidence of the dual-layered environmental consciousness is, in Howard's case, similar to that of Mackenzie's: he started with a series of purely local observations and eventually wound up using them to speak for a Cycle that encompassed climate phenomena so far beyond the local that aspects of them reached to the Moon. The synthesis of his London data into a broader Cycle is demonstrative enough of the dual-layered consciousness, but the colored graphs of *Barometrographia* are an additional step that has no analogue in Mackenzie's experience. In creating the charts Howard sought not only to measure and quantify the features of the broader environmental layer, but also to plot them spatially and color them, making them intelligible both artistically and intellectually. This uniquely creative engagement with the broader layer by a Cold Decade weather watcher was no doubt occasioned in part by the technology and format of Cumming's barograph clock and its output, but Howard seems to have lent to it a human touch.

Howard's chronology of the weather events of the Cold Decade was largely anecdotal, assembled mainly from newspapers, only some of which he specifically identified. Yet the items he selected to document weather trends are interesting and illuminative of the various phenomena that he thought were relevant to the study of London's climate. The errata presented in *The Climate of London* go far beyond definite weather events and incorporate reports of earthquakes, volcanoes, lightning, atmospheric oddities and celestial events. Though Howard did not purport to explain the climate of any place but London, his collected anecdotes often mentioned events far-removed from there. This is further evidence that he viewed the world's climate as interconnected to at least some significant degree.

In December 1809, for instance, Howard found an account of an earthquake in South Africa run in the London *Times* interesting enough to quote, with an emphasis on reports of "an uncommon number of stars falling" immediately following the temblor. He noted reports that the winter of 1810-11 began uncommonly early in Siberia, affecting crop harvests, and also included newspaper reports of the earthquakes in New Madrid, Missouri territory in December 1811 and January 1812. Howard found a report on the earthquake in Caracas, Venezuela on March 26, 1812 particularly important. The eyewitness account from Caracas noted that the weather at the time of the quake was "warm without being sultry…and with heavy night dews." Howard remarked:

> [P]robably it would have been happy for the city of Caracas, had a volcano opened in its neighbourhood at this time. The celebrated *Humboldt*…is clearly of the opinion, that one and the same cause, deeply seated in the globe, produces both *earthquakes* and *volcanic eruptions*: he seems moreover to regard volcanoes as the *spiracula* through which the elastic vapours, occasionally disengaged in the bowels of the earth, find a vent into the atmosphere…Supposing the prime agent in these phenomena to be *water*, penetrating to unusual depths through the inclined strata of mountainous countries, and thus meeting with masses of highly oxidable bases of the earths…there will then appear to be a close connexion between the recurrence of these effects and the variations of the atmosphere."[87]

This theory explains much about Howard's interest in seismic and volcanic activity, as does his citation of Humboldt as its source. Beyond the dubious concept of "elastic vapours," Howard came close to understanding of how volcanic particulate matter spread throughout the upper atmosphere. After the eruption of Mt. Soufriere in April 1812, Howard remarked on the "*favilla*" of the eruption being carried on "superior current[s]" of wind across the Atlantic from the Caribbean. He connected this eruption to vivid sunsets visible in London, two of which he recorded during 1812 in the months after the eruption.[88] With the "haze" of 1783 in the aftermath of the eruption of Laki figuring so prominently in Howard's own memory of the weather, it is likely he was aware of the opinions expressed by Benjamin Franklin that the Laki eruption and the "dry fog" it spread over Europe might have been responsible for the severe winter of 1783-84,

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87 Howard, *Climate*, II:96, 125, 167, 168-69.

88 Ibid., II:171-90.

though whether Howard agreed with this opinion is unknown.[89] Among the volcanic eruptions he noted in *The Climate of London*, Tambora in April 1815 is notably missing, though this may be a result of the much thinner trickle of media reports of this eruption as compared to the more well-known Soufriere, which was in a part of the world more frequently visited by Europeans.

That something unusual was happening to climate even before the Tambora eruption is evident from Howard's errata. In addition to vivid sunsets and early winters in the early part of the decade, he noted a report from Gibraltar calling 1813 "the coolest summer ever remembered." Then came the severe cold events of late 1813 and early 1814. On the eve of the great cold snap, one of the deepest and most disastrous known in the British Isles, Howard himself remarked upon "a succession of thick fogs" and that there was "much red in the morning and evening sky; the peculiar smell of electricity has been perceptible of late." He also claimed that the appearance of bees in unusual numbers predicted the frosts. Just after the New Year turned, plunging temperatures froze the Thames and brought commerce to a standstill. This great freeze was the occasion of the final Frost Fair ever held in London, in late January and early February 1814. Even when the spring returned Howard noted "a pink tinge to the twilight"—this was in the first few months following the eruption of Mt. Mayon in the Philippines—and that songbirds were much less numerous than usual, which he attributed to the severity of the winter.[90]

Then came the strange cold year of 1816. Even before the unusual weather events of spring and summer Howard was tracking extremes in the seasons. The winter saw

[89] Rampino et al., 74.

[90] Howard, *Climate*, II:217-39; Howard, *Barometrographia*, 6.

frequent temperature drops below zero and remaining there for many hours in a single night, confounding his usual observations of how quickly the mercury usually struggled back above zero after a severe freeze. In the early spring he noted that the mean temperature "is full 8° lower than the corresponding portion of 1815…not a single day having occurred in it of what which cultivators emphatically denominate 'growing weather.'"[91] The pages of *The Climate of London* for May and June 1816 were filled with news items, many from the United States, about frosts, strange snowstorms and damages to crops. In Europe the most usual manifestation was rain. "This was emphatically a wet summer," he wrote. "The whole season presented a series of storms and inundations; not meadows and villages alone, but portions of cities and large towns lay long under water."[92] In Howard's Tottenham home the barograph clock turned slowly and steadily, recording the varying weight of the troubled air. His graph for 1816 did not look appreciably different than those from other years, but his notes and conclusions on the weather of the year clearly indicated that it stood apart in Howard's mind from any other year he recorded.

Howard spent much of the summer of 1816 on the continent, which afforded him an opportunity to break temporarily from his Anglo-centered field of observation. He, his son and William Allen were active in a Quaker society providing funds to ameliorate Friends communities, especially in Germany, left destitute in the wake of the Napoleonic Wars. To make contact with communities instrumental in the relief effort, Howard and his associates sailed for Holland on June 26, 1816. They remained in continental Europe

[91] Howard, *Climate*, II:297.

[92] Howard, *Barometrographia*, 8.

until the end of August, and in his travel diary Howard occasionally noted unusual rains, cold spells and the sodden appearance of villages, fields and roads. After he returned, surveying evidence that the previous winter's snows were still visible in many places in Scotland in July 1816, he noted "that in passing through Switzerland, I saw the snows of the preceding winter lying in very large masses…from whence they usually vanish in summer."[93]

As many observers did, Howard saw commonalities between the weather in 1816 and 1817, treating them as sort of a single two-year storm. Hopeful signs returned slowly to the British Isles in the storm's wake. In June 1818, after two months of plentiful sunshine, he wrote that the renewed foliage and flowers "presented a striking contrast to their appearance during the last two seasons." According to Howard July 1818 was warmer than any period in his records since 1808, before the Cold Decade began, and he also noted that the fall was so mild that nasturtiums continued to grow in mid-December. These final observations appeared only in the later editions of *The Climate of London*, as the debut edition appeared during the year 1818. Howard's synthesis of the weather into an embryonic study of climate was now in the lap of the public.[94]

*The Climate of London* ultimately did resonate in scientific history, though perhaps not for the reasons Howard might have expected. His Cycle, present though not emphatically argued in the work, went virtually unnoticed by the scientific community. Indeed the main contribution for which Howard is remembered concerns his observations regarding climate differences in the city of London as opposed to those outside of it. He

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93 Howard, *Luke Howard*, 29-72; Howard, *Climate*, II:303.

94 Ibid., II:375-93.

argued, most prominently in the 1833 edition of *The Climate of London*, that general temperatures inside the city were greater than those outside of it, due to the abundance of non-permeable surfaces, high population density and burning of fuel. Howard is thus credited as the discoverer of what modern times have come to call the "urban heat island effect." Though his nomenclature of clouds will likely always be the key factor in his historical reputation, discovery of urban heat islands is his other significant contribution to climatology.[95]

As with Thomas Jefferson and George Mackenzie, the importance of Luke Howard to understanding of the Cold Decade rests far less upon his direct impact on the development of climatology—which is small, though certainly greater than Jefferson's or Mackenzie's—than it does with the representative nature of his worldview and his understanding of global climate. Howard was able to take the slow scratchings of Alexander Cumming's barograph clock, and his own observations on wind, precipitation and local conditions, and connect them to a global whole, more expansive in its scope even than modern ecological understanding of climate. Today's climatologists regard the notions of earthquakes or lunar forces' effects on climate to be pseudoscientific. To Howard they were vital parts of the system. Working in and around London but also keeping careful track of earthquakes in Venezuela, early winters in Russia and August frosts in America, Howard clearly demonstrated the same dual-layered view of the atmospheric and hydrologic environment—local weather intimately connected in a holistic system to global climate—that Jefferson and Mackenzie also constructed.

95 *See, e.g.,* Iain D. Stewart, "Local Climates of the City," *Architectural Design* 83, no. 4 (2003): 102-03.

Howard's motivations for his attempts to reach out and define the broader environmental layer differed to some degree from Jefferson's or Mackenzie's, because Howard's view of the world was infused with and informed by his devout religious belief. In 1821, after the Cold Decade was over, Johann Wolfgang von Goethe wrote to the British Foreign Office seeking details about Luke Howard, specifically the sort of man he was. Goethe had a keen interest in science, especially its philosophy and how it meshed with morality and religion. In 1815 Goethe read an incomplete translation of Howard's "Essay on the Modification of Clouds" and was impressed. Sensing a kindred spirit, when Goethe inquired about the meteorologist and word got back to Howard of these inquiries, he penned on February 22, 1822 an autobiographical letter to Goethe setting out the chief details of his life and the key tenets of his religious philosophy. (He also sent Goethe a copy of *The Climate of London*). Howard professed that his Quaker faith was the most important aspect of his life and work, speaking in almost dismissive tones of his own scientific pursuits. "[K]nowing that in any other character the world may well spare me," he told Goethe, "I am content to be occupied in it for the main part *as a Christian*. Science will go on—there are plenty of labourers."[96]

Luke Howard's environmental consciousness thus had an explicitly spiritual dimension. In this he was different than Jefferson, whose difficult relationship with faith seems to have colored his scientific pursuits only in subtle ways, and from Mackenzie, who was more interested in serving his own glory than that of a higher power. Howard's view of climate and the environment was not unlike the divine clockwork worldviews of pious early modern scientists like Kepler. Though subject to laws and containing Cycles

[96] Luke Howard to Johann Wolfgang von Goethe, February 22, 1822, *Luke Howard*, 5, 7-23.

that could and should be explained through rational means, the various gears of Howard's interconnected Earth had been set in motion by a divine hand, and the spiritual triumph of Christianity over the world was the ultimate meaning to be found in it.[97] Howard, then, was the perfect embodiment of environmental consciousness in the era of the Cold Decade: a dual-layered construction of weather and climate but set in a context of interconnectedness and interdependence among various disparate phenomena, capable of perception through spirituality and faith as well as by reason.

Goethe appreciated the work, personality and worldview of Luke Howard enough to pay him a great compliment. In 1823 he wrote a poem in honor of the London weather-watcher, with stanzas titled after the categories of clouds Howard invented. Goethe praised him thusly:

> But Howard give us with his cleaner mind
> The gain of lessons new to all mankind;
> That which no hand can reach, no hand can clasp,
> He first has gain'd, first held with mental grasp.
> Defin'd the doubtful, fix'd its limit-line,
> And named it fitly.—Be the honour thine!
> As clouds ascend, are folded, scatter, fall,
> Let the world think of thee who taught it all.[98]

Luke Howard died in London in 1864 at the age of 92.

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[97] Howard wrote to Goethe, "The Christian religion in its sincere practice will overspread the nations—it will improve the conditions of mankind generally…Wars will cease, and…general harmony and mutual good offices between nations and individuals, will replace he present too general selfishness and discord." Ibid., 5.

[98] Ibid., 26.

The consequences of Howard's attempts to grasp and define the broader environmental layer were in one sense similar to Mackenzie's, and in another way different and more direct. With his highly speculative Cycle, Howard could arguably have been included as one of the practitioners of that "very flimsy and spurious kind of philosophy" that was retarding the real progress of meteorology and against whom the *Edinburgh Review* railed in 1818.[99] Though he presented it with far less bluster and self-promotion, Howard's Cycle was no more accurate or scientifically useful than Mackenzie's System, and consequently wound up on the same dusty shelf of discarded pseudoscientific toys. Because of his classification of clouds, however, Howard possessed another ticket to potential scientific legitimacy which Mackenzie did not. More than this, the meteorological language of Luke Howard began to creep into the popular press and culture in the second half of the Cold Decade, as I will soon show. This is another indication of the existence of public demand for meteorological knowledge that weather watchers began to fill, albeit incompletely.

Profile: Thomas Ignatius Maria Forster

The final profile is less extensive, but serves as a segue to the problems, previously identified, with the transitional state of meteorology during the 1810s which the weather watchers attempted to address.

Thomas Ignatius Maria Forster was, in many ways, the epitome of the scientifically-minded men who hung on the fringes of meteorology during the Cold Decade. Forster had in common with the other weather watchers profiled here a host of

[99] "Polar Ice," 5.

diverse interests and a comparatively colorful and interesting life. Much of that life was given over to scientific (or pseudoscientific) study of one stripe or another; at various points Forster published treatises on the winter migrations of swallows in the British Isles, the effects of alcoholic beverages on human physiology, and air pressure in the ears at high altitudes. His one formal degree was in medicine, earned from Corpus Christi College, Cambridge in 1818, but he never practiced medicine a day in his life. Forster's primary historical reputation is as one of the founders of the pseudoscience of phrenology, a discipline he soured on in later years. But he was also a weather watcher, and as such was keenly interested in the operations of the atmosphere and the trends of climate.[100]

Forster's life was a fascinating and unusual one. He was born in 1789 into a prominent London family of antiquarians and botanists, and in his youth was highly influenced by his father and uncles who devoted much study to flowers as well as the works of Rousseau. "Their house," Forster wrote years later, "was a hive of activity in which all the bees were constantly moving among the flowers of science." He was only twenty when the Cold Decade began but had already (in 1805) published a journal of his weather observations. Assuming as all the weather watchers did that celestial events were relevant to terrestrial weather, Forster was fascinated by the Great Comet of 1811 and opened a dialogue with other scientific commentators on its effect upon the weather. By

[100] Thomas Ignatius Maria Forster, *Epistolarum: Or Fasciculi of Curious Letters, Together With a Few Familiar Poems and Some Account of the Writers as Preserved Among the Mss. of the Forster Family* (Bruges, Belgium: Privately Printed, 1845), 18-21.

then he was working on his own meteorological treatise, *Researches About Atmospheric Phaenomena*, which appeared in 1812.[101]

Unlike Mackenzie or Howard, Forster did not use his book to advance a unified system or theory. *Researches About Atmospheric Phaenomena* is mainly a lengthy comment on weather phenomena rather than an attempt to synthesize them into a predictive or explanatory whole. Yet Forster was unable to prevent his biases and suppositions about the factors influencing weather from creeping into the narrative. Meteors, he wrote, placed "combustible gaseous exhalations" into the atmosphere when they fell to Earth. He was fascinated by the habits of animals, asserting that one could predict changes in the weather by observing dogs, cats, birds, geese, flies, frogs, chickens and seagulls. This subject he specifically connected to disease in humans—about which he would later in the decade (1817) write a book—which he also thought was connected to atmospheric changes. The appearance of the darkling beetle in a house with a sick person, Forster claimed, could accurately presage death, "since the same peculiarity of atmosphere which may bring out the beetle, may be such a one as would produce the death of the patient."[102]

The early portion of Forster's book examined and generally lauded the work of Luke Howard in classifying clouds. Forster knew Howard; he visited him at Plaistow in 1811, and he was clearly influenced by many of Howard's ideas. They shared an interest in the effect of astronomical phenomena upon weather and climate. Forster was

[101] Ibid., 18-20.

[102] Thomas Ignatius Maria Forster, *Researches About Atmospheric Phaenomena* (London: Cradock & Joy, 1815), 114-28, 131-41, 156, 246.

fascinated with appearances of lights in the sky he called haloes, which he believed were intimately connected to electricity in the atmosphere—a factor he thought was crucially important, if not determinative, of weather at any given time. This interest in electricity also animated his thinking about the effect of changes in the weather and atmosphere upon the human body. “[I]t is not the heat or cold, dampness or drought of the air,” he wrote, “which is chiefly concerned in producing disorders…[I]t is some inexplicable peculiarity in its [the atmosphere’s] electric state.” He cited as evidence of this effect medical patients who, just before thunderstorms, sometimes experienced pain in limbs that had once been broken. Here Forster’s medical training—the only formal scientific training he received—intersected his interest in atmospheric phenomena.[103]

Though his contribution was not as concrete as Luke Howard’s classification of clouds, Thomas Forster arguably did have an impact on the development of meteorology as a science. Comets and other astronomical events did not escape Forster’s notice, but he and others such as Henry Robertson, another medical doctor who wrote a treatise on the atmosphere published in 1808, at least helped bring the study of weather closer to Earth and farther from the stars. Meteorology is literally the study of meteors, but Roberts, Forster, Mackenzie and Howard all demonstrated in their work that it was the atmosphere—its winds, the movement of air and moisture and its various manifestations—that was the central stage on which meteorology had to perform. The science was moving beyond its pre-modern and 18$^{th}$ century roots of encompassing the study of anything one saw when he or she looked skyward. This slow process represented

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[103] Ibid., 156-65.

a fundamental sea change in what meteorology was about and of what earthly use it might be to the planet's inhabitants.[104]

Forster also struck a chord that many observers of the state of weather science during the Cold Decade echoed: the world simply did not know as much about meteorology as it should. In doing so he exhibited a self-awareness of which other weather watchers, especially George Mackenzie, were entirely ignorant. Forster wrote:

> We do not yet know what regulates atmospheric changes in general; how electricity becomes so distributed as to produce those various effects which analogy leads us to ascribe to it; in short, we have no good general theory of meteorology, as we have of astronomy, mechanics &c. The old notions of astrologers about the conjunctions of the planets involve too many palpable absurdities to allow us to collect any useful information from their writings.[105]

It did not automatically follow that Forster's commentary significantly added to the state of the science. One review of *Researches About Atmospheric Phaenomena* remarked that the book "possesses considerable claims to respect, and must tend to the advantage of the science";[106] another review came to exactly the opposite conclusion, chiding Forster for taking on too many subjects and saying nothing particularly worthwhile about any of them. But both reviews agreed that meteorology was

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[104] Janković, 156.

[105] Forster, *Researches*, 156.

[106] Review of *Researches About Atmospheric Phaenomena, Together with Meteorological Journals* by Thomas Ignatius Maria Forster, *The Analectic Magazine (1813-1820)* 7 (April 1816): American Periodicals 368.

underdeveloped, understudied and poorly understood.[107] A scientific niche needed to be filled, and the volunteers who stepped forward to fill it were either too few, the wrong kind, or both.

Though he maintained his interest in weather and climate for much of his life, the diversity of Forster's scientific interests—and possibly his youth, only 22 when he wrote his book—drew his wandering attention in too many directions to remain focused on meteorology. Toward the end of the Cold Decade, while still in medical school, Forster published *Observations on the Casual and Periodical Influence of the Atmosphere in Diseases*, which is relevant to the events of the decade in another way that will be considered in due course. After *Observations* came out in 1817 he returned to astronomical pursuits, discovering a comet in 1819. In the next decade he published an almanac which defined the days and seasons in botanical terms, focusing especially on flowers; no doubt he drew from his childhood experiences of being raised by avid botanists. But in 1814 Forster met Johann Spurzheim, the father of the "science" of phrenology, and increasingly his attention was devoted to divining the mystic lumps in people's skulls. He died in Brussels in 1860.[108]

Although Forster did not attempt to create a theory or system for the explanation of weather, his lament that one had not been discovered seemed to presuppose that weather and climate were ultimately explainable through some sort of scientific

[107] Review of *Researches About Atmospheric Phaenomena, Together with Meteorological Journals* by Thomas Ignatius Maria Forster, *New-England Journal of Medicine and Surgery, and Collateral Branches of Science* (1812-1826) 6 (January 1817): American Periodicals 82.

[108] Forster, *Epistolarum*, 21-22; Janet Browne, "Thomas Ignatius Maria Forster," *Oxford Dictionary of National Biography* <http://www.oxforddnb.com/view/article/9920> (visited February 28, 2017).

application. In this thinking he had the company of many other weather-watchers as well as scientific writers in general. His writings demonstrate that he also shared the dual-layered worldview common to weather-watchers and ordinary people. *Researches About Atmospheric Phaenomena* serves up colorful minutiae such as crawling beetles and the petals of Siberian sowthistles, but Forster always linked them to larger processes such as atmospheric electricity. That he did not create a theory leaves open to question how he conceived the connections between the local layer and the broader one, but it is unquestionable that he believed a connection existed and was discoverable. Forster then was a less bold and more modest weather-watcher; in his work one perceives the enthusiasm of the amateur naturalist tempered by a hint of scientific conservatism.

### Into the Void: Meteorology and its Transition in the Cold Decade

Thomas Forster presents us with another example of the typical pattern of weather watchers' thinking, and an attempt once again to reach out, touch, define and tame the broader environmental layer. He is also useful for his thoughts upon the deficiencies of the science of meteorology, which, like the examples of Mackenzie and Howard, add further evidence to the existence of the void in meteorological knowledge and understanding that weather watchers saw themselves as uniquely positioned to fill.

In a way it is occlusive to assess meteorology in isolation as a distinct branch of science. Rigid divides between scientific disciplines are much more a function of modern hyper-specialized and institutionally-driven approaches to science than they are the reality of how science worked in the early 19th century. Science historian Susan Faye Cannon in 1978 characterized the universe of Western scientific thought prevalent in this period as "Humboldtian science," after its leading light, Alexander von Humboldt, arguably the most famous name associated with scientific pursuits in the world in the decades between 1800 and 1830. Though Humboldt is easily characterized as an explorer and geographer—a "scientific traveler," as Cannon put it—his horizon of scientific investigation included not merely geography and place, but also the structure and behavior of the Earth, volcanism, astronomy, the oceans, plants and animals, and the functioning of the atmosphere, which naturally included weather and climate processes. On the travels throughout the Americas between 1797 and 1804 that established Humboldt as one of the leading scientific thinkers of the time, he brought four barometers, numerous thermometers, hygrometers, six electrometers (to measure the electrical content of the atmosphere), and a Fontana eudiometer to measure oxygen in the air.[109] Writing twenty years later, weather historian Vladimir Janković questioned the usefulness of Cannon's stress that Humboldtian science was non-laboratory oriented, being primarily field study; Janković made the point that both laboratory-based and field-based approaches to meteorology existed in the English tradition of the 18th and early 19th centuries.[110] This debate is not especially germane to weather watchers and environmental consciousness, but what is important is the historical recognition that the study of weather in the early 19th century was both inseparable from study of other scientific phenomena, and also significantly geographical in its orientation. Weather existed above the Earth and extended, in the view of some, even far into the heavens, but

[109] Susan Faye Cannon, *Science in Culture: The Early Victorian Period* (New York: Dawson Science and History Publications, 1978), 73-77.

[110] Janković, 165-66.

it was still rooted to, and deeply affected, individual places. This means that the study of the Earth *itself* was (and still should be) viewed as relevant to the understanding of weather and climate phenomena.

Earth sciences, and by that I mean what today we identify primarily as geology, were undergoing a transition at this time that can arguably be called a revolution. Interestingly, Martin J.S. Rudwick argued that the central thrust of this revolution—which he dated from 1787 to 1823—was the discovery, primarily by British and French scientists, of "deep time," meaning the understanding and historicizing of Earth's history as an immensely long and ongoing process.[111] In America this same period, roughly 1790 to 1840, saw the focus of scientific thought on "natural history," which, like Humboldt's approach, touched matters of geology, botany and animal study and also branched out into studies of artifacts and aboriginal peoples. Andrew J. Lewis argued that in the United States the development of natural history had political dimensions occasioned by the American Revolution and its aftermath, and also that the political, cultural and ideological orientation of the new United States enabled natural history to be a uniquely participatory enterprise, not merely among learned white men but various classes of people across a broad swath of society.[112] These concomitant developments cannot be coincidental: they are closely related. That the Cold Decade falls almost exactly in the middle of this period of scientific revolution is also not coincidental.

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[111] Martin J.S. Rudwick, *Bursting the Limits of Time: The Reconstruction of Geohistory in the Age of Revolution* (Chicago: University of Chicago Press, 2005), 1-11.

[112] Andrew J. Lewis, *A Democracy of Facts: Natural History in the Early Republic* (Philadelphia: University of Pennsylvania Press, 2011), 1-9.

The point I am making is this: all manner of science was in significant transition in both Europe and America during the Cold Decade, and meteorology and climatology were part and parcel of this change. The study of atmosphere and weather is indeed inseparable from other sciences and their developments during the same period, and this is why I present the cautionary statement that conceiving of meteorology as a distinct branch of science, as if its fate was somehow independent of other scientific transitions in the early 19th century, is problematic. That said, practitioners and observers of meteorological science in the Cold Decade perceived, as Thomas Forster did, that in some ways meteorology was *less* developed and cohesive a discipline than perhaps it should have been. This is what is germane to the study of weather watchers, because this perception is part of the void in the discipline that they tried to fill.

If there is a fair argument that early 19th century science can be termed "Humboldtian," surely the contemporary opinion of Humboldt himself on the state of meteorology is an important indicator of how scientists felt about it. In the introduction to an 1818 reprint of his *Personal Narrative* of the Latin American travels that made him famous in the first years of the century, Humboldt observed that many sciences, including meteorology, were stunted and undeveloped. "[W]hilst the number of accurate instruments was daily increasing," he wrote, "we were still ignorant…of the periodical oscillations of the aerial ocean; the limit of perpetual snows under the polar circle…and so many other phenomenon, equally important." Exploration and adventure, Humboldt argued, were the endeavors to which the public and governments paid attention, but these endeavors were not well-suited to achieve a net increase in real scientific knowledge.[113] Meteorology and the study of the atmosphere was simply not as far advanced as it should be, and Humboldt's criticism seemed to despair that the current state of institutions and public support could change that anytime soon.

Across the Atlantic, *The New-England Journal of Medicine and Surgery*, which reviewed Thomas Forster's *Researches about Atmospherical Phenomena* generally negatively, made much the same argument. The reviewer identified "the rise of water into the atmosphere and its return to earth" as a prime example of a scientific process crucial to the understanding of meteorology that was as yet unexplained. This was one of many deficiencies in the field. Electricity in the atmosphere, the role of climate in disease and the nature and causes of meteors were equally mysterious.

> In making these remarks, it is not intended to deny that the researches of De Luc, Saussure, Hutton, Berthollet, Van Mons, Rumford, Leslie, Dalton, and of many others, have been of essential service. The observations of these philosophers have unfolded a multitude of facts which must be useful to succeeding meteorologists, and may serve as the ground work, for a system of meteorological knowledge. At the same time, it must be conceded that this department of science is encumbered with many loose opinions, and some fanciful and inadequate hypothesis, which rather retard than assist the inquirer in his investigations.[114]

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113 Alexander von Humboldt, *Personal Narrative of Travels to Equinoctial Regions of the New Continent During the Years 1799-1804*, trans. Helena Maria Williams (Amsterdam: Theatrvm Orbis Terrarvm Ltd. & De Capo Press, Inc., 1972), vi.

114 Review of *Researches About Atmospheric Phaenomena,* 82. Jean André Deluc (1727-1817) was a Swiss meteorologist most well-known for his construction of meteorological instruments. Horace Bénédict de Saussure (1740-1799), also Swiss, conducted experiments with the hygrometer to measure atmospheric moisture and attempted to explain evaporation in terms of the early modern elements of fire and water. Charles Hutton (1737-1823) was a British mathematician who considered meteorology to consist primarily of the study of meteors, and also volcanism and seismic events. Claude Louis Berthollet (1748-1822) was a French chemist. Jean-Baptiste Van Mons (1765-1842) was a Belgian horticulturalist chiefly known for the breeding of pears. Benjamin Thompson—also known as Count Rumford, 1753-1814—was a British pioneer in the understanding of thermodynamics. John Leslie (1766-1832) was a Scottish physicist known for research into the conduction of heat. John Dalton (1766-1844) was an English chemist, best known for his early work on atomic theory, but who also compared meteorological observations at differing elevations. The citation of these contributors in such

In this argument we hear a strong echo of the *Edinburgh Review* piece from 1818 complaining about the unhelpful proliferation within the field of persons "possessing a slight tincture of physical science [who] conceives himself qualified to speculate concerning the phenomena of weather."[115]

The weather-watchers—the most enthusiastic members of a loose society comprised entirely of enthusiastic amateurs—filled, or at least attempted to fill, the void in knowledge and development at the heart of meteorology, and they did so at a crucial time. The public at large that consumed scientific material was, during the Cold Decade, becoming increasingly interested in weather and climate phenomena, but the field of meteorology had no leading personalities to guide it, such as William Herschel in the field of astronomy. Into this vacuum stepped dubious persons with only "tinctures of physical science," though the tincture ran deeper in people like Luke Howard than novices like George Mackenzie. The weather-watchers did not have what it took to be the William Herschels of meteorology, but at least they were on the vanguard of the discipline, blazing some sort of disorganized and incoherent trail, the task of whose demarcation and organization would eventually fall to professionals.

The public's interest in, and demand for, meteorological information and analysis clearly grew over the course of the Cold Decade, especially in its second half. Before

widely-varied fields itself indicates the scattered nature of meteorological science at this time. *See, e.g.*, Janković, 33, 152-53.

[115] "Polar Ice," 5.

1810 it was relatively rare for major newspapers in the United States or Great Britain to devote significant daily space to weather-related events, such as daily or weekly temperature or precipitation records. By 1820 many major newspapers were doing so.[116] At the beginning of the Cold Decade most Americans and Europeans evaluated the impact of weather and climate in their lives on personal terms: how they affected their crops, business, moods or other individual circumstances. By the end of the Cold Decade, weather and climate began to become defined by consensus—in some cases the parameters and definitions assigned by experts, and in others by a growing sense of what information people wanted about the weather and how that information could best be provided to them.

An example of the increasing hold of meteorology during the Cold Decade, as well as the seepage of weather watchers into it, is the curious odyssey of the *Naval Chronicle*. This periodical, established in 1799 by naval chaplain James Stanier Clarke and captain John MacArthur, was essentially the trade journal of the British Royal Navy. For nineteen years in its pages appeared articles, editorials, letters, maps, reports, biographies and histories of nearly every aspect of the armed service upon which the continued existence of the British Empire depended. Its readers, writers and correspondents studded—and traveled—the globe from the Isle of Man to the Drake Passage, and because of the Royal Navy's presence all over the world the *Naval Chronicle* was uniquely positioned to observe and report on weather and climate events in a global context. Furthermore, the primacy of weather knowledge to the basic

[116] Newspapers did not begin publishing weather *forecasts* until later in the century; the invention of the telegraph was a necessary prerequisite for the development of systematic weather forecasting becoming a fixture of popular daily journals. Anderson, 1-2.

functions of warships—and the fact that all good British mariners knew something about weather and climate—made the *Naval Chronicle* an almost inevitable conduit through which thinking about and discussion of meteorology would pass through to the general public.

The first systematized meteorological data to grace the *Naval Chronicle* made its appearance in the issue for the second half of 1815, shortly after the conclusion of Britain's long war with France and its shorter one with the United States.[117] The "Meteorological Register," as it came to be known, listed barometric pressure, maximum, minimum and mean temperature every day in Covent Garden, London, from June 25 to July 25, 1815. The Register was kept by one C. Blunt, a "Philosophical Instrument Maker," and may have been intended partially as an advertisement for such instruments.[118] In the following issues—which came out every six months—the Meteorological Register became more elaborate and expansive. During the Year Without Summer, the *Naval Chronicle* commented that "Fahrenheit's Thermometer, during this period [July 31-August 26, 1816] has not stood higher than 74°, which was on the 13th instant…the weather has been for the most part wet and gloomy." The *Chronicle* also made reference to sunspots, a frequent subject of speculation as to the cause of the anomalies, and remarked that "the unusual number of large opaque spots which have been seen on the sun…may account for the general lateness of the season." The statistical

[117] News pertaining to the war(s) typically dominated the *Naval Chronicle* in the first half of the decade, for obvious reasons. This was also true in the United States in many newspapers, which from summer 1812 to spring 1815 were inordinately preoccupied with accounts of military engagements and related political developments.

[118] C. Blunt, "Meteorological Register," *The Naval Chronicle for 1815* XXXIV (July-December 1815): 56.

evidence offered in support of this conjecture was a chart comparing mean temperatures from April to September 1815 with those for the same period in 1816, showing a marked difference. All of these items appeared in or adjacent to the Meteorological Register tables of temperatures.[119]

The following year, 1817, saw considerably greater sophistication in the *Naval Chronicle's* presentation of weather information. The journal for the first half of the year included for the first time a detailed meteorological report from the Observatory of the Naval Academy at Gosport, located opposite the harbor from Portsmouth, the Royal Navy's principal home base. This report included a narrative chronicle of weather conditions in addition to the usual weather statistics and tables. The more detailed format resembled and were probably based on the "Meteorological Journal" features that had been running in *Nicholson's Philosophical Journal* since September 1808. The same issue of the *Naval Chronicle* also included a lengthy general explication of prevailing wind systems around the globe. An account of earthquakes—accompanied, as often during the Cold Decade, with descriptions of lightning—occurring in Switzerland in March was given prominent treatment, including a quote from the letter of an unnamed witness: "We neither in truth know what passes on or under our earth. It trembles every where. We are reaping in the midst of winter; it freezes in spring; the thunderbolts fall amidst the snow."[120]

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[119] "Meteorological Register," *The Naval Chronicle for 1816* XXXVI (July-December 1816): 175, 349, 438, 516.

[120] *The Naval Chronicle for 1817* XXXVII (January-June 1817): 80-84, 145-52, 373 (quote).

A significant change that the *Naval Chronicle* made during 1817 was to adopt and endorse the cloud classification system of Luke Howard. "That our Readers may have a reference in future to the distinct appellations of the various modification of clouds," read the introductory article, "[]we have thought proper to insert the definitions of Mr. Luke Howard's various Nomenclature, nearly in the same words as in…*Nicholson's Philosophical Journal*." The article then gave a list of Howard's main cloud types.[121] While this new format satiated the appetite of the *Chronicle's* readers for more detailed and systematic meteorological data, some readers evidently felt it did not go far enough. A clerk working in the Royal Navy's weather office wrote to the editor in the following (July-December 1817) issue, complaining that a list and textual description of Howard's cloud types was essentially useless without illustrations, and he suggested including a copper-plate engraving of the cloud archetypes. The editor disagreed, quoting [unnamed] "one of our greatest Meteorologists" who worried that students of the science would not appreciate the wide latitude of variation within each classification. "[W]e doubt that a simple Engraving of each Modification would be of much assistance to young Meteorologists. The difficulty, however, may soon be surmounted by frequently observing and attentively pursuing Mr. Luke Howard's Essay on the Clouds." Howard had few champions more resolute and dependable than the editors of the *Naval Chronicle*.[122]

The new format of meteorological information introduced in the *Naval Chronicle* in 1817 persisted until the end of its existence as a publication. By the final issue,

[121] Ibid., 174.

[122] "Meteorological Register," *The Naval Chronicle for 1817* XXXVIII (July-December 1817): 86.

covering July through December 1818, the meteorological material was quite detailed, including tables, summaries, narrative descriptions and (of course) Howard's cloud nomenclature. The meteorologists of the Observatory of the Naval Academy also sought to put their current data in historical context, as they did while summing up temperature data for summer 1818: "The average temperature is 5° warmer than the same months in the three preceding years. In August, 1802, the warmest month in that year, the mean temperature was 67½°, and in July, 1808, 67.2°…" The weather content of the *Naval Chronicle* had become, by the end of the Cold Decade, a cornucopia of the same expansive obsessions as those that consumed the weather watchers: long lists and tables of data, including temperature, winds and barometric pressure, historical comparisons, narratives on the character of seasons and the coming of crops, ruminations on polar ice, sunspots, earthquakes and "cavities" in the atmosphere, sprinkled with the dropped names of presumed experts and casual citations to philosophical journals.[123] The weather watchers had co-opted the mighty British Navy.

Of course, the *Naval Chronicle* was a specialty publication aimed at a specific audience, namely the British Navy and people with an interest in naval affairs. However, the same sort of meteorological data that the *Chronicle* began offering was mirrored by newspapers of general circulation across the Atlantic. The *Philadelphia Register and National Recorder*, for example, in March 1819, gave several column inches to none other than Josiah Meigs to present a sampling of meteorological data collected by U.S. Land Office clerks in Detroit and Savannah in response to his circular requesting such information. "If such observations are continued," Meigs wrote, "as I hope they will be,

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[123] *See, e.g.,* "Meteorological Register," *The Naval Chronicle for 1818* XL (July-December 1818): 81.

for a few years, much interesting knowledge of the meteorology of our country will be effected."[124]

Similarly, an American paper no less influential than *Niles' Weekly Register* of Baltimore devoted seven pages in February 1819 to tables of weather data compiled at Chillicothe, Ohio by one Samuel Williams over the previous two years. Williams noted temperature, wind direction, cloud cover and cloud type day-by-day from July 1, 1817 to June 30 of the following year, and in explanatory statements and marginalia commented on storms, vapors in the atmosphere, moon haloes, the ripening of peas and strawberries, and provided a boastful description of his thermometer which was imported from London.[125] The increasing presence of meteorological data in the media is evidence that the study of weather was creeping out of the parlors and gardens of private citizens and into the public consciousness.

Why did this increase in public demand for meteorological knowledge occur? The possible answers are heavily intertwined with the conceptual questions of why the 1810s represent a significant moment in the history of environmental thought and consciousness.

The first and most obvious answer, and one that again comes back to the weather watchers themselves, is that weather and climate events were unusually prominent during this decade, and as such sparked curiosity, questions and ruminations. Mackenzie's explicit motivation to develop his System as a means to explain the weather anomalies of

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[124] "Meteorological: Detroit, Savannah," *Philadelphia Register and Nataional Recorder*, March 27, 1819, 1.

[125] Samuel Williams, "Meteorological Register," *Niles' Weekly Register*, February 20, 1819, 15.

1816 is clear evidence of this;[126] so too is the bulletin from the Philadelphia Society for Promoting Agriculture, received by Jefferson and others, requesting information and the results of observations during the extraordinary crop season that year.[127] John Quincy Adams, then serving as U.S. Ambassador to Great Britain, remarked several times during the summer of 1816, both in his diary and his letters, as to the phenomena of the cold summer and public discussion in Britain and America about what might have been causing it.[128] The high visibility of sunspots in the spring of 1816—which in fact had a cause related to Cold Decade volcanism—was a subject of constant reporting in the *Daily National Intelligencer*, the semi-official mouthpiece of the Madison administration, together with frequent comment on the perceived relationship between sunspots and unusually cold weather.[129] Aside from the Year Without Summer, various weather and climate events on both sides of the Atlantic were noteworthy subjects of public fascination. The severe cold spell in the British Isles in the winter of 1813-14 made possible what turned out to be the last Frost Fair ever held on London's river Thames, which was a public *cause célèbre* quickly folded into the traditional cultural fabric

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[126] Mackenzie, *System*, 3-4.

[127] Philadelphia Society for Promoting Agriculture to Thomas Jefferson, November 13, 1816, *The Papers of Thomas Jefferson: Retirement Series*, ed. J. Jefferson Looney (Princeton: Princeton University Press, 2013), X:526.

[128] John Quincy Adams, Diary, July 19, 1816, *Memoirs of John Quincy Adams, Comprising Portions of His Diary from 1795 to 1848*, ed. Charles Francis Adams (Philadelphia: J.B. Lippincott & Co., 1874) III:404-05; John Quincy Adams to Abigail Adams, August 30, 1816, *Writings of John Quincy Adams*, ed. Worthington Chauncey Ford (New York: The MacMillan Company, 1916) IV:77.

[129] *See, e.g., Daily National Intelligencer* (Washington, DC), May 3, 1816, 3, May 7, 1816, 2; , May 9, 1816, 3.

surrounding such events.[130] Howard devoted considerable attention to this cold spell, collecting a host of media reports on it which he ultimately published in *The Climate of London*.[131] As shown in Chapter III, the events of "Cold Friday" in New England were a strong impetus of public discussion and popular memory. It is beyond question that many people were looking skyward in the years between 1810 and 1820, and talking to others about what they saw there.

There are other more subtle reasons, many closely related to the state of science in the 1810s. In the United States, scientific institutions were growing at a remarkable rate during the decade—considerably more so than in previous decades. For example, five natural history societies were founded in New York state alone in the second half of the Cold Decade, and public funds were used for the first time in 1819 in that state to support societies for the advancement of agriculture.[132] Societies of this nature included many weather watchers among their members.[133] Similarly, journals devoted partially or completely to scientific writings were increasing dramatically, again beginning in the second half of the decade.[134] John C. Greene argues that these developments mark this same period, roughly 1815 to 1820, as the end of what he terms the "Jeffersonian Era" of American science. Various American practitioners of science and natural philosophy died

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130 *Frostiana*, *passim*.

131 Howard, *Climate*, II:224-29.

132 George H. Daniels, *Science in American Society: A Social History* (New York: Alfred A. Knopf, 1971), 148.

133 *See, e.g.,* ibid.

134 Ibid., 150.

during the decade, including Benjamin Rush, and Jefferson had largely retreated from the public scene. This cleared the way for a new generation of Americans who approached science with ideas rooted in American, as opposed to European, thought. Part of the explanation for this sea change involved the increasing prevalence of internal improvements such as canals, waterways and mines, which created a demand for scientific and technological expertise.[135] Because I argue that meteorology, climate and weather study cannot be decoupled from the revolutions occurring in science in general during this period, it follows that public appetite for and interest in various scientific phenomenon during the Cold Decade would track a similar increase in interest in meteorology.

The return of peace after two decades of world war also seems to have been a factor. The War of 1812 between the United States and Great Britain ended in February 1815; Britain's long involvement in Napoleonic conflicts on the continent of Europe concluded in June. In the United States, the end of the war resulted in patriotic calls for development of uniquely American science, as independent of British and European roots as the American republic now was, finally and completely, from the former mother country.[136] The return of peace left Britain with its navy at peak strength and with a truly global reach, meaning in practical effect that sailors trained to watch and record the behavior of seas, skies and winds as part of their occupation were positioned all around

[135] John C. Greene, *American Science in the Age of Jefferson* (Ames, IA: Iowa State University Press, 1984), 410-11.

[136] Daniels, 139.

the world on mobile platforms that could be (and were) used for weather observation.[137] The recession of war and military news from newspapers and periodicals, which had dominated the press on both sides of the Atlantic in the first half of the decade, made ample room for the coverage of other subjects, and, as I have shown, some of those subjects included weather and climate. The conditions for increased public interest in weather and atmospheric phenomena were improving dramatically in 1815—and, as if on cue, Tambora erupted and provided a spectacular show for this empty stage.

If these are all arguments why public appetite for meteorology increased during the Cold Decade, additionally they are not far off from a historian's argument as to why the Cold Decade in particular is worthy of study. The understanding of the 1810s as an era of scientific transition strengthens the judgment that this particular decade was the "last moment" of one era[138]—Greene would call it Jeffersonian science, Cannon Humboldtian—just prior to the first breath of a new one. The 1810s comprised the last decade, in both the United States and Europe, in which one could argue that industrial technology, industrial processes and a modern market economy were not significant factors of societal change.[139] The 1810s were the last decade in which one could not bring

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[137] *See, e.g.,* "Meteorological Register," *The Naval Chronicle for 1816* XXXVI (July-December 1816), "Meteorological Register," *The Naval Chronicle for 1817* XXXVII (January-June 1817).

[138] I will elucidate the "last moment" argument (that is my own term) more completely in the conclusion.

[139] For example, Marxist historian Dirk Struik made an argument—not much in vogue today—that American science fundamentally changed as a result of the rise of manufacturing after the War of 1812, emphasizing science that would prove useful to the owners of industrial capital. I am not interested in the substance of that argument, but it clearly could not have been made for any decade prior to the 1810s. A contrasting argument, that of Perry Miller, credited a change in American science to psychological and conceptual changes in thinking about science, which he claimed are also tied to developments in technology—a process he said was complete by 1830. Note again the temporal convergence of these interpretations. Greene, 413-17 (discussing Dirk E. Struik, *Yankee Science in the Making* (New York: Collier Books, 1962), and Perry Miller, *The Life of the Mind in America* (New York: Harcourt, Brace & World, 1965)).

goods to New York from the interior of America via the Erie Canal and the first decade in which one could book passage on a transatlantic steamship to Europe.[140] With regard to meteorology and climate study in particular, historians of the subject have sometimes used, for differing reasons, the year 1820 as a temporal bookend of their analyses,[141] and it is clear that beginning in the 1830s meteorology was forever altered by the development of forecasting.[142] Thus the end of this second decade of the 19th century certainly seems to be the end of *something* worth investigating. That this particular space on the calendar coincided with a period of significant climate change—the last such global climatic event not caused principally by humans, and the most recent episode of cooling as opposed to warming—adds to the list of reasons why this period should be considered important and unique.

Although they correctly perceived a void in the scientific understanding of meteorology and also understood the public demand for such understanding in the 1810s, the weather watchers were ultimately not successful in filling the void or satisfying the demand. Their efforts to do so were incomplete, imperfect and ineffectual. Notice the pattern in all four profiles I have presented here: each of them ends with disengagement or indifference. Despite keeping his weather diary for 14 years and synthesizing its data

140 One *could* do this, but no one did. The *S.S. Savannah* sailed from Georgia to Liverpool in May 1819 empty of paying passengers. Frank O. Braynard, *S.S. Savannah: The Elegant Steam Ship* (Athens, GA: University of Georgia Press, 1963), 66-67. The *Savannah* will be discussed more completely in Chapter XI.

141 *See, e.g.*, Janković, Ludlum.

142 Anderson, 15-40.

into statistical tables and averages, Thomas Jefferson wound up not doing anything especially significant with his weather data; his own efforts to affect American meteorological understanding were eclipsed by even the partial success of a much smaller "fish" swimming in Jefferson's "pond," that being Josiah Meigs. George Mackenzie's self-ballyhooed *System of the Winds* was, both scientifically and commercially, a flop. Similarly, Luke Howard's Cycle never caught on in scientific circles, and as pretty as the barograph clock graphs are that he ultimately published in *Barometrographia*, they remain mostly an artistic and scientific curiosity. After making his own dubious foray into the world of climate analysis, Thomas Forster lost interest and turned instead to analyzing the lumps in people's heads. Of these four weather watchers, it is Jefferson and Howard who are remembered at all prominently in the history of science, and in both of their cases it was for contributions—*Notes on the State of Virginia* and the classification of clouds—only tangentially related to their weather observation activities.

The weather watchers, therefore, show an incomplete record of achievement, but their attempts to pull in, define and quantify the broader environmental layer did animate weather and climate discourse during the Cold Decade. Jefferson and Madison's weather watching activities paved the way for the real world contributions of Josiah Meigs to the development of an American system of weather observation. The negative examples of Mackenzie and Forster at least sparked self-awareness within scientific elites of the problems existing in meteorology, and the need for some sort of institutions with gate-keeping functions to exclude Mackenzie-like characters from potentially hijacking the discipline. Newspapers and periodicals eventually began speaking Howard's language of cloud classifications, and many concerned themselves with the same preoccupations as the weather watchers had been tracking for years. Revolutionary the weather watchers were not; transformative they were not. Their small contributions would ultimately be dwarfed by the sea change in meteorology that occurred with the development of forecasting in successive decades. In 1832 noted Scottish physicist James David Forbes addressed a report on the science of meteorology to the British Association for the Advancement of Science in which he decried the state of the discipline. He complained that meteorological instruments were "toys" in the hands of the general public, and "much time and labour have been lost in making and recording observations utterly useless for any scientific purpose."[143] Reams of systematic weather data *would* ultimately become useful—as baselines for forecasting—but not in the way the weather watchers originally hoped.

Nevertheless, the weather watchers present some of the clearest and most compelling glimpses into the environmental consciousness of weather and climate that prevailed in the United States and Europe during the Cold Decade. The dual-layered worlds they constructed were structurally similar to those created by various other people in the Cold Decade, but it is the weather watchers' penchant for minute observation, description and analysis—whether scientifically persuasive or not—that enables us to see the anatomy of this consciousness in the finest detail. The diarists, doctors, arguers or travelers were rarely so precise or explicit. The weather watchers, for all their faults, left us an unusually clear record of their thoughts.

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[143] Janković, 165-67 (quoting J.D. Forbes, "The Report on Meteorology," *Report of the British Association for the Advancement of Science, 1832* (London: John Murray, 1833), 7).

## CHAPTER V

## "HEAVEN SEEMS TO FROWN"

Thomas Robbins, venerated minister and book collector of East Windsor, Connecticut, was quite compulsive about his diary. He made his first diary entry, just seventeen words, on New Year's Day 1796, when he was 18. Except for very brief breaks, most due to illness, he recorded a diary entry every day of his life for the next 58 years, most of them on the interleaved blank pages of farmer's almanacs. As a result of his regular writing habits, Robbins's diary—ultimately published in two volumes in 1886—serves as an impressive and comprehensive daily record of the entire first half of the 19th century, including the entirety of the Cold Decade.

Robbins wrote often about the weather. His short notations of daily weather mingled among terse accounts of church business, visits, deaths and funerals, sermons, crops, and items in the news. His entry for August 31, 1809 was typical of his style:

> Rode to East Windsor. We have had probably the coolest summer for many years. There has not been but a very few, perhaps five or six hot days. The English harvest was very light, and the prospect of the corn still poorer….Heaven seems to frown. May its frowns bring us to repentance. Warm. Received a letter from the church, calling us to convocational council at Hartland. Generally people are but just beginning to have green corn.[1]

Robbins's diary contains a record of every significant weather and climate event that was experienced in New England during the Cold Decade. Cold Friday, January 19, 1810, Robbins describes as a particularly "tedious" day, with fewer people in the streets

[1] Thomas Robbins, *Diary of Thomas Robbins, D.D., 1796-1854*, ed. Increase N. Tarbox (Boston: Beacon Press, 1886) I:409.

than he'd ever seen; he remarked, "I was very cold," and noted that he read Shakespeare on that day.[2] During a heat spell in early July 1811 he noticed "the sun and moon appear unusually red," possibly a result of volcanic particulates from the eruption of Mountain X.[3] Robbins noted the great snow of Christmas 1811, seeing the Great Comet that year, and the Great September Gale of 1815.[4] There are also personal trials and calamities, of which he wrote in the same blank matter-of-fact style as he used to communicate the weather.

Often the two were intertwined. In late June 1812, in the midst of a warm spell—the temperature was 88° F on June 20—Robbins learned of the American declaration of war against Great Britain. He "procured some liquor" that day, an exceedingly rare lapse for a pious clergyman.[5] In October 1813 Robbins's father, also a clergyman, died of dysentery. "Our house is extremely gloomy," he wrote the next day. "Its glory is departed." The entry ends with the word "Cold."[6] On the occasion of another death, a neighbor he comforted in her final illness, he wrote:

> Visited Mrs. Loomis, a neighbor. A little before one o'clock, while I was present, she expired. She has been in decline half a year. Saw blossoms on some of the trees. The first I have seen. I suspect they have never been later.[7]

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[2] Ibid., I:424-25.

[3] Ibid., I:482.

[4] Ibid., I:499, 500, 642.

[5] Ibid., I:518.

[6] Ibid., I:569-70.

[7] Ibid., I:514.

The rise and fall of Robbins's—and his congregation's—moods and fortunes seemed often to track the weather. In January 1814, Robbins was attacked in mid-speech by "a crazy man" who broke into the church, rushed the podium and tore his sermon out of his hands. This was in the midst of a bitter cold snap with temperatures well below zero. The next day Robbins encountered "the crazy fellow" again; after noting he was thrown out of the house, he recorded, "The thermometer was below 10° all day, and between eleven and twelve o'clock at night it was 9° below zero."[8] The convergence of weather, Robbins's personal mood and the health of his congregation was never more evident than his entry on New Year's Day, 1815:

> Wrote notes and preached in the forenoon...The season was uncommonly interesting and solemn…The church, I believe, was more numerous than I have ever seen on a similar occasion...There have been eighteen deaths in ths place the year past. At evening attended the conference. The day was very pleasant. The thermometer above 50°. Will a merciful God spare me this year, and make me wholly devoted to his service. Am feeble with my cold.[9]

In the beginning of June 1816, at the height of the Year Without Summer anomalies, Robbins's diary similarly wove its way through his mental states along with the strange weather. "I am very much oppressed with anxiety," he wrote on June 7, in an entry in which he also recorded great injuries to crops from cold and frost, and that people going about in the street did so in greatcoats. By the end of the month, after cold snaps and warm spells, "refreshing" showers, local people "alarmed at the small quantity

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[8] Ibid., I:580.

[9] Ibid., I: 615.

of hay" and a time during which he was sleeping much more than was usual for him, Robbins stated, "I pray for divine teaching and assistance."[10] Robbins's moods and health seemed to track, often with very close precision, the course of the unusual weather.

Thomas Robbins's diligent attention to his diary was unusual, but his attention to the weather was not. He was but one of numerous people, men and women, farmers and clergymen, highly pious or not, who made the weather a central part of the recollections of their lives during the Cold Decade. Modern eyes tend to skip over the simple notations that appear in the diaries of Robbins and others: "Cold," "The roads very wet," "Cold and tedious," "Very warm." But these simple words form in the aggregate more than a record of weather in a particular place as experienced by individuals: they become something of a key, with which modern historians can unlock—or at least try to decipher—the environmental consciousness of the people who lived in this time.

[10] Ibid., I:670-74. While not relevant to the content of either of their diaries, Robbins's happens to contain an interesting connection to another diarist dealt with at length in the subsequent chapter. In June 1815 Robbins encountered a Reverend Samuel Sewall from Boston, who preached a guest sermon at his church. Robbins did not like him much, commenting, "He appears to know but little about religion, doctrinally or experimentally." Ibid., I:630. Samuel Sewall was a cousin of Sophia Sewall Munroe, whose 1812 diary, which also contains a great deal of weather-related material, gives us one of the more colorful insights into the way people conceived of their environments during the Cold Decade.

# CHAPTER VI

# THE DIARISTS

In the decade of the 1810s, people from various countries, regions and walks of life—as they had done long before and continue to do today—chronicled their lives and thoughts in personal journals and diaries. No less so than anyone else, diarists of the Cold Decade viewed their environment in two distinct layers: the local, encompassing the stuff of their occupations and daily lives, and the broader, encompassing everything else. Because diaries and journals are such personal documents, these writings display with unique insight and clarity the very personal ways in which people sought to reach out and touch, define and understand the layer beyond the local. Diarists sought to define and understand the broader layer by bringing it into their daily lives—exploring it firsthand, conquering it through personal intimacy. This chapter will offer a survey of this effort to define and understand the broader layer through a host of case studies of individual Cold Decade diarists and the journals they left behind.

The diarists' engagement with the broader environmental layer mattered because it enabled them to memorialize the events of their own lives and give them meaning by placing them in a larger context. This is, to some degree, inseparable from the larger question of why people chose to keep diaries at all—a difficult question to answer, as we will see. It is not as simple as assuming that weather diarists fancied themselves as budding weather watchers, or that people primarily recorded only weather events that directly affected them, for example, a storm or other weather event that impeded travel or caused a person to change their personal plans. Dozens of non-scientific diaries containing weather records make no explicit attempt to link them to life events. Why, then, would someone choose to devote half of a day's two-sentence diary entry to noting clouds or the temperature, leaving only a few bare words for the human events of the day? Such questions force us to challenge the assumptions we may unconsciously have about weather, and necessitate inquiries into identity and psychology as well as meteorology and climatology. The weather diarists of the Cold Decade held their motivations close to their hearts, so close perhaps in many cases that even they might not be able to explain why they did what they did.

A possible answer is that weather and climate formed a key—but perhaps undefinable—part of the personal, emotional and spiritual existences of people in their day-to-day lives. Simply put, weather and climate were integral parts of people's lives, and as such they were no less appropriate subjects for memorialization in diaries than social events, family dinners or financial transactions. A survey of Cold Decade weather diaries clearly shows the division of worlds into the same dual layers, local and planetary/cosmic, that I discussed in the context of the weather watchers. The context and content of the layers themselves varied depending on the individual and his or her occupation, socioeconomic situation or spiritual persuasion, but the theme of duality repeats itself over and over again in many different diaries. That people saw the distinction between these layers is interesting enough, but most fascinating are the diaries where the layers converge—in essence when each layer becomes equally relevant to the diarist's daily life, and where events in one are closely connected to events in the other.

The Cold Decade with its bizarre and unmistakable weather and climate events provided a plethora of circumstances to foster this convergence. This is why diaries from this period containing weather information are worth study, although journaling weather was obviously not endemic to the Cold Decade.[1] It is through these diaries that we can glimpse what weather and climate meant to ordinary people as they experienced it, day after day, as but one of the many events, both momentous and prosaic, that crowded the pages of their diaries.

Given how common diary-keeping seemed to be in the English-speaking world at the beginning of the 19th century, the amount of potential source material for this investigation is large. My investigation of Cold Decade diarists focused upon people who left behind written journals—not letters or memoirs composed after the fact—dating from the relevant decade containing significant weather information, but whose sole or primary purpose was *not* to record weather or climate data in any systematic way.[2] As this analysis is more in the nature of a general survey of what people wrote about weather and climate and how they wrote it, *quantitative* analysis of diary entries—who wrote about weather how often, or how many entries contain comments on weather compared to those that don't—is not relevant.[3]

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1 Just to be clear, I am not arguing that there is some characteristic or phenomena regarding personal weather diaries written between 1809 and 1820 that represents a stark discontinuity with other periods of time. Consequently, the question of whether people in the Cold Decade wrote about weather in their diaries "more often" than they generally did in any other time—an unanswerable question, to be sure—is not relevant to this analysis. I maintain that the Cold Decade is significant in itself as a subject of study—see the arguments for this set out in detail in Chapter XIV (Conclusion)—and the resource of personal diaries provides us a useful window into understanding environmental consciousness in this time.

2 Given this criteria, Thomas Jefferson's weather book, being *primarily* a record of weather conditions, is not a "diary" within the scope of this chapter, while Isaiah Thomas's extensive journals, which do often contain specific records of temperature or wind conditions, are. Thomas, as we will see, used his journals to document the general events of his daily life, one of those events being weather conditions. This is the key selection factor.

3 It is not entirely fair to say that the diaries I analyze in this chapter are truly "random," in the sense of a set of sources derived completely by the luck of the draw, like selecting ping-pong balls with lottery

As a result, the diarists are something of a heterogeneous bunch. While it is theoretically possible to group them roughly on some conceptual basis—I analyze, for example, several diaries from New England women that are similar in tone and approach[4]—such an organization runs the risk of drawing more attention to the boundaries and meaning of those conceptual subcategories than to the substance of the environmental consciousness contained within the diaries themselves. Consequently, the best way to present the case studies is chronologically, although because the diaries span different lengths of time this organization is somewhat rough.

Isaiah Thomas: The Dual-Layered Ledger

By 1809, the beginning of the Cold Decade, Isaiah Thomas, one of the most famous and prosperous Massachusetts publishers of the Revolutionary era, had been retired from his business for seven years. His son now ran the presses, and Thomas, now 60, tended to his private affairs at his house in Worcester, which would eventually include the founding of the American Antiquarian Society. Thomas was a compulsive diarist, keeping a voluminous record of his later years in the interleaved pages of the almanac that was printed under his name. After his death in 1831 his diaries—which span

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numbers on them. While I suppose there is an element of "randomness" to the fact that Sophia Sewall Munroe's diaries, which happened to contain significant comment on weather matters, happened to find their way into the Massachusetts Historical Society archives—thus coming within the ambit of my research—while the potentially much more extensive diary left by some unknown man from New York City did not, I exercised no selection bias (of which I am aware) other than determining whether a diary contained enough substantive comment on the weather to bear analysis. As you will see, in some cases even one- or two-word weather descriptions in a few scattered entries, without more, rise to the level of inclusion in this chapter. Because my analysis is an intellectual and conceptual one, and my argument does not depend on assertions that X or Y happened *more often* or *more extensively* than W or Z, the quasi-randomness of my source group should not matter much.

[4] Those being Betsey Graves Johnson, Mehitable Sullivan Cutler Amory, and Susan Heath.

the entirety of the Cold Decade—were ultimately conserved in the archives of the historical society he is famous for founding. Most of his individual entries consist of only one or sometimes a few sentences, but taken together they provide a rich and expansive look at Thomas's daily life and his vision of the worlds around him.[5]

September 1809 was an abnormally cool month in Worcester. On the first and second days of the month Thomas recorded in his diary simply "Cool mornings." He noted unusual cold several more times in September, then a succession of considerably warm days in October. On October 27, 1809, he wrote that the day was "mild for the season." Throughout this period he also noted various events in his personal life: the failure of a brokerage firm with which he had invested, losing $5000 (September 7); attending sessions of the Massachusetts Supreme Court (September 26-27), and various dinners and visits by family members (late October). The coexistence of these matters—weather events and personal history—in Thomas's diaries is illuminating, because he enforced a clear demarcation line between them. His weather observations appeared on one page, usually following the printed almanac page for that month, but the personal history events were written on a separate page. Thus each volume of his journal really consisted of two diaries: one the history of Isaiah Thomas the man, and the other the history of the meteorological and environmental world in which he lived.[6]

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5 Isaiah Thomas, *Diary of Isaiah Thomas 1805-1828*, ed. Benjamin Thomas Hill (Worcester, MA: American Antiquarian Society, 1909) I:x-xi; Isaiah Thomas, Diary, Isaiah Thomas Papers 1748-1874, American Antiquarian Society, Worcester, MA. This version of Thomas's diary is heretofore referred to as [published version].

6 Ibid., Vol. 6, September-October 1809; Thomas, *Diary* [published version], I:74-76.

Sometimes weather events, usually extreme ones, crossed this boundary between Thomas's twin diaries. On January 19, New England's "Cold Friday," Thomas noted the abnormally cold weather and made a notation of the temperature. The following day, in the section recording personal history, he recorded prosaically that he lent five dollars to a Mr. Sheldon, and then spoke of the weather: "This day the mercury fell to 12 degrees below zero…The wind so forcible as in some places to unroof houses."[7] He also wrote of weather in his personal history section when it directly affected him, such as when disagreeable rainy and snowy weather impeded a trip to Boston in January 1812, forcing him to change from a sleigh to a stagecoach which then became mired in snowdrifts six times.[8] But for the most part Thomas enforced the separation between his diaries until the end of the notable decade. In his weather section he wrote at the end of January 1819 a sort of meteorological summation of the month, as he often did: "This month, in this part of the United States has been remarkably mild…the 29th was the only very cold day…The day following was very temperate." The same days in his personal history section—January 29 through 31—record a cramp in his foot, the purchase of a ticket for the Union Canal Lottery, and getting over a cold. The only mention of weather is a note, "Ground continues bare."[9]

The formal duality of Thomas's journal is a uniquely stark example of the dual-layered worldview into which many people during the Cold Decade organized the

[7] Thomas, Diary [unpublished version], Vol. 6, January 1810; Thomas, *Diary*, I:81-82.

[8] Thomas, Diary [unpublished version], Vol. 7, January 1812.

[9] Ibid., Vol. 8, January 1819; Thomas, *Diary* [published version], II:3.

spheres of their planetary existence. The pages in Thomas's journals recording weather events evoke the observational fastidiousness of the weather watchers, but the coexistence of these pages with the events of his life, recorded in much the same way, demonstrate that there was more at work here than simple observation. Thomas's diaries, organized almost like business ledgers, display that the two layers of his world were often separate, but never truly out of reach of one another.

### Alexander Everett: Russian Spring

Alexander Hill Everett of Boston—older brother to the politician, statesman and orator Edward Everett—fell into the orbit of John Quincy Adams in his mid-twenties. In 1809, when Adams was posted to St. Petersburg as the American Minister to Russia, Everett accompanied him and served there as Adams's personal secretary. His diary provides a rich record of diplomatic and social life in St. Petersburg during the reign of Tsar Alexander I, but remarks on weather and climate in a variety of contexts are intricately woven into the pages of his journal.

Everett began by describing a sunset he observed over the Gulf of Finland, while still on the ship traveling to St. Petersburg. "On the western side," he wrote, "the sky assumed a richness and variety of colouring that I scarcely ever observed before." He described the vivid purple glow of the sky, subsiding into a yellowish cast that became a brilliant scarlet. This was on October 20, 1809, seven or eight months following the eruption of "Mountain X," during a time when particulates in the atmosphere from this eruption may still have caused especially spectacular sunsets. Nevertheless, the winter of 1809-10 was less severe in Russia than usual; on the first of March, the day Everett marked as the beginning of spring, he noted that the weather "is not at all more severe in this place than it would have been in my native Boston."[10]

Nevertheless, he *was* still in northern Russia, and the climatic conditions that were different from his native Boston naturally attracted his notice. Everett wrote on April 20:

> Notwithstanding the lateness of the season the ice still continues fixed in the [Neva] river. The bets begin to increase on the subject. They are generally placed on the 15th or 22nd [old style] or some where about there. This is an extremely favorite subject for wagers. Large sums are every year lost and won [from wagers on the date the ice will begin to break up.].[11]

The last of the Neva's ice finally melted on May 16. Although the Russian winter was not as severe as expected, it had lasted longer than usual. "Continental rains and fogs make it appear more like April than June," Everett wrote in the late spring, and later noted that the air first began to "smell a little of summer" on July 6. Observations such as these pepper the journal at irregular intervals, with the bulk of many entries detailing diplomatic and social business and his impressions as a patrician Bostonian in the odd locale of Tsarist Russia.[12] Everett's local world was one of diplomacy and the colorful richness of political and social circles in Russia's European capital, but the broader scope of weather, usually frigid, was seldom far from his consciousness.

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[10] Alexander Hill Everett, Alexander Hill Everett Diary, 20, 131, Box 1, Massachusetts Historical Society, Boston, MA. Everett's observance of March 1 as the beginning of spring was not unusual. Some people in this era conceived of seasons beginning on the first calendar day of the month during which the astronomical change of season occurred; winter, with its astronomical beginning at the winter solstice usually on December 21 or 22, would "begin" December 1, summer on June 1, etc.

[11] Ibid., April 20, 1810.

[12] Ibid., May 16, June 4, July 6, July 23, 1810, March 22, 1811.

Aaron Burr: Fish out of Water

Living in Europe in self-imposed exile after making too many political enemies in America, former U.S. Vice-President Aaron Burr kept a diary in 1810 and 1811 that chronicled his wanderings on the continent. His journals dealt with social invitations, dinners, sightseeing and his impressions as an American of foreign lands. Many of Burr's entries take the form of letters to his beloved daughter, Theodosia Burr Alston.[13]

Burr also noted meteorological events in an irregular, non-systematic way. On January 15, 1810, near Weimar, Germany Burr met a man "who keeps regular meteorological notes," and who told him the cold that day—20° below zero—was a ten-year record. The summer, which he spent in Paris, was cold, and like many of his contemporaries in the Cold Decade Burr characterized cold days by wishing for a "good fire, but see none." The next winter was also cold. He seemed to become more interested in weather as the season wore on, writing of it more often throughout January 1811. In that month he bought a thermometer. Many of his entries thereafter contained weather and temperature data—not weather-watching per se, but something akin to it. Yet Burr's diary was never a data journal. Communicating his daily actions, thoughts, feelings and messages to Theodosia seemed to be his paramount reason for writing.[14]

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[13] Theodosia's famously mysterious fate may have had much to do with weather disturbances. Hurrying to the side of her father who had recently returned to America, she sailed from Georgetown, South Carolina toward New York aboard the schooner *Patriot* on the last day of 1812. The ship vanished with all hands lost, including Theodosia. Nancy Isenberg, *Fallen Founder: The Life of Aaron Burr* (New York: Viking, 2007), 387. Despite persistent romantic tales of pirates and Indians, the *Patriot* was most likely wrecked in a storm off Cape Hatteras in early January 1813. Pieces of the wreckage are said to have washed ashore. Edward Rowe Snow, *Strange Tales from Nova Scotia to Cape Hatteras* (New York: Dodd, Mead, 1949), 288-304.

[14] Aaron Burr, *The Private Journal of Aaron Burr* (Rochester, NY: William K. Bixby, 1903), I:375; Ibid., I:463; Ibid., II:69-104.

As an American in a foreign land, Burr, like Alexander Everett, was a fish out of water on the local level, where most of his journal was focused. But, also as with Everett, in Burr's case the higher layer, encompassing weather, atmosphere and climate, touched his local world in unique and unexpected ways. Russian gentlemen making a profitable gambling enterprise out of the melting Neva (from Everett's diary) and the coldness of the seasons that prodded Burr to dabble flirtatiously with weather-watching (from Burr's) each represent a form of transcendence from the local to the higher world. This is the most basic form of transcendence, and the line between the worlds is fairly stark. In that sense Everett and Burr are more similar to Isaiah Thomas's ledger-like separation. This was but one conceptual approach to the dual-layered consciousness, and certainly not a universal one.

### David Greenough: Down on the Farm

From the 1790s until almost the time of his death in 1826, David Stoddard Greenough of Roxbury, Massachusetts kept a series of diaries chronicling the life of his family's farm at Jamaica Plain. During the Revolution Greenough had been a member of the Sons of Liberty and made his trade as a lawyer in addition to owning farms in Massachusetts and the West Indies. The farm diaries from the Cold Decade contain detailed records of when he planted particular crops, the production of certain commodities ("cheese cyder," for example) and the weather. Greenough was not a weather watcher but did evidently have access to a thermometer, as he occasionally recorded specific data. The sale of agricultural commodities—fruit, cider and especially firewood—was a key part of his day-to-day business. Consequently, like the weather watcher Thomas Jefferson whose livelihood depended on agriculture, the environmental layer of Greenough's world was up close and personal, and it warranted much attention in his journals.

"Memo," he wrote down in October 1809. "The first ten days of Octo. were extremely warm—FryDay the 6 & Tuesday 10 were as hott [sic], or hotter, than any days past summer." On the Cold Friday of January 1810, he noted with emphasis, "*Extream cold*. Therm 4 below 0." He reported frost in September 1812 that damaged "corn still in the milk." Later in that abnormally cold fall he observed that the previous summer "was remarkable for there being very little fruit of any kind," with a dearth of cherries, apples, pears and peaches. As the profitability of his Massachusetts farm depended on this sort of bounty, these seasons were, like the cold and drought-ridden Cold Decade years at Monticello, economically lean ones.[15]

The hurricane of September 1815, however—the "Great September Gale" that struck New England, probably the worst hurricane to strike the region between the coming of white settlers and the 20th century[16]—proved a boon to Greenough's fortunes. The season was warmer that year, and "cyder" was again available; but on September 23, the "*most ferocious Gale of Wind*" destroyed vast numbers of trees in Massachusetts and the surrounding areas. Greenough set his employees to work collecting downed trees and splintered branches to sell as firewood. "Gott [sic] in a load S. from above Garden," he

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15 David Stoddard Greenough, David S. Greenough Diaries, Box 37, Massachusetts Historical Society, Boston, MA, October 1809; January 19, 1810; October 1811; September 1812; November 1814.

16 Sean Munger, "The Great September Gale of 1815," *Slate*, September 25, 2015, <http://www.slate.com/articles/technology/future_tense/2015/09/the_great_september_gale_of_1815_and_the_way_we_think_about_the_weather.html> (visited April 13, 2017).

noted on the 29th, and similar notes frequently appeared in the succeeding month. The ready supply of firewood provided Greenough an income stream for at least the next 18 months. As late as January 1817 he provided in his journal an accounting of all the firewood he sold to various buyers, “All blown down in Sept. 1815.” For once the extreme weather delivered opportunity and not hardship.[17]

For David Greenough, the layers of his world, the local and the cosmic, were almost congruent. His day-to-day existence was centered on the farm, a setting in which the environment was a paramount factor, but Greenough seems to have made the leap to the broader layer more easily than most. The almost cosmic occurrence of a hurricane was another day at work, and provided another economic opportunity. Indeed, the weather of the Cold Decade was almost a not-so-silent partner in the agricultural business. This approach contrasts with the stark divisions of Thomas.

<u>Betsey Graves Johnson: God’s Unworthy Servant</u>

Diaries written by women, especially religious women of New England, often took an approach to weather and climate different than that of men. Male diaries—again, Isaiah Thomas’s being an archetypical example—tended to consist of brief entries taking up one or a few lines, much like entries in a business ledger. Diaries of women, like Betsey Graves Johnson of Nahant, Massachusetts, were often more free-flowing, less rigid and much more personal and introspective. Religious matters and personal moods competed with domestic affairs for the chief subject of attention by many female Cold Decade diarists. When they referenced weather and climate—as they often did—the

[17] Greenough, Diaries, September 23, 29, 1815; October 1815; January 1817.

references were usually couched in explicitly religious terms, something largely missing from the male diaries.

Betsey Graves was 20 when the Cold Decade began, unmarried; she would not wed Joseph Johnson until the decade's end. The extant volumes of Graves's journal began in 1812. Most of the events she recorded involved social visitors to the house where she was living, teaching school, and embroidery or sewing; the knitting of a fishing net, for example, was a project that dominated much of her time. But a large portion of the diary was religious. Though Graves was always devout, she had a religious revelation during 1814 that caused her to double down on her faith. Her references to weather previous to this revelation are interesting when compared to those, much fewer in number, that followed.

"Sunday [May] 3d [1812]. Very very cloudy and cold," Graves, then age 22, wrote. "I have hardly been outdoors all day…The storm continues never was known so cold this season of the year before." She often characterized weather events as storms. A period of June 1812 was to her "very cold and stormy," and she called snowfalls in November 1814 "severe snow storms." Before her religious experience she made frequent religious references that emphasized how she saw her life totally at God's mercy. "6th Wednesday [May 1812]. By the blessing of god [sic] I have lived another day."[18]

The hurricane of September 1815 was a memorable event for Graves, and one that caused the layers of her world to unite for a brief time. She reported on September 23 that

[18] Betsey Graves Johnson, Journal, May, June, November 1812; January, March 1814, Massachusetts Historical Society, Boston, MA.

"this day we experienced a very distressing tempest such as was never known by the oldest person living." She chronicled the damage—five local men wounded, barns and sheds destroyed, great quantities of trees blown down and torn up, etc.—and then lapsed instantly into a religious evaluation of the event. "O that it may prove," she wrote, "the happy means of awakening and quickening us to repentance, then we shall have reason to rejoice that God has visited us."[19] Her entry a week later struck a similar tone, but went deeper in its connection of weather events to religious devotion:

> Been reading accounts of the terrible effects of the tempest last Sat. in Providence and Newton how greatful [sic] ought we feel that God was so favourable with us, we thought it very severe in this town but nothing compared with there. O may our love and gratitude abound according to his goodness toward us may we feel our undeservedness, of such distinguished goodness.[20]

It is unclear to what degree the hurricane or other weather events might have changed Betsey Graves's outlook, but in this passage lay a foreshadowing of what her journal was eventually to become. By 1816 she had almost entirely ceased talking about the weather or noting weather events and seasonal trends. Her narrative was now almost exclusively an internal religious monologue, stressing, as did the September 30 entry, her perceived deficiencies as a human being and her unworthiness of God's love or redemption.[21]

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19 Ibid., September 23, 1815.

20 Ibid., September 30, 1815.

21 Ibid., 1816, *passim*.

For Betsey Graves, like David Greenough, there was only the thinnest tissue between the local layer and the broader one. Graves interpreted the broader layer explicitly as the domain of God, but in her evaluations of the meaning of God's works on a local level—the intercession of weather events like the September Gale—one sees the broader layer reaching down to touch the local. In fact, intellectually and conceptually, it was the reverse: Betsey Graves was reaching out with her mind and spirit, grasping from the rocky spit of Nahant, Massachusetts to touch the realm of God as she perceived it. There are few more compelling and personal views of the dual-layered environmental consciousness from the Cold Decade.

Sophia Sewall Munroe: The Squirrel Whisperer

From the pen of another New England woman, Sophia Sewall Munroe, came a diary extraordinarily rich in evidence of environmental consciousness. Sophia Sewall hailed from York, Portland and Wiscasset, Maine. Presumably it was near here where her diary, which she began in 1812 when she was 24, records her vivid impressions of both the world around her and the divinely-constructed cosmos of which it was a part. Here is one of her early entries:

> March 1st, 1812. Spring is ushered in amid the war of elements—or rather just as the sun regains her shining station—often repeated storms of snow & wind…for the Almighty hand that waves the darkening clouds & gives fortitude to the tornados blast—tempers the wind to the 'shorn lamb' & preserves us safe throughout the howling furies of the troubled elements which during this *receding* winter have raged louder & longer, than for twenty years before.[22]

[22] Sophia Sewall Munroe, Diary, March 1, 1812, Massachusetts Historical Society, Boston, MA (emphasis in original).

Sewall was an observer of environmental events from afar as well as in her immediate surroundings. In the spring of 1812, as much of the country was still talking about the great earthquakes near New Madrid, Missouri, Sewall recorded that "[r]epeated & dreadful acts of earthquakes almost daily meet our anxious gaze, as we read the public prints." She took notice of earthquakes not just in America but overseas as well. Given her religious faith, her prophesying of imminent end times was curiously optimistic:

> [H]ow alarming! [are the earthquakes.] & does it not portend the final & speedy dissolution of all things here below—wars, & rumors of wars, pestilence, famine & every evil resident to man, seem now abroad in the earth & loudly emphatically warn us to be ready to meet God. Alas we are as of yesterday I know nothing—& the coming events of each day we hid from our view—but this source of joy & gratitude unspeakable, that the sovereign disposer of our lives, does all things well.[23]

Her moods shifted quickly, as did her identification with the layers of her world. Only a few days later an excursion with family into the forest became the occasion to commune with nature:

> Yesterday very cool for the season, but the eve beautiful in the extreme took long walks in the fields & woods with Mama, Julia & Henry, stood on the margin of any romantic pond, the scene was silent lovely & sublime. Scarce a [illegible] the foliage of the fall vines, & for wheat reared their stately heads high in the wind—while the various little shrubs & trees and larger growth—just putting forth their swelling limps, promise a verdant, fragrant, brightly coloured & rich tapestry...I held several conversations with the 'feathered tenants of the grove,' the spry squirrels of the forests…[24]

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[23] Ibid., May 15, 1812.

[24] Ibid., May [exact date not given], May 25, 1812.

Sewall's entries in this period—and intermittently for several months afterward—sporadically referenced beautiful mornings and evenings and described spectacular sunsets. Mention of notable sunsets or sunrises in Cold Decade sources can often be correlated with the volcanic eruptions that likely contributed to them, and it is true in this case also: during the spring and summer of 1812 the global atmosphere was suffused with particulate matter from the eruption of Mt. Soufriere on April 30. "From a dawn of orange & crimson," Sophia wrote, "[it] soon terminated in the pale blaze of a glorious sun." Sewall was a glorious painter with words.[25]

Though her 1812 diary was extraordinarily vivid, Sewall's pen became considerably more reserved for the remainder of the decade. She married Edmund Munroe on August 8, 1815 and moved to Boston. Her surviving diaries after her marriage contained no comparable passages of epiphany, whether environmental or divine. Perhaps the experience of marriage restrained her emotions or substituted a different set of priorities whose passions never made it to the pages of her journal. She died in 1878.[26]

Like Betsey Graves Johnson, Sophia Sewall Munroe sought actively to engage with the broader environmental layer of her world, and like Johnson, that broader layer was intimately connected with God. Yet Sophia's God seemed to have cloaked himself more directly and literally in the robes of nature: sunsets, the colors of the forest, and squirrels, as well as mighty emblems of wrath like earthquakes and tornadoes. Here we

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[25] Ibid., May [exact date not given], September 16, 20, 1812.

[26] "Barrell Grove, York, 1800," *Maine Memory Network* <https://www.mainememory.net/artifact/16930/enlarge> (visited April 18, 2017). At that link is an image of a watercolor that Sophia Sewall Munroe painted in about 1800 of her family home; it is possible it is the place where she wrote some or all of her diary.

see another example of the layers touching one another, permitting the hand of the almighty to intervene directly on the local level.

John Marsh: Suffering Husband

John Marsh, born in Dorking, England in 1752, was the most prolific English composer of the late 18th and early 19th centuries and one of the most important documentarians of the British musical realm during this period. His extensive diaries spanned 37 volumes and chronicled his entire life, from his early childhood (written later as a series of reminiscences) until only a short time before his death in October 1828. As such Marsh's diaries include virtually every significant experience of his life, but as he was first and foremost a composer, much of his diary concerns musical matters.[27] Nevertheless weather and climate creep into his life story with regularity.

Marsh lived in Chichester, England during the Cold Decade. Some of his entries detailed weather events that he perceived as unusual and which had a direct day-to-day impact: for instance, the January 1809 storm that blew down branches—one crushing the roof of Marsh's coach-house—and flooded his cellar to the depth of 16 inches. His penchant for colorful description and detail paints a vivid picture of some of these events, such as the cold snap of January 1814 about which he wrote:

> The frost being harder than ever at the end of the week, Mr. Baker [local clergyman] found it impossible, from the oil being frozen in the tubes, to light the lamps of the chapel; as it was also very slippery walking for the people to [be] outside in the dark, the second service therefore on Sunday

27 *The John Marsh Journals: The Life and Times of a Gentleman Composer (1752-1828)*, ed. Brian Robins (Stuyvesant, NY: Pendragon Press, 1998), *passim*.

> the 23rd was at A.M. (with only the pulpit candles lighted) instead of evening.[28]

The principal drama of Marsh's life in this period was the condition of his wife, Elizabeth. Suffering from gout and probably various other conditions, her health was fragile during the Cold Decade and deteriorated slowly and steadily. Marsh recorded her frequent illnesses mostly dispassionately, yet his careful non-emotional words seemed to mask his own deep anxiety and anguish at her long suffering. Yet even during Elizabeth's worst spells, such as in the summer of 1816, Marsh found time to remark on weather and climate events. In August 1816 he commented with the oft-repeated words that it was "a remarkably backward season" and "there still wanted sunshine to ripen the corn." As Elizabeth rallied and deteriorated alternately over the next two and a half years he continued to record incidents of high winds, uncommonly hot and cold spells and other events.[29]

Elizabeth died in January 1819. After only a few poignant words in his journal about her—they had been married 44 years—he went on a tour to Scotland, then returned to his music, religious and charitable activities in Chichester. His observations of weather became more detailed. In January 1820, for example, during a cold spell he noted various thermometer readings. "The wine in the bottles was also frozen," he wrote, "as was in the course of the night the salt water in the bottle in my room window. There being a new moon on this day, I now began to look for a change of weather." Though never a strict

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28 John Marsh, *A History of my Private Life* (Diary), Vol. 27, 93, Huntington Library, San Marino, CA; Ibid., Vol. 30, 26. This January 1814 cold spell in the British Isles was the same one that gave rise to the famous "Frost Fair" on the River Thames, the last ever held in British history. See Chapter XIII.

29 Marsh, Diary, Vol. 31, 65-66; Ibid., Vol. 32, 9, 45.

weather-watcher, Marsh had an obvious interest in atmospheric and astronomical phenomena, evidently sparked by a meeting with William Herschel years before; as we have seen, the line dividing meteorology from astronomy or any other form of sky-study was generally quite thin.[30]

John Marsh, struggling to continue his musical occupation while coping with the burden of his wife's long illness, seemed to hop across the gap to the cosmic layer as almost a form of mental escape: when he was writing about the weather his mind was momentarily elsewhere from both his musical work and Elizabeth's suffering. This, too, is a form of reaching out and touching the broader layer, though not as personal or religious as the New England women. But Marsh's broader layer was a way of contextualization as much as an escape. By noting the weather, the atmosphere and the stars, Marsh may have been establishing a larger and more important picture into which his personal sufferings fit—a way to give meaning, perhaps, to personal loss by appealing to a cosmic order. This is reminiscent of the religious approaches of Johnson and Munroe, but without an explicit appeal to God.

### William Lodge Kidd: Starving in Armagh

A vivid and unique example of world-layers converging comes from the journals of William Lodge Kidd. An Irishman who was later to achieve minor fame as a physician, Kidd was born in County Armagh, Ireland in 1784 and went to sea in the British Navy during the Napoleonic Wars. While in the navy Kidd began keeping a

[30] Ibid., Vol. 32, 176-77; Brian Robins, "John Marsh," *Oxford Dictionary of National Biography* <http://www.oxforddnb.com/view/article/18113?docPos=2> (visited April 18, 2017).

journal. As seafaring was his business, the local layer of his world was never very far from the cosmic and environmental layer. He recorded gales and unusual rains in the manner typical of Cold Decade sailors, but as Kidd had medical training, his observations included another environmental factor: disease. Three times in 1812 alone, while serving aboard the *HMS Bacchante*, he specifically linked weather conditions to the incidence of sickness aboard ship. “The weather has been very unsettled during the last week and still continues so,” he wrote on September 27. “[I]ts heat is very much reduced, and in consequence the numbers of people suffering by disease from it have reduced.” In February 1814, while off the Italian coast, the *Bacchante* sailed through a severe storm that Kidd characterized as “almost a hurricane.” He said, “The cold has also been greater than any I have felt since I left the Baltic,” with a reading of fifteen degrees below zero noted on February 24. “We have upwards of 10 cases of pneumonia on board, and as it may well be supposed the Cold is increasing their disease very much.”[31]

Kidd left the navy in 1816 after the conclusion of the war and returned home to Armagh. It was here that the layers of his world, already fairly close during his seafaring days, became nearly congruent. Though he evidently practiced medicine in Armagh there is little mention of it in his journals. Crops and environmental conditions, however, are paramount. He had the misfortune to become a farmer as the Cold Decade anomalies were reaching their destructive climax. The climate, agricultural and social effects of the Year Without Summer were much more pronounced in Europe than North America, and Kidd’s journal reflects this. During a drought in the spring of 1817 he wrote:

[31] William Lodge Kidd, Journal 1806-1818, Vol. 9, September 27, 1812; Ibid., Vol. 12, February 24, 1814, Huntington Library, San Marino, CA.

> [April 20, 1817] For the last three weeks we have had scarcely one drop of Rain…the land is extremely hard and lumpy requiring to be broken down by mallets & never were the horses in the country less fit for labour many of them dying…even in the hands of those who have had food enough to give them but it would appear that there has not been nutriment sufficient in it to support the loves of the animals as several of them are dropping down in the plough and some even in the stable. Many of them are also covered with vermin—Among the Human Race too a bad fever at present exists of a low typhoid kind.[32]

The lack of nutritional value in European grains during 1817 was a direct result of the Year Without Summer anomalies. Flour ground from wheat produced in the stunted harvest of 1816 was thin and insubstantial. A French peasant noted that year, "You could not eat the bread. It stuck to the knife." The famine that struck Ireland beginning that winter reduced people to eating moss and cats. Kidd, who at least had crops to plant, was more fortunate than many in Ireland, but clearly this famine year was a trying one for him and his neighbors.[33]

> [June 5, 1817] In the county Clare there has been a good deal of Rioting among the lower classes owing to the [dearth] of Provision…About Kerry several Cows have been killed at night & the Carcases carried away, and the lame practice has commenced here, the distress of all classes appear to be extremely great, and some cases of absolute Starvation appear to have occurred!![34]

The winter, spring and early summer of 1817 were difficult, but by the end of the next growing season environmental conditions were becoming more favorable. "The

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32 Ibid., Vol. 13, April 20, 1817.

33 Louis Guéneau, "La disette de 1816-1817 dans une region productrice de blé, la Brie," *Revlue d'histoire moderne* 9 (January-February 1929): 21-22, quoted in John D. Post, *The Last Great Subsistence Crisis in the Western World* (Baltimore: The Johns Hopkins University Press, 1977); Stommel & Stommel, 47-50.

34 Kidd, Vol. 13, June 5, 1817.

weather continues very unsettled," Kidd wrote in mid-August, "but tho' there is a good deal of rain…the season on the whole is very unlike last year." Between terrible rainstorms, including one that occasioned "One of the most awful [nights] that ever was remembered in this Town & neighborhood," there were spells of warm dry weather that boded well for crops. The Cold Decade was not over and environmental and agricultural dangers were by no means in the past, but there is a palpable sense from Kidd's entries in late 1817 that the worst was over. Nevertheless, agricultural life in Ireland continued to be hard.[35]

The journal of William Lodge Kidd, like that of David Greenough, presents the fascinating anomaly of layered worlds that came to occupy nearly the same mental and conceptual space for each diarist. Though both had other occupations—Greenough a lawyer, Kidd a physician—their diaries contained few or no references to these duties, and focused almost entirely on environmental happenings, conditions and consequences. Both saw climate and the environment as factors that constantly intervened into their personal day-to-day existences. Kidd's journey is particularly interesting. He spent the early years of the Cold Decade on a ship, frequently at the mercy of weather conditions, but there was at least then a "distance" between his local layer and the cosmic/environmental; however, this distance faded into insignificance when he returned to Armagh to farm. Kidd's journal, then, represents two layers of world construction that mirror each other almost perfectly. His writings provide a unique and richly-detailed window into environmental consciousness of the early 19th century.

35 Ibid., Vol. 13, June 5, 12, 24, August 12, 1817.

Mehitable Sullivan Cutler Amory: A Ritual Cadence

The diary of Mehitable Sullivan Cutler Amory, of Boston and Brookline, Massachusetts, presents an interesting example of the environmental layers touching. Mrs. Amory, age 37 at the beginning of the Cold Decade, was the wife of prosperous Boston merchant Jonathan Amory and mother of the noted lawyer and poet Thomas Coffin Amory. Her journal entries regarding weather tended to begin with a brief description of weather conditions, and then move on to other matters, mainly social and domestic in nature. A typical entry was that for August 3, 1812, while she was pregnant with her famous son: "A fine, cool, delightful day. Mr. Sohis at dinner, very pleasant." Her descriptions centered on four compass points, two sets of opposites: *pleasant* and *unpleasant*, *fine* and *disagreeable*. All four words appear repeatedly. From 1811, the beginning of her extant journals, until 1816 her entries followed this almost ritual cadence of weather observations followed by mentions of tea parties, balls and social visits. Then as the Year Without Summer anomalies became more noticeable a few entries appear that are solely devoted to weather. "Sat. [May] 11th [1816]. The morn[i]ng tolerably pleasant in the afternoon showery with thunder and lightning." On the day of the snowstorm she wrote: "Sat. the 8th [June 1816] very cold unpleasant. Tis said that there is snow 30 miles from Boston." Such entries indicated her growing attention to the weather.[36]

Religion also began to creep into Amory's journal. In July 1816 conversion was on her mind:

[36] Mehitable Sullivan Cutler Amory, Diary of Mehitable Sullivan Cutler Amory, Vol. I, August 2, September 21, 1812; Vol. III, July 1813; Vol. IV, April 5, 1814; Vol. V, January 31, 1815; Vol. VII, April 14, May 11, 1816; Vol. VIII, June 8, 1816, Massachusetts Historical Society, Boston, MA.

> The 16th Tuesday…the weather has been remarkably cool & on this day a soft warm rain calculated to do good—to the Earth—the conversion of the [J]ews one of the favourite subjects of the day—God Grant that while we are attempting to convert the [J]ew to our faith we may not let go of our own. But that pure religion may prevail upon us.[37]

Here the local and cosmic layers of Amory's worldview touched briefly, in two ways: rain *doing good to the Earth*, and, in a cosmically-magnified religious reflection, God and *pure religion* doing good to humanity. In both images there is a sense of cleansing: rain cleansed the Earth as she expected conversion would clean the Jews. Beyond literal concerns of relief from drought and improved weather conditions benefiting crops and agriculture, a reference to environmental conditions having a cleansing effect on humans and their affairs is a rare gem in Cold Decade diaries.

In the fall of 1816 Mrs. Amory became ill. She did not identify the cause but noted on December 23 that she was in "pain beyond all [e]ndurance." As the new year of 1817 began she was not yet completely recovered, and her New Year's entry employed two telling metaphors in communicating her emotional state:

> Wed. the 1st day of Jany, the [year] 1817—the weather uncommonly fine—our family all dined at George Sullivans—every thing done to make the day pass happily but alas!—the *clouds hang with portentious darkness* over my *devoted* head.[38]

Amory continued to chronicle the weather through the ups and downs of its erratic anomalies through the remaining years, 1817, 1818 and 1819. Unusual or superlative trends occasionally took center stage, occupying the entirety of a journal

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[37] Ibid., Vol. VIII, July 16, 1816.

[38] Ibid., Vol. VIII, January 1, 1817 [emphasis added].

entry, such as one on a 100-degree day in July 1818 where she stated that the weather "has been warmer the last ten days than it has been known for the last fourteen years." Then, as the strangeness of the Cold Decade receded, so did her special attention to the weather. By the fall of 1820 Mrs. Amory was largely back to her previous cadence: "A fine day"; "Clear, cold weather," "Stormy, disagreeable weather" preceded entries primarily about social and family matters ("I cannot consent to any young man's coming into my family just when he pleases!") without much other comment. The layers of her world regained the former degree of distance from one another they had at the beginning of the decade.[39]

In addition to the view it shows us of the layers encountering one another, Amory's journal is interesting in how it incorporates the Cold Decade anomalies themselves against the backdrop of less anomalous conditions. The ritual cadence—*pleasant/unpleasant* and *fine/disagreeable*—represented, for want of a better word, the normal state of weather and climate as Mrs. Amory experienced it. Anomalous weather violated the norm, forming a slow peak from 1816 to 1819, and then receded back to the norm. She never expressly elucidated this conceptualization, but few Cold Decade diarists did anything of the sort.

### Ezra Shaw Goodwin: Business as (Un)usual

Ezra Shaw Goodwin was a Unitarian minister in Sandwich, Massachusetts. He came to the congregation in 1813 at a time of religious turmoil following the dismissal of

[39] Ibid., Vol. VIII, February 13, 1817; Vol. IX, June 9, 1817; July 17, 1818; Vol. X, February 13, 1819; Vol. XII, December 10, 29, 1820.

their previous pastor over disagreement with the community on theological issues, and kept a diary throughout the period. Goodwin, like Isaiah Thomas, kept his journal on blank pages interleaved in an almanac, in this case the *Farmer's Almanack* by Robert B. Thomas, a popular competitor to Thomas's version. Goodwin's diary habits attracted the notice of his friend, one Reverend Francis, who wrote after Goodwin's death in the preface of a book of his published sermons: "[T]here are abundant indications [in his diary] of the purity of purpose with which he entered on the duties of the pastoral office…his benevolence and piety, accompanied with a deep sense of personal responsibility, are no less manifest in his private journals in this period, than they were in his social relations and public exercises."[40] Goodwin's diary was focused intently on his occupation, and his occupation was the salvation of the souls of Sandwich.

Goodwin's diary from 1815 contains numerous references to weather and climate. He remarked on snowstorms and cold snaps, sometimes comparing them to previous seasons ("there was more [snow] than had been known for upwards of thirty years") in ways that evoke the frequent weather superlative *in the memory of the oldest person living*. Yet at times the weather was closely and inexplicably intertwined with Goodwin's occupational duties. "I preached at home," he wrote in October, "a sermon on the late storm and hurricane; after service baptized the child of Mrs. Hannah Dimmick at the house of Mr. Joseph Bassett, a posthumous child." The hurricane was quite destructive in Sandwich, a coastal community perched on the "bicep" of Cape Cod if imagined as a flexed arm. Goodwin reached out to his congregation to collect money for James

[40] Ezra Shaw Goodwin, *Sermons of the Late Rev. Ezra Shaw Goodwin* (Boston: Benjamin H. Greene, 1834), 10.

Hinckley, a laborer who "lost all his summer work by the storm September 24." At the end of 1815 after tallying the vital statistics of Sandwich—"Baptised 3 Buried 8 Married 4 couples"—Goodwin noted that he had personally lost $100 as a result of the September hurricane. Then he concluded: "It has been an unprofitable year in regard to the kingdom of heaven."[41]

One of the most interesting weather items in Goodwin's diary—perhaps not surprising considering Sandwich's geographical orientation—was his attention to tides. He frequently went to or passed by a place called Scraggy Neck, where he sometimes collected firewood. In March after visiting Scraggy Neck he wrote, "The tide here is 3 hours earlier than on this side the cape or in Boston Bay." This observation was highlighted by lines and triangles pointing to it, as if it was particularly significant; no such doodles appear elsewhere. At the start of the hurricane on September 23, Goodwin noted "tide higher on south side Cape than ever known." His account of the gale melded tidal observations and historical memory with an eyewitness survey of the wreckage:

> The gale of the 23 was ye most fierce of any known upwards of 150 years like the famous hurricane of 1635 it extended about 80 miles wide, at Provincetown but little felt and increased in power and rage towards the north, where forests were prostrated, buildings blown down very many chimneys overthrown…On the south side, the tide was 10 to 12 feet higher than a <u>common count of high tides</u>. Swept the whole shore of salt works, wood buildings, etc…[S]ome vessels in Buzzards Bay were carried completely into woods. Some houses filled to the chamber floors.[42]

[41] Ezra Shaw Goodwin, Diary 1815, January 31, February 22, October 1, November 12, December 31, 1815, American Antiquarian Society, Worcester, MA.

[42] Ibid., March, September 23, 1815.

Goodwin's diary illustrates a clear trajectory of the two layers of the diarist's worlds moving closer to one another. For Goodwin, the gap between the layers seemed only inches wide. Cold snaps and unusual tides formed the set-dressing of the stage upon which he acted out his occupational duties as the spiritual captain of Sandwich, taking up collections for unemployed laborers and baptizing stillborn infants. When the hurricane of September 1815 arrived, it projected itself literally and directly into Goodwin's occupation: he preached a sermon about it to his congregation. Though the text of the sermon has been lost, one presumes Goodwin explained to his flock that the hurricane was an act of God, or perhaps framed its destruction as a series of trials whose resolutions would require divine guidance and spiritual devotion. Either way, the weather was present in the church, surrounding the congregants on the day Goodwin preached his meteorological sermon.[43]

Aaron White: Down and Out at Harvard

Aaron White, the son of a well-to-do family from Boylston, Massachusetts, was born in 1797, attended Harvard and eventually became an attorney, teacher, shopkeeper and sometime politician.[44] White maintained an almost daily journal by the time he entered Harvard as a teenager. He was uniquely introspective, religious and erudite for a

[43] The hurricane sermon was not among the essays by Goodwin collected by his friend Reverend Francis and published posthumously in 1834.

[44] Later in life Aaron White served as private secretary to Thomas Wilson Dorr, the eccentric Rhode Island lawyer who in 1842 led a Quixotic (and unsuccessful) revolution against the state government of Rhode Island. Though unrelated to the argument of this dissertation, I profiled the fascinating life of Aaron White, and his Harvard contemporary Stephen Salisbury, in a podcast episode dedicated to their experiences and drawn from their diaries. Sean Munger, "14: Down & Out at Harvard," *Second Decade*, podcast audio recording, February 20, 2017, <http://seconddecade.libsyn.com/14-down-out-at-harvard> (visited April 14, 2017).

17-year-old, and his diaries, which often recorded weather events, offer a tantalizing glimpse into what must have been an unusual and intense personality.

On August 16, 1815, White wrote:

> Rainy. After a long drought how pleasant it is to hear the dropping of water from the eaves in the stillings of the evening—with what inward calmings and serenity does it affect the mind—Vain are all the words of man in comparison with the goodness and kindness of God towards the sinful and lost children of men.[45]

The next month was eventful, both personally and meteorologically. On September 7, White turned eighteen, and as he looked ahead to the next year he remarked on his own mortality: "[P]erhaps this may be the last year of my life…Prepare me O Lord for whatever trials await me." Later in September a hurricane struck the Massachusetts coast. White continued to mention the storm months afterward, noting that since its subsidence in the final week of September it seemed to have ushered in a long period of unusually calm weather. While recording weather events and trends, the majority of his diary contains mentions of his comings and goings from Cambridge, parties he attended, a colorful and memorable episode where he got drunk for the first time, and his mental and physical state of which he seemed keenly and constantly aware. In December 1815 he wrote a frustrated entry complaining about people making fun of his abnormally long legs. Over the next few months White made several references to feeling dejected or unworthy. "Some what touched by the hypochondria," he wrote on June 13, 1816, utilizing a contemporary word for depression. The entry that contained this reflection was

[45] Aaron White, Diary, Aaron White Diaries 1815-1880, August 16, 1815, Massachusetts Historical Society, Boston, MA.

preoccupied mostly with his laundry—the doing of which, for a college student living away from his family for the first time, was evidently a particular hassle.[46]

White's diary was typical of lay people's observations on the Year Without Summer events. He referred to the season being "cold and backward" several times, noted an unseasonable snowstorm in April and odd fluctuations of unusually cold and unusually warm days in late June and early July. "A great spot is perceived on the face of the sun," he wrote on April 29, but did not explicitly link sunspots to the weather events. His particular bout of melancholy in June coincided with the most memorable and abnormal anomaly of the Cold Decade observed in New England, that being the snowstorm of June 6-7. Later in the summer as cold and dry conditions continued White used terms like "a very remarkable season" and "strange times." A severe frost in September, injuring corn, coincided with his return to Harvard for another school term. "[T]ook possession of my new room," he wrote, "the same [room] my Grandfather occupied forty years ago." The cold winter of 1816-17 was difficult for him personally. One entry in early May sums up the closeness of the layers of Aaron White's world: "Fair. Troubled with melancholy reflections."[47]

One does not need formal training in psychology to raise the possibility, from this evidence, that Aaron White suffered from depression. But beyond this, we see in Aaron White's diary the layers of his environmental world, local and broad, touching one another in his own psyche and mental state. Echoing the moods of Thomas Robbins that

[46] Ibid., September 7, November 11, December 9, 1815; April 11, June 3, 10, 13, 14, 1816; March 27, 28, 1817.

[47] Ibid., June 3, 10, 14, 24, 1816; July 8, 13, 17, 19, 1816; September 28, 1816; October 4, 1816; February 14, 24, 1817; April 21, 1817; May 7, 1817.

rose and fell with the weather in another part of New England, when the weather was poor or "backward," Aaron White's "hypochondria" or his "melancholy reflections" seemed generally to be worse. When the weather was fair, he seemed much less troubled, such as in September 1819 when, after noting "the Season has been crowned with Plenty," he wrote, "Blessings of heaven have been scattered in abundance, may the recipients of these favours acknowledge their Benefactor."[48] Within the context of 1810s environmental consciousness, simple statements like this show a profound convergence of factors: the weather and climate, the self, and God all colliding in Aaron White's head, and on the pages of his diary.

"Mr. A": God's Winter Wonderland

An especially interesting Cold Decade diary is one whose author is unknown. For lack of a better term, we can refer to him as "Mr. A."[49] We know nothing for sure about Mr. A, but much can be deduced about him. That he was male is not explicitly admitted but seems almost certain.[50] He lived in Boston and consorted with various well-known Boston merchants such as Oliver Fisher and the Child family (Joshua and John, of the firm J & I Child). He kept his diary on interleaved blank pages of Thomas's *Farmer's Almanac*, exactly as Ezra Shaw Goodwin did. Mr. A worshiped at the Hollis Street

48 Ibid., September 19, 1819.

49 "A" is for "Anonymous," the official author designation by which he is known in the catalog of the Massachusetts Historical Society archives.

50 I reach this conclusion not from stereotype but from deduction. The diarist's social acquaintances were almost exclusively male and the diary does not mention activities or concerns of the traditional feminine sphere of New England in the early 19th century. The diaries known to be by women, by contrast, contain frequent references to embroidery, housework and other female occupations of the time.

Church, a famous Unitarian enclave in Boston and the home, until 1818, of controversial minister Horace Holley. Mr. A was very devout, attending church services and church-related social meetings frequently. The only topic Mr. A wrote more about than church business was the weather.[51]

Mr. A kept short—often one-line—daily observations of weather conditions in the terse style typical of Cold Decade diarists: “Friday. Chilly unsettled weather.” Some of his entries almost resemble those of weather watchers, except for the rarity of specific data, though he does seem to have had occasional access to a thermometer. Mr. A’s winters were measured by the length and frequency of sleigh rides, the appearance and depth of snows and whether days were “pleasant” or “uncomfortable,” his most common general adjectives. “Snow & Ice thaw very fast,” he observed on February 22, 1817. “The harbour still closed with Ice so that no Vessels can come in or go out.” He judged seasons in terms of other seasons, such as late January 1818: “[T]he weather seems more like March than January,” or March of the same year: “But rather cold for spring.” Curiously Mr. A did not record weather in the summer. Whether circumstances intervened to make journaling difficult during warm months or he simply had no interest in summers, all of Mr. A’s weather information pertains to late autumn, winter and early spring.[52]

Church and social activities are woven tightly together with weather in many of Mr. A’s entries. During the extreme cold snap of February 1817, he recorded that February 14 was “Said by the Revd. Horace Holly to have been the coldest day known

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51 Anonymous, Anonymous Diaries 1807-1817, February 1817, January, March, April, May 1818, Massachusetts Historical Society, Boston, MA. Though the minister’s name was *Holley*, Mr. A always spelled it *Holly*.

52 Ibid., January, February, March, April 1818.

for 25 years." Nearly a year later, in January 1818: "Sunday 25. Cold and squally. Mr. Holly preached all day." February: "Sunday 22nd moderate and snowed all day—Mr. Greenwood preached all day and as heretofore, was entertaining." Four days later: "Thursday 26th. Cold and fair, went to Father Child's in the afternoon, and to Joshua Richards's in the evening in company with O. Fisher & Wife." Mr. A also spoke of meetings at an Alms House, presumably a charity organization, and he seldom failed to record which minister preached sermons on Sundays. It is difficult to find an entry that is not preceded by some short statement of the weather.[53]

The exceptional cold of February 1817 left an obvious impression upon Mr. A, and apparently upon Horace Holley too. On the first Sunday of the new year, 1818, Holley gave a report to the Hollis Street congregation, which Mr. A recorded:

> Sunday 4th Clear cold and windy; Mr. Holly preached and informed the congregation that there had the past year been in his parish 52 Children Baptised 26 males and 26 females; and that the deaths had been 34—17 males and 17 females; 5 had joined the Church, and that there had during the same period been 24 Marriages, also that February 14, 1817, was the coldest day that has been for 25 years past.[54]

The very next line of the diary was a notation of the first snow of the year, on January 10, a fall of six inches.

The centrality of weather, especially that of winter, to Mr. A's diary and its juxtaposition with church affairs resembles Ezra Goodwin's approach in many respects. However, unlike Goodwin whose occupation *was* church business, Mr. A was a lay

53 Ibid., February 1817, January, February, March 1818.

54 Ibid., January 4, 1818.

parishioner, not clergy himself. Though we can guess he was a merchant, that surmise comes solely from the company he kept, not any discussion of his own occupation, which is curiously absent from the journal. The world that Mr. A inhabited—at least that which made it into the pages of his almanac journal—consisted mostly of weather and of religious matters. It is also noteworthy that his discussions of religious matters centered entirely around what one might term “external” affairs—sermons preached and by whom, what Holley said, meetings of charity organizations and such—and not the sort of internal religious reflections favored by diarists like Betsey Graves Johnson or Sophia Sewall Munroe. There was little discussion of Mr. A’s own thoughts and feelings regarding religion and devotion or what personal ruminations might have been triggered by the sermons he constantly consumed.

That said, Mr. A’s local world was very close to the presence of God, separated from it only by the thin tissue of human activity that was the business of the church and the congregation. His cosmic world doubtless contained God, but the almighty’s manifestations were vividly present and unmistakable as weather events. Mr. A’s two world layers almost touched each other in the aisles and pews of Hollis Street Church. His journal is an interesting contrast to the introspective and devotional diarists like Johnson or Munroe, or even Aaron White, whose world layers collided in the very personal space of the soul.

### Susan Heath: Fire and Ice

One woman’s journal captures a uniquely vivid synthesis of the multi-layered worlds and their convergence at the end of the Cold Decade. Susan Heath of Brookline, Massachusetts was about 17 when she began keeping a diary in 1812 which is replete with weather references for the many years she maintained it. Like many Cold Decade diarists, she had a usual repertoire of words and short phrases to describe weather conditions: "Pleasant. "Very pleasant. "Cold." "A beautiful day." Like other New England women and some of the men, she expressly linked weather conditions to religious devotion. In August 1813 she wrote, "I cannot express my feelings when I reflect upon the goodness of God—who can help feeling grateful for such a delightful summer as we have had." Her catalogue of the Year Without Summer anomalies was also typical, mentioning the necessity of indoor fires in June, her apprehension at the damage to crops, and descriptions of the weather as "melancholy." In these respects she was a classic weather diarist.[55]

Heath's relationship with weather seemed to become deeper, however, as the decade wore on, and she increasingly discussed weather conditions in the context of how it was affecting her family. In February 1817, on the occasion of the intense cold snap of the 14th, she wrote:

> Insufferable cold. Distressing weather indeed for poor people. When we can barely keep comfortable—what must destitute people suffer. The weather was a few degrees colder than the Cold Friday [January 19, 1810] so long celebrated as an extraordinary day. The men used every precaution from freezing. Like tying up ears heads & c. We finding it impossible to make the sitting room at all comfortable—deserted it—for Ma's chamber—where we succeeded better in our attempts.[56]

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[55] Susan Heath, Susan Heath Diary 1812-1874, Vol. II, January 30, April, May, August 21, 1813; Vol. IIL, July 5, 1814; Vol. V, June 5, 6, 7, 8, 9, 24, 1816, Massachusetts Historical Society, Boston, MA.

[56] Ibid., Vol. VI, February 14, 1817.

Heath may have written entries in her journal some time after the dates she records. This seems to have been the case for her entry regarding March 4, 1817, where she wrote: "I cannot remember any thing about—believe it was a stormy day." She regarded the weather as the *only* feature of that day worth recording, even though her memory of it was evidently indistinct. Noteworthy too was her increasing use of collective pronouns, referring to her family as a plural whole, in her relations to the weather.

March 1818: "The clouds generously supplied *us* with rain and snow." May 1818: "Tho' *we* are so much disposed to murmer [sic] at these long & repeated rains." June 1819: "Singular weather—*we* have had four or five distinct showers in the course of the day." August 1819, during a heat wave: "*Everybody* was groaning & almost ready to give up quite." A year later, during another heat wave in September 1820, Heath believed that some of her family members and neighbors would literally die unless the weather changed, which fortunately it did.[57]

The idea of collective suffering as a family reached its zenith in the most dramatic aspect of Heath's diary. Its longest single entry was dated December 1, 1820, though it seems to have been written significantly after that. It begins "O! the horrors of that dreadful day! I shall never be able to forget it." On this day, weather conditions mixed with, and indirectly caused, a crisis for the family. As Heath told it:

> The wind was tremendously high & the weather extremely cold & freezing. As we sat at work [embroidery?] round the comfortable Stove as usual we remarked how terrible it would be in case of Fire—little imagining how soon we were to experience the dreadful feelings. Ma

[57] Ibid., Vol. VII, March 4, 12, 1817; March 7, 11, May 19, 1818; Vol. VIII, June 13, August 1, 1819; September 1820 (emphasis added).

> having occasion to go up to the garret, found it full of smoke & the flames bursting in…[W]ith admirable presence of mind she sent Nitty up with a pail of water…& Susan collect the most valuable things together. O what distracting words I [thought] it was a horrible dream…I knew not what to do—I gave up all hope of having a house to shelter or clothes to cover us at night. I tho't our great family was to be separated & scattered over the world & that overwhelming trouble had burst upon us in terrible array.[58]

The family pulled together, with sisters running to alert neighbors and brothers grabbing pails of water to douse the flames in the garret. Neighbors lent hands to the bucket brigade, though the effort was made difficult and miserable by the extreme cold. Only a portion of the house burned. When the fire was over Heath beheld the family home, half-destroyed and completely covered in ice from the frozen water thrown to tamp down the flames. "I never realized," she wrote, "how terrible Fire was before—how it confuses the intellects, & petrifies the stoutest hearts!" Though the house was saved from complete destruction and no members of the family were injured, a new environmental challenge quickly befell them: many members of the family fell sick from the dampness and extreme cold to which they were exposed while fighting the fire.[59]

The episode of the Heath family house fire provides a vivid illustration of many of the cross-currents present in Cold Decade diaries of the weather. The local layer of Heath's worldview was intimately connected with her family, and it was her family that experienced collectively the trials of the weather—the planetary/cosmic layer that for Susan Heath, as for other introspective diarists, was only a short hop away from her local construction. In December 1820 the layers of her world touched each other to create a

[58] Ibid., Vol. VIII, December 1, 1820.

[59] Ibid., Vol. VIII, December 1820.

cataclysm. Bundled together around a stove to resist the cold, the stove and its chimney were likely the cause of the fire, to which the family reacted in the same literally collective way as Susan imagined them bearing the burdens of weather anomalies. Her primary concern was for her family, and the first terrible contemplation of the result of the fire was an imagination of the family "separated & scattered over the world."[60] Had this in fact occurred it would have been the planetary/cosmic layer swooping down and reorganizing the fabric of the local layer of Susan's life. She feared that one layer of her world would be the undoing of the other.

## Why Did People Write About Weather?

The voluminous self-correspondence of diarists regarding weather and climate during the Cold Decade—or any other period of history—begs an obvious and important question. *Why* did people choose to write about weather in their personal diaries? Aside from those, like Greenough and Kidd, whose world-layers were congruous and whom we can reason had no choice, why would a person fill valuable literary real estate in their diaries by recording the comings and goings of clouds, precipitation or temperature variations? Some consideration of the question is necessary, because it's intimately connected with how they saw weather and climate in the context of their lives; it is, however, a difficult question to answer.

In approaching the question, one must jettison the seductive assumption that weather was of little importance to Cold Decade diarists. As we have seen, weather and climate conditions were vitally important to many people. Greenough and Kidd provide

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[60] Ibid..

the most direct examples and the "introspective" diarists the most emotionally compelling, but none of the cases considered here seemed to regard weather as a mere triviality. Indeed, one New England diarist, Aaron Wight of Medway, Massachusetts, treated weather journaling so seriously that his family continued it even after his death. Wight, just like Isaiah Thomas, kept his diary on the interleaved pages of printed almanacs—sometimes Thomas's, other volumes the *Poor Clergyman's Almanack* or Robert B. Thomas's *The Farmer's Almanac*. The printed versions were much the same. Wight's notations in fact are very similar to Thomas's. The extremely cold day of January 1810: "Clear windy Cold Snap Extream." February 1811: "Snow Storm holds on tite." These observations were regular, year after year. Then Aaron Wight died on February 8, 1813. An inscription in his 1813 almanac journal records his death. Yet, in another handwriting, the weather observations continue almost right where they left off, and in very much the same style. June 1816: "Cloudy rain and very cold." September: "Smokey weather about these days sun and moon look very red." It is not entirely certain who continued the journal after Wight's death, though it was likely his son; there is a brief reference that a gravestone had been placed on "father's grave" some six months after his death.[61] For whatever reason Aaron Wight sought to record weather and climate conditions, this reason was of sufficient importance to bequeath, whether explicitly or implicitly, the duty to do so to his family, and for them to honor the bequest years after Wight had been lowered into his grave.

[61] Aaron Wight, Aaron Wight Diaries 1769-1826, Box 2, January 1810; Box 3, February 1811; February, August 1813; June, September 1816; February 1817, Massachusetts Historical Society, Boston, MA.

Another curious indication of the paramount importance of weather and climate data can be found in the diary of an unnamed "Hospital Officer" stationed at a U.S. Army outpost in Pass Christian, Mississippi in 1812. Like Kidd, the Hospital Officer made explicit links in his journal between weather and disease. In August as a hurricane struck the post the Officer feared it would "have a very ill effect upon the health of the troops." Although the extant portion of the journal is only for a portion of the year, the Officer recorded weather conditions nearly every day. Several entries include a notation: "Nothing worth noting," but then go on to record the weather for the day, wind direction and temperature. From his precise data one may conjecture that the Hospital Officer was a weather-watcher, but that makes his choice to emphasize weather all the more striking. *Nothing worth noting—nothing happened today—but here's the weather report.* On every "nothing worth noting" day, the Hospital Officer is judging the weather to be the *only* occurrence on that day that rose above the threshold of significance needed to warrant a journal entry. Even if one surmises that jotting down a weather report was a default position—that there was nothing to write that day so he might as well write about the weather just for the sake of making an entry—this indicates that both the act of journaling for its own sake and the selection of weather as appropriate "filler" each have some sort of unique significance in the Hospital Officer's mind.[62]

These examples demonstrate the obvious significance of weather and climate information in personal diaries, but neither says anything explicitly about *why* their authors judged them to be significant. Explicit references to the *why* question are, in fact,

[62] Diary Kept by a Hospital Officer at Pass Christian, Mississippi, 1812, August, September 1812, Huntington Library, San Marino, CA.

virtually nonexistent in Cold Decade diaries, suggesting that perhaps the authors themselves never considered it, or could not have answered the question had it been asked of them. One diary that does address the *why* question provides a somewhat unsatisfying answer. In 1811, New Haven printing firm Oliver Steel & Company put out a book called *A Register of the Weather, or An Account of the Several Rains, Snow-Storms, Depth of Each Snow, Hail and Thunder; With Some Account of the Weather Each Day, and Some Other Events Worthy of Notice*. The author was one Jeremiah Alling who lived in the vicinity of New Haven and began to keep weather records there in 1785. Alling appears to have been a weather-watcher, but the book is essentially a published version of his weather diary. In the preface he stated:

> The following account of the weather has been taken with care at the time the several events happened, and from personal observation. Among the reasons which have induced me to publish it, are these: I have often heard people differ respecting the time of a late frost, the depth and number of snows there were in such a winter, which day of the year, or week, such a storm of hail, snow, great rain, or high wind happened…and the like; and they have often expressed a desire to be satisfied on these points.[63]

This is less illuminating than it might seem. For one thing, it addresses why Alling chose to *publish* his weather diary, not why he kept it in the first place. Creating a resource for curious readers to "look up" the dates on which certain memorable weather events in their own lives is admirable, one supposes, but could be and probably is completely divorced from whatever reason might have compelled Alling to become a

[63] Jeremiah Alling, *A Register of the Weather, or An Account of the Several Rains, Snow-Storms, Depth of Each Snow, Hail and Thunder; With Some Account of the Weather Each Day, and Some Other Events Worthy of Notice* (New Haven, CT: Oliver Steele & Co., 1811), 3.

weather-watcher or to keep a weather diary.[64] For another, it also indicates thinking about weather within an assumption that weather does or should become visible and noteworthy only when and to the extent it deviates from some perceived condition of "normal." Clearly neither Aaron Wight nor the Hospital Officer at Pass Christian accepted this assumption; indeed the Hospital Officer completely explodes it, by anointing weather as worthy of recording even when a day otherwise presented "nothing worth noting." Thus, Alling's explanation is of little practical value for determining why Cold Decade diarists made weather and climate such intimate parts of their daily journals.

Could the *why* question be related to—or perhaps even inseparable from—the question of why people choose to keep diaries at all? This broader question, too, is difficult to answer. Philippe Lejeune, a French critic who spent his career studying diaries and other forms of autobiographical writing, suggested that diaries serve four basic functions: self-expression (both the desire to release and to communicate); reflection, closely associated with expression and memory; to freeze time, or as Lejeune puts it, "to build a memory out of paper, to create archives from lived experience"; and to take pleasure in the act of writing. Lejeune stresses diary-keeping as an act rather than the creation of a product; it is a reflection of self and a work-in-progress that helps the diary writer define him or herself. This theory is illuminating on a psychological level but still

64 It does, however, indicate Alling's recognition of a public demand for this sort of information. Even in our own time people often do express fascination with learning technical details—especially dates and specific weather conditions—of weather events they remember from the past. *See, e.g.,* Alexander Hall and Georgina Endfield, "Snow Scenes: Exploring the Role of Memory and Place in Commemorating Extreme Winters," *Weather, Climate and Society* 8, no. 1 (2016): 5-19.

falls short of providing a cogent explanation for the prevalence of weather and climate in diaries.[65]

The most intuitive explanation is also the simplest. Weather and climate found their way into people's diaries because they were a key factor in people's personal and emotional beings, and a part of their lives as important as anything else. It is no more puzzling why someone would write about weather than about social calls, emotional states, the illness or death of a loved one, or political events. The very question "Why write about the weather?", when asked in isolation without an inquiry into why a diarist might choose to write about any other particular subject, presupposes that weather and climate are extraneous to people's lives and generally unworthy of mention in an intimate record of life events. As we have seen in this chapter, this assumption is untenable: people *did* find weather and climate worthy of occupying space in their personal journals, at least as worthy as social calls, business dealings, religious sermons or any of the other myriad subjects that appear in their pages.

That said, weather and climate are not a constant and unchanging priority, even among those Cold Decade diarists who chose to write about it. Betsey Graves Johnson and Sophia Sewall Munroe, both concerned intimately with weather events in the early part of the decade, ultimately dropped the subject as their journals went on. One can suppose from their personal histories that life events rendered other subjects "more important" than weather: Betsey Graves Johnson increased her devotion to her faith, and Sophia Sewall Munroe got married. This assumption, however appealing it may seem at

[65] Phillippe Lejeune, *On Diary*, ed. Jeremy D. Popkin & Julie Rak, trans. Katherine Durnin (Honolulu, HI: University of Hawaii Press, 2009), 181-82, 194-96.

first glance, is also deceptive. It presupposes, like the "why write about the weather?" question, that *only* events or subjects that a person judges to rise above some baseline threshold of life importance ever make it to the written page of a journal. Given the examples presented in this chapter, we see that this is not how diaries and journals work in the real world.[66] The Hospital Officer wrote about the weather when there was literally nothing else he deemed worthy of inclusion. While one can speculate why Johnson or Munroe stopped writing about weather, such speculations can only really be conjectures with little analytical value.

Lejeune makes one more observation that is germane to weather diaries. In considering the temporal features of a diary—a narrative with an uncertain end, written always toward an ever-moving future—Lejeune conceives of the autobiographical nature of a diary as a sort of "life in process," which is part of a diary's function in helping to construct a person's identity. If a diary is a "life in process," which each individual entry being a brick in the wall that comprises a human life, then it stands to reason that weather data recorded in diaries is also something of a process. Each individual weather event recorded in a person's diary is like a brick in a wall which in its totality comprises climate. Thus the temporal and ongoing identity-building factors in diaries, as they relate

[66] While writing this chapter, I had occasion to revisit an old journal of my own which I kept for a brief time when I was 11 years old. Its subjects are essentially random: television shows I watched, annoying occurrences at school, and, yes, the weather. While I have no memory of deliberating what to write in my diary at age 11, there is no evidence from the written entries that I engaged in any process of deliberation at all—yet the entries are not really random either. My lack of understanding regarding my own motivations for keeping a journal lead me to suspect that these decisions made by diarists are essentially unconscious. It does not follow, though, that they are unimportant.

to human identity, are analogous to the ongoing construction of climate as a holistic aggregate of weather.[67]

Simply put, people wrote about weather and climate in their diaries because weather and climate were integral parts of their lives. Sometimes weather formed the backdrop to life events, served as a foil to complicate them, directly affected moods and emotional states, presented occupational opportunities or challenges, reflected a diarist's perception of God or divine judgment, or became the constant and unpredictable companion to livelihoods intimately connected with the environment. Weather mattered, and it mattered in a multitude of ways, some not easy to explain. But there can be no escape from the conclusion that what happened in the skies, atmosphere, oceans and heavens was vitally important to many people.

World-Building: Nothing More Personal

As with many people who took notice of weather and climate during the Cold Decade, the diarists profiled here were engaged principally in world-building. But unlike the other groups I have and will deal with, for the diarists the worlds they constructed were intensely personal. One can debate how "important" diary writing was to the various players we have examined here, but it's a fair assumption that the worlds they constructed in their minds were, whether they realized it or not, vital to their personalities and identities.

We have seen, through the writings of journals and diaries, a reflection of the dual-layered environmental consciousness of the early 19th century. The diarists,

[67] Lejeune, 23-24.

however, had different things at stake than others who exhibited the same kind of environmental consciousness in different contexts. The weather watchers reached out and touched the broader layer to try to make sense of how the environmental world worked; doctors reached for the broader layer to gain knowledge and skill in healing their patients; arguers sought to “win” a rhetorical game; travelers were engaged in world-taming and empire-building. The diarists, though, had no such ulterior motives. They were just trying to make sense of their lives, their surroundings and themselves. For them, the stakes were intensely personal.

We constantly seek, in our own lives, ways to construct and order the worlds around us to give our lives meaning or to provide the motivation we need to carry on with the tasks that fill our days. This was no less true of the people of the Cold Decade. With weather and climate being an integral part of their lives—often an affirmative player onstage as well as the context in which everything happened—the diarists of the Cold Decade sought to situate the weather and climate environment in personally meaningful ways. Susan Heath, during a storm in the spring of 1818, offered a compelling comment that evoked both the meaningful and the mysterious aspects of weather when she wrote, “This weather is esteemed a sore evil by weak shortsighted mortals who cannot comprehend the ways of Providence. It will answer some wise purpose no doubt.”[68]

[68] Heath, Vol. VII, May 19, 1818.

# CHAPTER VII

## "THIS DAY ENDED ALL MY HAPPINESS"

In the late summer of 1809, in Camden, South Carolina, Mrs. Susan Carpenter Blanding fell terribly ill. A Northerner, she had accompanied her husband, Dr. William Blanding, when he moved to South Carolina from Rehoboth, Massachusetts two years previously.[1] Perhaps the warm humid climate did not agree with her, or she may have caught some illness common in summer; the cause of her malady is not recorded. Blanding was a preeminent physician back in Rehoboth and also in Camden, but now the 36-year-old doctor found himself treating his own wife. He kept a record of her final illness in much the same way as he kept records of previous patients, but one can imagine the personal anguish and anxiety behind his words.

> Sept. 1st 1809. [She had] a restless night but this morning almost clear of fever and allowed by all to appear some better—12 o'clock, the fever rising, a bad evening—Mercury stand[s] at 92—at 10 at even'g dozed a little.[2]

It was very hot in Camden that weekend. Blanding did his best to keep his wife as comfortable as possible. He covered the windowsills with pine boughs and continually threw water on them, hoping to cool the room. He kept sheets and cloths wet with vinegar hanging various places in the sick-room "to purify and cleanse the air." It was only of modest utility. The temperature was still 89° where Susan lay. The doctor gave her some

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[1] Ann Fabian, "The Long Life of William Blanding: Doctor, Apothecary, Naturalist," *Journal of the Early Republic* 36, no. 1 (Spring 2016): 5-36.

[2] William Blanding, William Blanding Diaries 1795-1849, September 1, 1809, folder "Medical Notes/Prescriptions 1," Massachusetts Historical Society, Boston, MA.

medicine earlier in the day and he noted, "[I]t has operated as we expected." He also noted: "Not one drop of Rain has fallen since she was taken unwell, there are showers at a great distance in the south and in the north, but none come to bless us." In the next sentence he recorded that as he was sitting down to write her fever was rising again.[3]

Susan lingered, her illness worsening. At one point Blanding summoned a colleague, one Dr. Trent, but he seems to have had nothing to add to Blanding's treatment. A few days later, on September 4, Blanding began to realize that his wife would most likely not recover. Then later that day she began to revive. The doctor experienced a spark of hope, but it was short lived. "Still I think," he wrote, "that Man cannot save her, but God can."[4]

The end came for Susan Blanding two days later, on September 6. She died, age 28. Evidently intending his record of her death to be read by a family member—exactly who is not clear—Blanding offered reassurance, then lapsed into grief:

> Although the object which was one cause of my attach[ment] to you, and your family, is removed, is gone, still that attachment is by no means abated. This day endeth the life of my companion—This day ended all my happiness. One hour with a bosom friend is better than one year.[5]

Evidently there was a sudden and dramatic change of the weather during the latter part of Susan's illness. While it was still quite hot on September 1, on the day of her

3 Ibid., September 1, 1809.

4 Ibid., September 4, 1809.

5 Ibid., undated (likely September 6, 1809). Mrs. Blanding's tombstone records the date of her death as September 6. "Susan Carpenter Blanding," Find-a-Grave < http://www.findagrave.com/cgi-bin/fg.cgi?page=gr&GRid=11001932> (visited November 19, 2015). Blanding eventually married again, one Rachel Willett of Philadelphia; the two lived in Camden for some years and eventually relocated to Philadelphia in the 1830s. Fabian, 12.

death Blanding wrote, “There has been a great fall of rain for three days past and the cold is so great that we have fires and woolen clothes.” In the same entry: “O my God what shall I do?”[6]

Susan’s remains were ultimately returned north to Rehoboth. She was laid to rest in the Village Cemetery (now Rehoboth Historic Cemetery No. 8). Her epitaph reads:

> To the memory of MRS. SUSAN BLANDING, who died in Camden So. Ca. on the 6th of September 1809; Aged 28 years. She was the truly amiable and affectionate companion of DOCT. WILLIAM BLANDING, and daughter of CALEB & ELIZABETH CARPENTER, late of Rehoboth. She is gone, she had little else to do than through the Mediator to present the scroll of her virtues to the God of mercy and be placed among the happiest of the happy in a world of bliss.[7]

There are two aspects of the account of Susan Carpenter Blanding’s death that stand out. The first is obviously its emotional quality: a physician, trained in the arts of healing, watching almost helplessly in a stifling (and later freezing) sick-room, watching his own wife die as he must have seen many patients die before her. But the second is its attention to the weather, both inside and outside the chamber, its humid air thick with the smell of palm fronds and vinegar, where Mrs. Blanding breathed her last. Blanding lamented in his diary, “O my God what shall I do?”—but in the same line he talked about the weather. The relationship between sickness and weather was clearly on his mind, as it was for many doctors and other medical professionals during the Cold Decade.

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6 Blanding, Diary, undated (likely September 6, 1809).

7 “Susan Carpenter Blanding,” Find-a-Grave < http://www.findagrave.com/cgi-bin/fg.cgi?page=gr&GRid=11001932> (visited November 19, 2015).

# CHAPTER VIII

# THE DOCTORS

The dual-layered environmental consciousness typical of the early 19th century is reflected, in a uniquely practical way, by the experience and thinking of persons who practiced medicine during the Cold Decade. How disease, medicine and health were inextricably connected to weather and climate—an understanding we must establish as we explore the local and broader layers of the environmental world for medical professionals—is evident from two vivid episodes of disease from the Cold Decade, different in details but similar in concept.

In the late summer of 1819 the neighborhood of Fell's Point in Baltimore, Maryland was something akin to a vision of Hell. Since late July parts of Baltimore were afflicted with a virulent strain of yellow fever. The first case appeared in the Fell's Point area, near Pitt and Wolfe Streets, on August 27. Within ten days it swept the area, killing its residents more or less indiscriminately. The wealthy who had means to travel packed up and fled the city for their summer homes or inns, leaving the poor to their fate. The suffering of the disease was compounded by unusually hot and sultry weather. Formerly busy squares and marketplaces were eerily dead and deserted; few carriages rattled through Baltimore's narrow streets. During the day one walking the streets of Fell's Point would pass the open windows of houses through which were visible dead and dying victims moaning in their beds, sometimes surrounded by family members trying, often in vain, to give them some measure of relief. At night the streets flickered with the orange light of bonfires, set by survivors who hoped the smoke would purify the atmosphere of disease-causing miasma. The only people visible on the streets were the destitute poor, doctors making their grim rounds and the attendants who trailed behind hearses filled with victims. The Board of Health officially recorded 242 deaths from yellow fever in Baltimore during September—a miserable, deadly hot-weather epidemic.[1]

Six years earlier, in the winter of 1813, an epidemic of what doctors called "bilious pneumonia" broke out in the town of Bardstown, Kentucky, a settlement on what was then the edge of the western frontier. Victims first reported chills and fever, then excruciating chest pains. Incessant coughing and phlegm-clouded lungs marked the next phase of the disease. Some victims lost their wits, falling into a stupor or a delirium in which they raved nonsense—if the disease hadn't yet robbed them of their power of speech. Most deaths, accompanied by convulsions, occurred on the fourth or fifth day. As the disease spread through the town, people blamed various agencies for the outbreak. Some surmised that bad tea or coffee was responsible. Others suspected it was deliberately spread from British garrisons somewhere in the interior; the War of 1812 was then at its height. But the fact that the epidemic occurred during a cold winter after a lean, frost-damaged harvest seemed to some to be the most significant factor. There simply had not been enough to eat in Bardstown the previous autumn, and its residents entered the bitter winter abnormally weakened and feeble—a fertile pool for the spread of a disease whose progress must have seemed inexorable.[2]

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1 John Revere, "An Account of the Fever which prevailed in certain parts of Baltimore, during the Summer and Autumn of 1819, with some remarks on its Origin and Treatment," *American Medical Recorder*, April 1820, 4-9.

2 Joseph Trent, "Original Essays: Essays and Papers on the Winter Epidemic of 1812-13-14, With Editorial Remarks," *The Medical Repository of Original Essays and Intelligence, Relative to Physic, Surgery, Chemistry, etc.*, March 1, 1816, 11-13.

These two episodes of disease, very different from one another, illustrate how weather and climate were intimately bound up with disease and medicine during the Cold Decade. Medical practitioners undoubtedly saw a close connection between weather/climate and disease/health. Because the Cold Decade presented especially unsettled patterns of weather events, the anomalies of the decade were of particular interest to doctors. Their interest grew out of a typically 19$^{th}$ century conceptualization of disease as being linked to environmental conditions, especially atmospheric and geographic ones, which were exemplified by—but by no means confined exclusively to—the "miasma" theory of disease.

The relationship between weather/climate and disease/health is the key to understanding how medical professionals tried to reach out from their local environmental layer to bring closer, define, understand and harness the forces present in the broader environmental layer for the benefit of their patients. Medical professionals defined the local layer by what they were familiar with in their daily practices: the bodies of their patients, the immediate effects of the maladies they suffered, the environmental conditions where they and their patients lived, and the weather in those places. Medical professionals sought to understand and appreciate the broader layer, particularly by understanding how weather and climate conditions affected health: for them, the cords connecting the local to the broader layer ran directly through human bodies. They sought to use this understanding to help treat their patients, and medical professionals' attempt to define and harness the broader layer helped to bring their patients (and themselves) into a closer relationship with their physical environment. Their efforts to gain this understanding also had important implications for advancing the science of meteorology;

the fact that many doctors would also qualify as weather watchers underscores the importance of the nexus between weather/climate and disease/health.

The Weather-Disease Nexus

Since the time of Hippocrates, physicians have believed that climate, weather and conditions in the atmosphere are uniquely relevant to outbreaks of disease and the health of the human body.[3] That doctors and other medical professionals[4] saw a close link between weather/climate and disease/health is amply demonstrated in voluminous medical writing in the early 19th century. Rush Nutt, a physician and plantation owner from Mississippi, expressed the nexus succinctly in a private tract he wrote on the subject:

> Climate, and the habits of mankind, exercise such an influence on the character of disease that physicians are not more puzzled in nosological arrangement than in the method of treatment…That climate influences the seat and character of disease may be seen not only from the fact that many diseases common to one country, are very uncommon in the other, and there are several of the most fatal diseases that are found in one country and unknown in another.[5]

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3 Aldredge, 194.

4 As with any other early 19th century occupation closely related to science, the term "doctor" as we understand it today is simply not the same as it was used 200 years ago. Training and credentialing processes and institutions were much rarer and less uniform in their practices than they are today, so who qualified as a "doctor" in 1810 was by no means clear. My use of the term "medical professionals" in this context is intended to include not merely doctors (i.e., persons who received some form of formal professional medical training, such as being apprenticed to a physician), but also people whose lives and occupations intimately involved medical issues and practice even if they received no formal training. A good example of a medical professional who is not a doctor or physician would be a midwife.

5 Rush Nutt, "The Influence of Climate in Modifying Disease—Specific Contagion of the Plague," Rush Nutt Letters, 13, Huntington Library, San Marino, CA.

Geographic dimensions of climate and disease—which I will discuss in due course—were not the only facet of the nexus. Varying weather patterns within a single place, especially over the seasons of a year, was equally important. In 1815 a New York City physician, surveying the bills of mortality published over the course of the preceding year, wrote:

> The uninterrupted healthiness of our city, during the last winter and spring months, was noticed in our preceding number. The pleasing task returns again to record, that the vernal period has offered to observation much less of its usual morbid affections of the phlegmatic, catarrhs, ophthalmiæ, angina, than atmospheric variations of temperature, of humid and cold weather, seldom fail to create…[T]he number of diseases is always rare at the approach of the summer.[6]

These thoughts, published in the *Medical Repository of Original Essays and Intelligence*, preceded a side-by-side empirical comparison of temperature readings for the summer of 1815 and official tallies of disease mortality in New York for the same period. An example of a similar but even more detailed comparison of weather and disease statistics came from Philadelphia and Charleston, South Carolina in 1810, where three doctors published tables of day-by-day temperature data, minimum-maximum-mean readings from thermometers and barometers, wind and precipitation data next to a bill of mortality breaking out medical deaths by all causes. Consumption (tuberculosis) was the most prolific killer in Charleston in February, with 11 corpses to its credit, followed by catarrh and dropsy with four each, convulsions, bowel complaints and "nervous fever" with three, and a host of causes including pleurisy, "worm fever," rheumatism, insanity and several others bringing up the rear. Indeed, articles such as

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6 "Intelligence: Diseases and Bills of Mortality in the City of New York, August 1815," *The Medical Repository of Original Essays and Intelligence*, January 1, 1817, 1.

these—quite typical during the Cold Decade—resemble quite closely the tables of meteorological data that, as we have seen, were becoming quite popular in printed media on both sides of the Atlantic especially during the second half of the decade.[7]

Medical professionals sought to pull the broader layer closer and harness its forces primarily by trying to explain how they thought the nexus between weather/climate and disease/health worked. Once they understood how it worked, first, it followed that they would be more prepared for disease when it came, and second, many believed they could prevent it entirely or at least blunt its attack. Medical professionals' methodology in explaining and defining the broader layer is at least conceptually similar to that of the weather watchers: they took a scientific, observational approach, collecting facts and searching for correlations and patterns. This is not surprising because, as we will see, there is a significant degree of overlap between weather watchers and medical professionals.

The paradigm explanation for how the weather/climate and disease/health nexus worked is what many historians have termed the "miasma theory of disease," a phrase often used in counterpoint to the modern "germ theory of disease." Simply put, many medical professionals believed diseases were caused by fumes or "miasmas" emanating from masses of decaying vegetation, especially swamps or other places with standing water. Because geography and climate usually determined where vegetable material rotted in sufficient quantities to cause disease, these factors were thought to be paramount. This characterization is something of an oversimplification—and acceptance

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7 Ibid., 6-7; "State of the Thermometer," *American Register, or, General Repository of History, Politics and Science* 7 (1810).

of the theory was by no means total—but belief in the fumes of rotting vegetation as a disease agent lay at the heart of mainstream medical thinking in the first decades of the 19th century.[8] Benjamin Rush, who was a particularly vociferous proponent of this theory, was instrumental in making it the dominant idea in American medical thinking in the late 18th century. Rush's practice and public influence were greatly shaped by endless battles against yellow fever epidemics. While he originally believed yellow fever was contagious between people, he later came to assert that it had a solely environmental cause, that being "certain noxious qualities in the atmosphere." This theory also had a dimension connected to climate change: as early as 1778 Rush argued that deforestation and other human activities made certain lands more prone to disease.[9] Noah Webster, another luminary who was not a medical professional but who shared a keen interest in weather and climate, also championed this theory.[10]

The lengthy report in *The American Medical Recorder* by physician John Revere on the Baltimore yellow fever epidemic of summer 1819 illustrates the basic outlines of the miasma theory. Revere began with a general geographic description of the city of Baltimore, noting the elevation and hydrology of particular parts of the city. With respect

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8 John B. Osborne, "The Lancaster County Cholera Epidemic of 1854 and the Challenge to the Miasma Theory of Disease," *The Pennsylvania Magazine of History and Biography* 133, no. 1 (January 2009): 5-28, 8-9.

9 Carl Binger, *Revolutionary Doctor: Benjamin Rush, 1746-1813* (New York: W.W. Norton & Company, 1966), 151, 228 (quoting Rush, Benjamin, *An Account of the Bilious Remitting Yellow Fever as it Appeared in the City of Philadelphia in the Year 1793*, 2nd. ed. (Philadelphia: Benjamin Rush, 1794), 240).

10 Aldredge, 194; Noah Webster, *A Brief History of Epidemic and Pestilential Diseases; with the Principal Phenomena of the Physical World Which Accompany Them* (London: G. Woodfall, 1800).

to Fell's Point, where the disease raged most fatally and ferociously, Revere noted a detail of its construction that he regarded later as particularly relevant to the epidemic:

> Nearly all the cellars [of houses in Fell's Point] are occasionally wet…The wharves are generally faced with timber, and then filled in with logs…with a thin stratum of gravel on the surface. In some instances chips, and shavings of wood constitute the principal material. There are many reasons for believing that these substances have for some time been in a state of putrefactive decomposition.[11]

According to Revere the outbreak did not begin here, but at "Smith's dock" in the latter part of July. "Smith's dock," Revere wrote, "is very long, but has never been noticed as being particularly filthy, nor is it ever left bare to any considerable extent by the tide." He again cited wet cellars as a key fact, and presented as proof of this agency the case of a previous yellow fever epidemic in 1800 at place called Bowley's Wharf, which then had similar conditions. In the intervening years the cellars around Bowley's Wharf were filled with earth and bricked up. Bowley's Wharf remained relatively free of yellow fever in 1819, whereas the disease was virulent at Smith's dock.[12]

Although the epidemic was already spreading through Baltimore by mid-August 1819, Revere's argument was that it arose at various points in the city through independent point sources of miasma, not from person-to-person transmission. His certainty that the rotting wood shavings beneath Fell's Point were responsible for the outbreak there was based on the fact that a "disagreeable odour" was reported emanating from the shavings, and police ordered them covered and tamped down with fresh earth.

[11] Revere, 2-3.

[12] Ibid., 4-7.

"Three labourers," Revere wrote, "all of whom lived in a healthy part of the town, were employed with carts for this purpose. In the course of a few days all these men were seized with the prevailing disease, and they all died."[13]

In a realm of disease so defined, the relationship between environmental causes of disease and the obvious contagious nature of some diseases was complex and somewhat murky. Revere attempted to define this relationship by discussing three interrelated words and concepts: endemic, epidemic and contagious. An *epidemic* disease—the word in Revere's usage was an adjective, not a noun referring to a specific outbreak—referred to "the effects produced by a certain unknown state or constitution of the atmosphere, in consequence of which, many persons residing in certain districts…become affected about the same time." An *endemic* disease was one that most closely demonstrated the miasma theory: "[It] may be defined [as] the morbid effects produced by certain exhalations, or effluvia, or miasmata, arising from the peculiar *properties* of *some soils* when applied, under certain circumstances, to the body."[14]

As for the final term:

> *Contagion* may be defined as a product, or secretion of a diseased body, which, when applied to a healthy body, is capable of producing a disease similar to itself….From the above definitions it will be seen that a contagious disease may be epidemic; that is to say, that in certain states of the atmosphere, these diseases may be propagated with more facility, than in others. But a contagious disease cannot be endemic; for although there be no absolute absurdity in supposing, a priori, that a disease produced by

[13] Ibid., 7.

[14] Ibid., 15-16 (emphasis in original). Revere mentioned spotted fever as an example of an epidemic disease, and "intermittent and remittent fevers" as examples of endemic ones. Admittedly the line between epidemic and endemic seems permeable, as both encompass an atmospheric dimension; the major difference appears to be that *endemic* diseases could be traced with some perceived degree of certainty to miasmas or rotting vegetation, where *epidemic* diseases arose from some unknown condition of the atmosphere.

> certain exhalations or miasmata, should become contagious, yet, after it has once acquired that quality, it may be communicated indefinitely.[15]

Revere's somewhat confusing categories illustrate that conceptualizing early-19th century thought on disease as purely "miasma theory" runs the risk of obscuring the nuances of the theory, which in part looks much more like "germ theory" than one might suppose based on its emphasis on terrestrial exhalations or atmospheric conditions. To medical professionals of the era, contagion was a dangerous quality that a disease acquired only after it had already been set in motion by environmental factors, like an extra tank of gasoline strapped to a plane already on a kamikaze trajectory. An outbreak of yellow fever in a neighborhood might begin from rotting wood shavings under its foundation, but an individual person might contract the disease from an infected family member. The resulting affliction was the same.

The line between miasma and germ theory grows fuzzier when one appreciates that some 19th-century conceptions of disease came remarkably close to modern understandings that we might assume could only result from application of the (presumably) more "correct" germ theory. In October 1810 a medical professional with the *nom de plume* "A Serious Enquirer" wrote a lengthy article on epidemic fevers in Philadelphia's *Freeman's Journal* that was widely duplicated in other papers. Discussing the catastrophic yellow fever epidemic in Philadelphia in 1793, the Enquirer seemed at first to endorse the leading contemporary theory of the epidemic's cause, that a mountain of coffee beans offloaded from a ship and left rotting on the wharf was the ultimate genesis of the disaster. Yet much of the article was concerned with the deleterious effects

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15 Ibid., 16.

of mosquitoes as a vector of disease. The rotting coffee, according to the Enquirer, created atmospheric conditions conducive to the breeding of mosquitoes carried to Philadelphia on a slave ship, and it was these mosquitoes and the "poifons" they spread which ignited the epidemic that burned through the capital. Less than a century later doctors understood the role of mosquitoes in spreading yellow fever, but, though his epidemiological mechanics are faulty, in a broader sense the Serious Enquirer—writing from the context of miasma theory—got the cause of the 1793 catastrophe more or less correct.[16]

As popular as miasma theory was, some practitioners were inclined to attack it, and weather/climate issues were often their chief offensive weapon. A collection of essays by several different physicians, including accounts of the cold-weather outbreak of bilious pneumonia in Kentucky in 1813, appeared in the *Medical Repository* in early 1816. One Dr. A. Hunn, who wrote on this epidemic, noted the following opinion:

> That the disease in question should be justly ascribable to 'ill-matured viands,' or to a 'pestilential *miasm*,' (if this is understood to be the result of putrefaction) appears to us to be extremely problematical; because we have the most satisfactory information before us of the disease having made its appearance throughout the state of New-York, and the adjacent countries, in the winter of 1813-14, when no failure of crops was heard of, and the temperature of the weather uniformly so far below the point at which putrefaction can commence, that all depravity of air from that source was wholly excluded.[17]

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[16] "Conjectures Respecting the Origin of Epidemic Fevers," *National Aegis* (Worcester, MA), May 15, 1811, 1. The coffee itself was irrelevant as a cause, but the same conditions that rotted the coffee nurtured the mosquitoes that served as the vector of the disease.

[17] Trent, 13.

Ultimately the author/compilers of the *Medical Repository* piece—the "Committee Appointed by the Medical Society of Saratoga, to Investigate the Nature and Causes of the late Epidemic"—was uncomfortable with Dr. Hunn's heresy, and their collective response was, to boil it down to its nub, *it's a bit more complicated than that*. "It is not in the power of man," wrote the Committee, "to account for every peculiar atmospheric constitution which generates an epidemical disease." The true nature of the relationship between weather/climate and disease/health, according to the Committee, was fabulously complicated and not susceptible to easy determination, though it viewed "irregular" seasons as a key factor—and in this revelation lies the understanding of why the Cold Decade, a long period of irregularity, was of particular interest to medical professionals.[18]

Another miasma contrarian was Dr. William Currie of Philadelphia, whose careful weather notations marked him, like the Charleston doctors, as a weather watcher in his own right. Weather and climate conditions were key to Currie's attack on the assumption that miasma caused disease in every instance, though he seems to have granted that miasmas had some conceivable relationship to sickness. Currie kept a register of weather conditions in the city during the summer of 1811, noting, as weather watchers did, temperature, precipitation and wind conditions. Part of his litany noted: "From the 18th to the 22nd [of August 1811], the heat was very great, and the atmosphere became loaded with exhalations from the stagnant water and moist ground." Yet weather conditions seemed of much greater importance to him than "exhalations." Currie wrote:

[18] Ibid., 16-17.

> Soon after the sudden decrease of temperature which had been so excessive during the fore part of July, exclusive of several cases of genuine cholera, (which is always a spasmodic affection of the stomach and intestines, unconnected with inflammation or fever, *and originates from sudden changes of temperature, independent of marsh miasmata*) a number of persons were attacked with a painful disorder of their bowels, accompanied with griping, sickness, and frequent inclination to puke...[19]

Currie's views on yellow fever—a touchy subject in Philadelphia due to the 1793 disaster—carried his most stringent indictment of strict miasma theorists. Contrasting "malignant" yellow fever (epidemic) with the "intermittent" form of the disease, he argued:

> I have seen but few cases of the intermittent fever this season, within the limits of the thickly settled and paved parts of the city…nor have I seen many cases of the remitting type…and not a single case of fever with the characteristics of malignant yellow fever; which, if we live 'in the latitude of pestilence,' as has been confidently pronounced by an author of some renown, must be 'passing strange,' considering the extraordinary high and low temperature which has alternately and frequently occurred, since the beginning of June to this time; especially to those very learned sages, whose sagacity first discovered, that all malignant and pestilential diseases originate from the exhalations which issue from dead animal and vegetable substances, during the process of putrefaction....[20]

Currie then embarked on a long list of the unsavory features of Philadelphia that should, if strict miasma believers were correct, have rendered the city a lethal furnace of eternal pestilence: filthy docks, covered sewers awash in excrement, steaming graveyards, decaying wharves, deteriorating houses, stagnant pump wells and other

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19 "A Sketch of the Weather and Diseases at Philadelphia, from the 1st of January to the 15th of September of the Present Year (1811), Extracted from the Meteorological Register of Dr. William Currie," *The American Medical and Philosophical Register*, July 1811, 5 (emphasis added).

20 Ibid., 5-6.

"grand manufactories of these pestiferous exhalations."[21] Logically one must admit he had a point, yet from the standpoint of modern germ theory it seems astonishing that with these conditions Philadelphia was not more disease-ridden in the early 19th century than it was. Currie's basic argument was to underscore that, however seductive sources of "exhalation" might be as scapegoats for disease generation, there must at the very least have been something else at work moderating or complicating the occurrences of disease in an urban environment. Weather and climate were the *something else*.

Sickness in Time and Space: Disease Calendars and Maps

Another way in which medical professionals sought to define the broader environmental layer was by understanding and defining the temporal and geographical dimensions of disease. By placing weather and climate at the forefront of disease and health understanding, it quite naturally followed that medical professionals would develop differing conceptions for diseases often found in different seasons—or sometimes strains of the same disease that recurred in different seasons. As much medical literature even in the popular press was aimed at educating medical professionals or sharing opinions that were of practical use in the field, it is unsurprising that the literature of the Cold Decade often contained seasonal and temporal guides to disease, with some going so far as to assign categories of diseases to particular seasons and times of the year. These "disease calendars" further illustrate the attempt to harness the broader layer and make it work on the ground for patients.

21 Ibid., 6.

An 1814 article in the *American Advocate* of Hallowell, Maine, was helpfully titled "HINTS Respecting the Disease Commonly Called 'Spotted Fever,' Now Raging in Kennebec" and may have been written to provide advice to local physicians as well as encourage them that conquering the disease outbreak was possible. "We have to admire the courage and address of those practitioners in New England," wrote the author (who did not identify himself), "who with little or no aid probably from books have…given us an almost entire safeguard from mortality in this disease, at least *as it shows itself in inland places in winter*." After describing the symptoms and treatment of spotted fever—which, despite the author's rhetorical flourishes, seemed to consist largely of the usual prescriptions like bed rest, herb teas and brandy—the author made a distinction between the winter form of the disease and the type that occasionally prevailed during the summer, most recently in 1807. As the article was published in March and specifically addressed the winter form, the author said little about the characteristics of the summer variant, but concluded with a warning about trusting "meddlers" who were "not of the profession":

> These, from seeing the manner of conducting a few cases, often think they know how to treat what some of them call a *cold* fever. But the cases of cold fevers are almost as *various*, and certainly they are *far more dangerous* than those of hot fevers…[N]ew varieties are to be expected upon changes of weather and of seasons…[22]

In addition to carrying articles such as these aimed at medical professionals, the popular press embraced the "weather calendar" concept.[23] Bills of mortality were

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[22] "Hints Respecting the Disease Commonly Called 'Spotted Fever' Now Raging in Kennebec," *American Advocate* V, no. 10 (March 26, 1814): 1 (emphasis in original).

[23] In a sense, it still does; people today often speak of "flu season."

common features of urban newspapers in England since their inception and in America beginning in colonial times, but during the Cold Decade disease and death registers in some cases melded with the type of meteorological data that, as we saw in the last chapter, was becoming more prominent during the period. Take, for instance, the "Report of Diseases" published in the *American Monthly* in June 1818, which was a meteorological report, a disease register and a bill of mortality all rolled into one. Compiling statistics for New York in April 1818, the article's author, Dr. Jacob Dyckman, reported "acute" diseases such as catarrh, bronchitis, enteritis, hepatitis and cholera, while tallying deaths from dropsy, typhus, old age, insanity, suicide and most other causes. Consumption, as usual, was the leading killer with a body count of 44. Dyckman also detailed the weather including specific temperature and barometric pressure readings. "From the frequent frosts, and the want of genial warmth, there is little appearance of vegetation," he wrote. "Cold unseasonable weather appears to have prevailed throughout the United States." He compared pneumonia deaths month-by-month from January to March and typhus for the same period. Although the weather was "unfavourable"—in fact he characterized it as "almost uniformly unpleasant"—Dyckman concluded that "this period has not been unusually productive of diseases."[24]

Dr. Currie, the Philadelphia physician hesitant to ascribe all disease to "exhalations," synthesized his views on disease and weather into a book, published in 1811, titled *A View of the Diseases Most Prevalent in the United States of America at Different Seasons of the Year*. This book was the exemplar of the disease calendar, and

[24] Jacon Dyckman, "Report of Diseases: Acute Diseases," *The American Monthly Magazine and Critical Review*, June 1818, 3.

proceeded in chronological fashion. Amidst its pages—admittedly not an easy read—studded with graphic descriptions of bloody vomit, weeping pustules and the bowel evacuations of dysentery victims, Currie tagged the months of the year with the maladies most closely associated with them. Respiratory diseases prevailed from November to July, along with hepatitis, gastritis, arthritis and hives. Summer was the season of diarrhea, followed at its end by dysentery, "particularly when long protracted heat and drought are succeeded by cold and wet weather of several days continuance." In the early fall months came the epidemic killers: yellow fever, typhus and scarlet fever. Though writing from Philadelphia, Currie did not vary the disease calendar for particular regions, which is somewhat remarkable given medical professionals' common conception of disease having geographic as well as atmospheric dimensions. His was an attempt to catalogue American diseases generally, placing them in a temporal more than geographical context; but geography did play a considerable role in the common conception of disease and sickness.[25]

Maine midwife Martha Ballard presents a rare example of a medical professional who was not a doctor and not formally trained, and from whose famous diary historians have learned much about popular medicine. She was less explicit and descriptive of her medical thinking than were the physicians, but circumstantial clues from her diary indicate that she too perceived a temporal dimension to disease and general health. One of these clues is the very form of her diary, whose pages she ruled and labeled in the fashion of a farmer's almanac, the key technology of timekeeping in rural America in this

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25 William Currie, *A View of the Diseases Most Prevalent in the United States of America at Different Seasons of the Year* (Philadelphia: J. & A.Y. Humphreys, 1811), 9-15.

period. On these almanac-like pages Ballard often recorded the weather and matter related to vegetation and the blooming of plants and crops as well as the children she delivered and the details of her day-to-day medical practice, which stretched from 1785 into the early years of the Cold Decade. The last entries in her diary, from April and May 1812, chronicle her "ague fitts" side-by-side with records of the weather. The final decline in her health—she was 77 years old—came in tandem with snow and a delayed spring. The second-to-last entry in her journal marked May 6, 1812 as "A very stormy day," and she noted "I do not fel [sic] any better." Within three weeks she was dead.[26] The close conjunction of weather and seasonal markers and her own medical conditions seem to suggest that Ballard would have agreed that sickness and health had a temporal dimension.

If one could theoretically pin disease to a calendar, it follows that one could locate it on a map. Many medical professionals in the Cold Decade did exactly that. Indeed the classic explication of miasma theory demanded it. The same 1811 *Freeman's Journal* article that discussed mosquitoes as a vector of disease, especially yellow fever, dealt as much with geography as it did with miasma. Climate was the link between them. The author distinguished—as many medical professionals and amateur climatologists did—between "temperate" and "tropical" zones of the world, briefly compared their flora and fauna, and with typical North American conceit declared tropical climates to be far more dangerous. "Their vegetable and animal poisons are much more deleterious than those of temperate climates." The problem came, of course, when regions of localities exhibited periodic characteristics of tropical climates, like the Delaware peninsula and the

[26] Ulrich, 8, 323, 340-41.

Chesapeake regions in deep summer. Problems also arose when commerce from tropical regions introduced vectors of pestilential miasma into temperate ones. Again speaking of Philadelphia's 1793 epidemic, the author of the article noted the origin of the rotting coffee and mosquito-infested bilge water aboard ships as the West Indies, a tropical and thus geographically unhealthy climate.[27] The implication was that products of an unhealthy climate, when transported to another place, could themselves cause disease because of their connection with deleterious climates.

One of the reasons Charleston's doctors took such care to record weather conditions was their belief that their city was located in an especially unhealthy place, afflicted with a climate that easily facilitated the conditions giving ride to epidemics. Charleston physician J.L.E.W. Shercut included in his 1819 volume *Medical and Philosophical Essays* a geographic profile of the city of Charleston, complete with descriptions of streets, swampy areas, duck habitats and drainage patterns. Since the 1790s the Medical Society of South Carolina had been urging city fathers to enact and enforce health and sanitation measures aimed at curtailing conditions that tended to add to the city's already miasmatic climate, such as regulations on household drains and sewers, clearing trash and "putrefying substances" from the streets as well as examination of incoming ships, especially from the West Indies, by port officials. At the end of the Cold Decade Dr. Joseph Johnson wrote a letter to the Society on the happy occasion of the city of Charleston having passed the summer of 1820 without a significant yellow

[27] "Conjectures Respecting the Origin of Epidemic Fevers," 4. Though not identified by name, the initials "M.F." appear at the end of the *Freeman's Journal* article. It is at least possible that the author could have been Malachi Foot, who wrote six years later on similar subjects of the climate dimensions of disease. *See* Malachi Foot, "Intelligence: Atmospheric Constitution of New-York, from October, 1816, to January 1, 1817," *Medical Repository of Original Essays and Intelligence*, April 1, 1817.

fever outbreak, but his letter made clear that he believed the city's deliverance to be a result of the unusual forbearance of a combination of rains and westerly winds that promoted disease-causing miasmatic decay—in other words, that Charleston happened to dodge a bullet thanks to the weather. Yet the letter also contained further recommendations for city sanitation measures.[28] Johnson's letter showed his belief that to a certain degree the geography of a place predetermined its propensity for disease, but these factors could be mitigated, in the thinking of many medical professionals, both by flukes of nature and by human intervention.

Whether a region had a healthy or unhealthy climate was of prime concern to potential settlers of Western lands in the United States, many of whom sought to emigrate to escape bad weather conditions or diseases.[29] Consequently, boosters of Western destinations went to considerable lengths to analyze the climate and disease conditions of particular places. Daniel Drake, physician, booster of Ohio and friend of weather watcher Josiah Meigs, wrote in 1815 a detailed and predictably upbeat geography of the region, the same one later lauded by Thomas Jefferson.[30] His analysis interwove climate, geography and disease in an almost inseparable skein. "In attempting to obtain a correct knowledge of the climate of a country," wrote Drake, "the study of its winds is of the first consequence. To be successful in this, requires a general acquaintance with its surface and aspect." After describing Ohio's physical geography, its winds and atmospheric

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[28] Aldredge, 199, 240-41.

[29] Skeen, 13.

[30] *See* Chapter IV.

conditions Drake analyzed the diseases prevalent in Ohio, linking them explicitly to climate. He did note that pulmonary consumption, pleurisy, peripneumony, croup, colds, catarrh, tonsillitis, tooth decay and rheumatism could be found in Ohio's climate. However: "Neither the extreme cold, nor the extreme heat of this climate, appears to produce many diseases by its direct operation. If scurvy, goitre [sic] and chilblains arise from cold, that of our climate is not sufficient to produce them."[31] Drake is an important figure to the understanding of environmental consciousness, and we will return to his story in the chapter regarding travelers.

For potential settlers and their families, the geographic location of disease was not merely a matter of comfort, convenience or quality of life. It was very often a matter of life and death. Common people, especially farmers, dealt with disease as a constant companion in their everyday lives; for many, the condition of being healthy was a sort of paradise of the physical condition in much the way promising new lands were thought of as benevolent landscapes of economic opportunity. Consequently, settlers characterized locations themselves as "sickly" or "healthy." One Irish farmer in 1819, about to embark for Missouri territory, wrote a family member that he was headed for "some healthy place where the land is good." Such sentiments demonstrate an almost perfect weld of climate, geography and conception of health and disease, and they also demonstrate how close, intimate and sometimes decisive these factors often were in changing the course of individuals' lives.[32]

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[31] Daniel Drake, *Natural and Statistical View, or Picture of Cincinnati and the Miami Country, Illustrated by Maps* (Cincinnati, OH: Looker & Wallace, 1815), 91, 97, 179-80, 187.

[32] Valençius, *Health*, 4-5 (quoting "Meet Me in St. Louis—1819," *Missouri Historical Society Bulletin* 7 [1951]: 182).

It is clear from these examples that the relationship between weather/climate and disease/health had numerous complicated and interlocking dimensions. Blaming disease on miasmatic exhalations is a necessary cornerstone of the relationship, but this hydra had many tentacles. Medical professionals could not expect to conquer or limit disease by simply being vigilant against miasmas and the conditions believed—certainly not universally—to cause them. A good doctor had to approach his patients armed not merely with the usual tools of early 19th century medical practice such as lancets, potions or jars of leeches. He also needed clocks and calendars to quantify time and maps and surveys to avoid disease-causing environments. For a truly comprehensive understanding of disease, the best doctor might also add to his proverbial bag a thermometer, barometer and wind gauge: the same weapons with which weather watchers fought the battle of understanding of Earth's environment on both its layers, local and broad.

### Disease in the Cold Decade

Interesting and multivariate as these observations are, they were by no means unique to the second decade of the 19th century. Miasma theory prevailed in medical thinking in some fashion for virtually the entire century—germ theory being developed at its end—and also stretched backwards to much older roots, as did the understanding of the role of climate and weather in disease and health. There was, however, something unique about the Cold Decade. Because it was a period rife with weather and climate anomalies and weather/climate was so critical to conceptions of health/disease, one would logically expect to find that medical professionals viewed Cold Decade events as particularly significant. They did. Like many other aspects of environmental consciousness, the Cold Decade did not itself create a new order in medical thinking, but it does serve as a lens that brings understanding of their existing thinking into especially sharp focus.

Medical professionals were especially wary of variable and unpredictable changes in weather, which was a common occurrence in the Cold Decade. A summary of disease in New York City, similar to others discussed in this chapter, explicitly linked unusual weather fluctuations to increased incidence of outbreaks. "The vicissitudes of the weather during [the winter of 1812], particularly in February and March," wrote the unnamed author, "have been…unusually great and sudden. In correspondence with these vicissitudes, have been the variety and character of the diseases which have prevailed during the same period." At no time since the yellow fever outbreak of 1798, argued this writer, had New York been more rife with sickness, "nor have its diseases been attended with more violence and fatality." The writer named catarrh, inflammations of the throat and windpipe, pneumonia and even heart conditions as the direct results of variable weather.[33] In New England in the summer of 1815, especially noted for its wild fluctuations in weather—and eventually the September hurricane that swept Massachusetts—the abrupt termination of hot weather and the onset of cool temperatures in August were blamed for the sudden disappearance of cholera, which had previously been a particular problem that summer, and its replacement with dysentery. One report of the disease history of New England for that erratic summer melded seamlessly an

33 "Observations of the Diseases of the City of New-York, during the Months of January, February and March, 1812," *The American Medical and Philosophical Register*, July 1812, 2.

indictment of the variable weather and a description of the medical anomalies it produced.[34]

The lengthy *Medical Repository* essay from 1816 summarized the concern with variable weather and disease, and also linked such variations to broader climate cycles. After analyzing various disease outbreaks in the U.S. South and Southeast from 1812 to 1814, the author argued:

> ‘A succession of irregular seasons,’ says an eminent modern writer, ‘do constitute the material cause of epidemics. The inflammatory ones will be more active in the spring than any other season….’ Who can say but that alteration in our seasons is a periodical one during the revolution of a lunar cycle, which is nineteen years? It is perhaps a consequence of a rotation of atmospheric constitutions too long to be recollected by individuals, that during another period of the lunar cycle, we have been exposed, in former years, to the continuation of south and south-west winds in summer and fall, and thereby, to prevailing bilious malignant fevers, fall fevers, and yellow fever.’[35]

This sentiment illustrates the connection of disease and medical subjects to other threads of weather and climate thinking we have already encountered. As with many of the weather watchers, the author of the *Medical Repository* piece held a conception of climate as being part of a repeating pattern, in this case a 19-year cycle governed by the Moon. If that was true, it stood to reason that seasons would be more variable at some points of the cycle than in others, and the variable stretches could be expected to give rise to epidemics. However, the author also suggested another possibility: that there could be another climate cycle, longer than a human lifetime, which may also affect seasonal

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[34] “Medical Report,” *New-England Journal of Medicine and Surgery, and Collateral Branches of Science*, October 1815, 4.

[35] Trent, 17 (quoting Pierre Marie Auguste Broussonet).

variations and concurrent disease factors. What if that as-yet undiscovered cycle was extraordinarily long—say, a hundred years, or a thousand? Might a succession of extremely variable seasons or years with significant weather anomalies appear to the short-lived humans passing through them to be a "new normal," unlikely to change within their lifetimes? The *Medical Repository* author did not explore these possibilities, but they meshed with stated and unstated uncertainties about broader climate cycles and the climatic trajectory of the Earth—global warming or global cooling, the preoccupation of the arguers—that were especially cogent during the Cold Decade.[36]

Uncertainty about what Cold Decade events portended for Earth's climate as a whole, and what effect it might have on disease and health, were more explicit in a different article also published in the *Medical Repository*, this one by Malachi Foot in the spring of 1817. In an essay regarding the "Atmospheric Constitution of New-York from October, 1816, to January 1, 1817," Foot considered the impact of the most serious and visible sequence of Cold Decade anomalies—the Year Without Summer—upon disease and health in general in New York. "We have particularly noticed in our last number," he wrote, "the unusual changes of the preceding season, its atmospheric and planetary appearances, with the calamitous state of agricultural produce throughout the country." Foot noted that there were no "epidemical or…unusual" diseases occasioned by the anomalies, but he did blame the weather for increased occurrence of "mental derangement" and particularly suicides.[37] He stated:

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36 *See* Chapter X.

37 Foot, 1.

> The unexampled coolness of the summer thus far has prevented the recurrence of the fevers usually prevalent; but we are beset by a train of evils of no less magnitude. The otherwise meagre corn crop is now threatened with almost utter ruin…Garden vegetables are scanty, crude, and innutritious, often producing oppression and sickness…Thus, Sir, in this mild climate, to which I had retired to escape the piercing blasts of the north on a hectic constitution, we have had frost through all the vernal and summer months, and vicissitudes so rapid as to try the best constitutions. However singular these phenomena, they have approached us gradually through a series of twelve or fourteen years, leaving their noxious traces on all living matter.[38]

With this passage Foot entered into the great warming vs. cooling sweepstakes then raging in public discourse on the side of cooling theorists—and we will encounter Foot again in the chapter concerning the arguers—but what is important here is his description of expected climate change possessing a health/disease dimension. He seems to have come to New York from someplace colder, to escape "the piercing blasts of the north" and their effect on his health, only to find that the anomalies of the Cold Decade meant those piercing blasts were essentially pursuing him south. He framed his own experience as a warning to others about the consequences of climate change. What a community might gain from global cooling in the form of a relaxation of the siege by epidemic diseases would be offset by a new and different set of health challenges, some stemming from the stunting of harvests by colder temperatures, others by increased volatility ("vicissitudes") in day-to-day weather. Foot's essay was an articulation of why medical professionals were right to take special notice of Cold Decade anomalies.[39]

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[38] Ibid., 2-3.

[39] Indeed, one need not endorse Foot's argument regarding gradual global cooling to recognize the challenges. Even if the period of general cooling was fated to be temporary (as, in fact, it was), medical professionals could expect health conditions related to weather to change during the duration of erratic or unusual seasons, and presumably to "change back" when the anomalies passed.

The way medical professionals viewed the link between weather/climate and disease/health is a compelling illustration of the relationship between the two layers of the environmental world, the local and the broader, that can be glimpsed through so many windows into the Cold Decade. Indeed there may be no better example of the funnel-shaped telescope through which the broader layer filtered down to the closer one. A physician's day-to-day work consisted of visiting patients, diagnosing their illnesses, and applying the remedies they knew and understood to individual bodies. Students of Benjamin Rush's medical techniques, for example, treated yellow fever with dietary restrictions, sweating, calomel (a laxative) and especially heavy bloodletting. Rush, who died early in the Cold Decade (1813), was a controversial figure in American medicine primarily because of his dogmatic adherence to the practice of bloodletting.[40] These same doctors—when they were not punishing their patients with constant bleeding and purging—were often busy watching the skies and the instruments they employed to monitor them, and as we have seen in the example of the Medical Society of South Carolina this activity was believed to be an integral part of responsible medical practice.[41] Rush's disciples or not, the evidence is clear that the connection of weather and climate to disease and health was mainstream among medical professionals. The cords that connected doctors' broader layer to their local layers ran directly through the bodies of their patients.

[40] Binger, 228-31. Rush seems to have grossly overestimated the amount of blood in a human body, making his penchant for bloodletting especially dangerous. Death by exsanguination was evidently a major hazard of being a patient of Dr. Rush.

[41] Aldredge, 231-32.

Consequences: The Close Relationship Between Health and Environment

Medical professionals who sought to define, understand and harness the broader environmental layer—to pull it closer and make use of it as a healing tool—did so for the benefit of their patients and their communities. To what degree they were successful is difficult to quantify, but for purposes of this study it is less important than another consequence it had: this worldview had the effect of binding medical professionals and their patients closer to their physical environment. A major consequence of belief in the miasma theory of disease was the conception of human bodies as permeable and porous, through which flowed the matter that came from the physical environment—the basic idea that the human body and the world it inhabited were not separate.[42] This is easy enough to see in cases where people believed that environmental situations like decaying swamps made them sick, but it is a little harder to glimpse when considering specifically weather and climate. Yet the connection was clearly there.

Weather, especially that which attended the change of seasons, was highly important to early Americans not only as they attended to their own health and that of their families, but to their work and livelihoods. Advice from doctors, neighbors and lay people throughout the period centered upon what to eat, drink or wear to ward off deleterious health effects occasioned by changes in temperature or weather, and many people interpreted the changes of seasons as periods during which they were more likely to suffer illnesses that would affect them and their family members' abilities to bring in

[42] Valençius, *Health*, 3. Conevery Valençius is on the forefront of historians who have dealt with this concept in the context of Early America. There is much more extensive historical analysis of the concept in more modern contexts, i.e., industrial pollutants and their effects on human bodies. For examples, see Nancy Langston, *Toxic Bodies: Endocrine Disruptors and the Legacy of DES* (New Haven, CT: Yale University Press, 2010); Brett L. Walker, *Toxic Archipelago: A History of Industrial Disease in Japan* (Seattle: University of Washington Press, 2010).

crops and earn incomes. This is to say nothing about the direct threat to crops and livelihoods occasioned by surprisingly variable or unusual-seeming weather, like the various instances of "cold backwards Spring[s]" recorded in many places during the Cold Decade.[43] Weather to us today is largely a matter of comfort and convenience: do we need an umbrella? Is a light or heavy jacket more appropriate for today's conditions? To a much greater degree, weather was for early 19th century Americans an important matter of life, death or economic survival. Disease was one of the primary mechanisms by which weather could affect people's lives.

In some instances, weather was thought to be not merely contributors to disease, but their primary causes. During the War of 1812 an Army surgeon, Joseph Lovell, treated U.S. Army soldiers at Fort George on the Niagara River in upstate New York. He wrote:

> During the month of June [1812] it rained almost incessantly; while the latter part of July, and the whole of August were extremely hot; the whole of September was however remarkably mild and pleasant. Thus after having been wet for nearly a month, the troops were exposed for six or seven weeks to intense heat during the day, and at night to a cold and chilly atmosphere…The diseases consequent to this alternate exposure to a dry hot, and cold damp atmosphere, were such as might have been expected: typhus and intermittent fevers, diarrhea and dysentery.[44]

This report is telling because in Dr. Lovell's characterization, the "middleman" is essentially eliminated: the health of the soldiers at Fort George is tied closely and directly to the weather and its changes. There is no discussion of miasmas or the mechanisms by

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43 Valençius, *Health*, 74-78.

44 Fleming, *Meteorology*, 13 (quoting account of Joseph Lovell in Harvey E. Brown, *The Medical Department of the United States Army from 1775 to 1873* (Washington, D.C., 1873), 88).

which rain, heat and dampness worked ills upon human bodies; he expected the reader simply to understand the weather caused diseases by itself. Lovell, in this example, cinched tighter the cords binding the local layer to the broader one.

The existence of this environmental worldview crosses the boundary—admittedly quite hazy and nebulous—between medical professionals and their patients. Ordinary people held much the same views about the relationship of weather/climate to disease/health as their doctors did. People did not have to be told by doctors that disease was likely to follow closely upon the occurrence of particular weather conditions: they knew it from their own personal experience. A Massachusetts farmer in his diary linked hot weather to diseases, commenting on his hope that heat waves would not trigger mirroring waves of sickness; a warm spell in August 1819 was especially worrisome.[45] In 1818 a young couple who had emigrated from Connecticut to Missouri brought a young daughter to the country home of the woman's parents in an attempt to cure the girl of whooping cough by way of taking "country air."[46] A travel guide to Louisiana and the Missouri River basin, published in 1814, warned potential settlers that the "scorching heat of the sun is universally agreed to be unfavorable to health," and that landscapes and fields "exhaling unwholesome damps" should be avoided due to the propensity of solar heat to trigger disease-causing miasmas.[47] The climate-disease link was not inscrutable or hidden, a secret of the universe which ordinary people depended upon medical

45 Peter Chardon Brooks, Farm Journals of Peter C. Brooks, Senior, Vol. II, August 14, August 21, 1819, Massachusetts Historical Society, Boston, MA.

46 Valençius, *Health*, 111.

47 Henry Marie Brackenridge, *Views of Louisiana, Together With a Journal of a Voyage up the Missouri River, in 1811* (Chicago: Quadrangle Books, 1962), quoted in Valençius, *Health*, 128.

professionals to interpret and translate through their expertise. It was part of the common knowledge that animated people's everyday lives.

At least in part this is because the line between medical professionals and what could be termed "ordinary people" was quite permeable, not surprising for an era in which medical credentials were more fluid and less rigid than they are today. Only a lucky few men in a tiny elite of wealthy families had the opportunity to attend one of America's very few medical schools extant in 1810, or study at medical centers in Europe.[48] Some physicians, particularly in urban areas, followed a more traditional career trajectory of apprenticing with a senior physician and then hanging one's own shingle in the same or another city.[49] This traditional trajectory often blurred, however, particularly when physicians set out to practice in rural areas. When the centers of medical training in Boston, Philadelphia, New York, London or Edinburgh radiated out rays of more or less professionally-trained physicians who went to practice in frontiers or hinterlands, the doctors who settled in those places began to pick up local customs of less formal medical practice and even some folk medicine and rural ways of healing. In part this was because doctors ceased to be elites—at least economically speaking—when they moved to these areas. They had to farm, struggle and work on the side, sometimes as merchants, carpenters or blacksmiths, because doctoring could not provide a living by itself; as a result physicians were subject to the same economic and environmental vicissitudes as

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[48] *See, e.g.*, Rhoda Truax, *The Doctors Warren of Boston: First Family of Surgery* (Boston: Houghton Mifflin Company, 1968), 115-43 (discussing Boston doctor John Collins Warren, who came from a family of doctors).

[49] *See, e.g.,* Aledredge, 229-31.

anyone else.[50] For medical practitioners who were not doctors, such as midwives, their knowledge and expertise came mostly or entirely from local or vernacular sources such as personal observation, family tradition, word-of-mouth and hands-on practice with patients in the field.[51] Knowledge and attitudes of environmental and medical phenomena could be expected to flow pretty freely across the fuzzy line that separated those who practiced medicine from those who did not.

In addition to medical theories about the environmental dimensions of disease being shared by medical professionals and their patients, there is another reason to infer the common understanding of climate-disease relationships across various walks of life: miasma theory was somewhat flexible and wide-ranging, and thus functioned as a sort of shorthand explanation for whatever ailed people generally. Conevery Valençius, historian of 19th-century American medicine, argues that people of this era could easily use miasma theory to describe a wide range of ills of disparate causes, in much the same way that 20th-century Americans pointed to "germs" as the root of various maladies. Scientific theories of environmental-disease links tended to backstop people's common perceptions.[52] If miasma theory was closely linked to weather and climate, as we have seen, it follows that many people in various geographical, socioeconomic and occupational circumstances would also accept the aspects of miasma theory that extended to climate and weather phenomena. Weather and climate were part of the physical

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[50] Valençius, *Health*, 171-72.

[51] Ulrich, 11-12.

[52] Valençius, *Health*, 114-123.

environment in which people lived their lives, and to which they believed they were embedded by geography and circumstance. Therefore, weather and climate had significant effects upon the human body and its humors.

This process of trying to reach out, understand and define the broader layer bound Americans closer to their physical environments in a number of different ways. Many doctors, like William Blanding, found themselves treating their own family members—or themselves—in life-or-death circumstances, and they paid close attention to environmental factors in the course of their treatments. Ordinary people, whether settling new lands or not, were cognizant of the landscapes around them and the weather in the skies above them as indicators of whether or not they or their families were likely to become sick. Even urban landscapes were sometimes shaped by the closeness of the local to the broader layer. In Charleston, South Carolina, as we have seen, doctors were at the forefront of suggesting sanitation and public health measures to improve urban conditions, and these same physicians in fact dominated the city's Board of Health and its policies.[53] All of these are direct consequences of a particular environmental worldview. In simpler terms, the way medical professionals constructed their worlds mattered on the ground.

Consequences: Doctors and Meteorology

Beyond the various social and human consequences of a dual-layered environmental worldview, medical professionals' attempts to pull closer and define the

[53] Walter J. Fraser, Jr., *Charleston! Charleston! The History of a Southern City* (Columbia, SC: University of South Carolina Press, 1989), 184.

broader layer had a significant effect on the development of the science of meteorology. This effect is particularly noteworthy during the Cold Decade. It is not merely that many medical professionals could qualify as weather watchers, as I previously defined that term; but doctors' efforts to record the weather represented deliberate attempts to refine the science and process of weather study and measurement, and these attempts would, after the Cold Decade was over, yield significant results.

The U.S. military was one significant institution in which an attempt of this nature took place. Toward the end of the War of 1812, James Tilton, Surgeon General of the United States, issued an order commanding all Army post doctors to keep a diary of the weather, note in it any events expected to have effects on disease epidemics, and transmit regular reports to the Surgeon General's office. The order was not generally complied with during the war itself. However, Tilton's order laid the groundwork for important developments after the conflict ended. His successor was none other than Dr. Joseph Lovell, whose observations on the link between weather and the health of U.S. Army personnel in New York in 1812, and whose war and postwar reports on climate and epidemics to Dr. Tilton, situated him well to carry out the idea of a physician-dominated meteorological reporting system when he took office in April 1818. Dr. Lovell even tasked the assistant Surgeon General to compile the meteorological reports and "discover as far as practicable the probable causes of disease, and recommend the best means of preventing them." This proved to be a long-term project, but weather stations and recording of meteorological data became more common in the United States during the 1820s. In 1827 a scientific journal published a compilation of meteorological registers that had emerged over the past decade from Lovell's office. The publication represented the most extensive survey of meteorological data about the United States to date and caught the favorable notice of recognized scientific men in Europe such as Alexander von Humboldt. The number of meteorological observations by U.S. Army posts continued increasing over much of the rest of the 19th century.[54] By the 1870s, when weather forecasting was firmly entrenched as the *sine qua non* of modern meteorology, the sorts of military weather observation posts that got their start in the 1810s were the standard by which meteorological networks all over the world were judged.[55]

Charleston is another place in which weather study by physicians helped to develop the field. We have already seen that the Rush-influenced physicians of South Carolina definitely counted as weather watchers. This is not surprising, given their wide scientific interests: medical historian James H. Cassedy argues that Charleston's medical community was unique, and from the 1740s they created a tradition of practice not just in medicine while also making significant contributions to geography, botany, zoology, geology and mineralogy.[56] In Charleston in December 1789 fourteen of these physicians came together to create the Medical Society of South Carolina, a board for the regulation of the medical profession in that city and one especially cognizant of the need to understand and combat the frequent epidemics that ravaged their community, especially yellow fever. Major epidemics of yellow fever had raked Charleston in 1699, 1703, 1728,

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[54] Fleming, *Meteorology*, 13-16 (quoting U.S. Army Medical Department, *Regulations of the Medical Department*, September 1818, 31).

[55] Anderson, 46.

[56] James H. Cassadey, "Medical Men and the Ecology of the Old South," in *Science and Medicine in the Old South*, ed. Ronald R. Numbers and Todd L. Savitt (Baton Rouge, LA: Louisiana State University Press, 1989), 167.

1732 and 1748, though some cases of it invariably appeared every summer. It was not long before the Medical Society essentially went into the business of meteorology as well as health care. In early 1791, barely twelve months after its foundation, the Society doctors passed a resolution requiring Dr. David Ramsay to procure a thermometer, barometer and hygrometer to assist in logging meteorological data, a process that was already underway and had been informally conducted by Charleston doctors going back to 1733 when Dr. John Lining had begun keeping meteorological tables in the wake of the 1732 epidemic.[57] Ramsay, one of the most prominent citizens of Charleston, had a lifelong interest in weather, climate, its relationship to disease and other branches of natural science. He died—murdered by one of his own patients, no less—in 1815, but only after he had achieved vaunted status as a pillar of Charleston's intellectual and scientific life.[58]

The weather observations by the Charleston doctors continued after Ramsay's death, eventually forming an unbroken chain of point-source meteorological data stretching until the death of Dr. Samuel Johnson, the chief weather watcher who made the readings, in 1862. These readings, like those kept by the Army, represented a significant body of weather data upon which later scientific analyses of weather and climate trends could eventually be based. In 1843 and 1844, the doctors of the Medical Society of South Carolina attempted to interest the government of the state in creating a State Weather Bureau, to which they evidently intended to contribute their ongoing observational

57 Aldredge, 200, 204-05, 226-36.

58 Arthur H. Shaffer, *To Be an American: David Ramsay and the Making of the American Consciousness* (Columbia, SC: University of South Carolina Press, 1991), 218-30, 248-54.

records as a resource. The State Weather Bureau did not come together as a result of this effort, but the attempt clearly demonstrates that medical professionals who doubled as weather watchers were a significant part of the impetus that arose, after the Cold Decade was over, for the creation of government-controlled organs of meteorological research.[59] That this sort of impetus closely resembles the long sojourn of General Land Office Commissioner Josiah Meigs to create regular meteorological stations and pool their records—an effort we encountered in Chapter IV—is no accident. Meigs during the Cold Decade and the Charleston doctors in 1843-44 were simply ahead of their time, for exactly the kind of state organs for the study and observation of weather would begin coalescing in the later 1840s, beginning principally with the meteorological projects of the Smithsonian Institution.[60]

These examples also support the argument of why investigating environmental thought in the Cold Decade is significant—the idea of the 1809-1820 period being the "last moment" of one system of scientific and environmental thought before another began to take over, an idea I will flesh out more fully in the conclusion to this dissertation. If one looks at the Cold Decade, one finds a number of events that arguably represent either the endings of certain scientific and medical traditions, or the beginnings of others. The death of Benjamin Rush (1813) was an ending; the initial establishment of U.S. Army meteorological stations (1818), or the first publication of a true American

59 Aldredge, 243-44.

60 Fleming, *Meteorology*, 75.

scientific journal, the *American Journal of Science and the Arts*, in the same year,[61] were beginnings. The coming of peace at mid-decade at the end of the War of 1812 in the Americas and the Napoleonic Wars in Europe represent the removal of a distraction from scientific research and development as well as percolation of scientific ideas into the press and popular culture; in other words, with the absence of war, military and martial affairs no longer commanded the attention of medical professionals, scientists or the newspapers and journals that might have reported on what they were doing. As we saw in Chapter IV, this could be one reason why meteorological registers began to appear in American and British publications in significant numbers after 1815, but it might also be a subtle indication in a general shift of attitudes and interests of the public. Medical professionals should have welcomed such a shift. The business of war-making and healing the casualties of those wars was done; now there was time, attention and resources to spend on scientific pursuits that could make real differences in the lives of ordinary people.

Conclusion: The Human Effects of Weather

Medical professionals offer a stark and compelling window into the nature of environmental consciousness during the Cold Decade. Their local layers, like that of Dr. Blanding toward the end of his wife's fatal illness, were peopled with the diseased or broken bodies of their patients, sometimes their family members, or themselves; their localities sometimes contained festering swamps, rotting wharves, insalubrious airs,

[61] George H. Daniels, *Science in American Society: A Social History* (New York: Alfred A. Knopf, 1971), 151.

damp chilly basements or overcrowded military barracks. When medical professionals reached out to pull in the broader layer of climate and its characteristics, they went about it with learned scientific thinking often mixed or tempered with practical everyday knowledge. The conclusions they reached about how weather and climate affected human health were not always the right ones, as we would judge them today, but their attempts mattered because they fostered a close relationship between their patients and the physical environment, and also because they helped advance the discipline of meteorology and lay the groundwork for what would come after the Cold Decade.

There are many examples of the links between weather/climate and disease/health that are melancholy or even catastrophic, from Dr. Blanding's sadness at the death of his wife to the hellish scenes at Fell's Point in Baltimore in 1819. But there are other examples that express the same environmental consciousness in a more lighthearted way. In August 1815, a humorous but not altogether unserious letter found its way into a New York newspaper. Signed with the pseudonym "Elizabeth E. Comfortless," the letter was explicitly addressed "TO THE WEATHER." It began:

> OH you ugly creature; notwithstanding you are evidently chagrined at the complainings of humanity, you are positively graciously pleased to be facetious…I shall therefore plainly tell you that the crimes you think alleg'd against you wrongfully, are most of them stubborn facts—half jest half earnest. You say aches, pains, rheumatisms, and shooting corns, are attributed to your influence; of that assertion I myself am an undoubted proof: aches and pains of all kinds you daily fasten on my poor old bones.[62]

*Half jest, half earnest?* Perhaps "Elizabeth" was more earnest and less jest than these words, or her flippant pseudonym, might suggest. She went on to lay the blame for

[62] Elizabeth E. Comfortless, "The Weather," *New-York Weekly Museum*, August 5, 1815, 1-2.

human maladies in terms that, with their deliberate evocation of miasma theory, expressed the conventional wisdom of the Cold Decade with refreshing clarity:

> It is likewise now a common town-talk that the pestilential effluvia of your sickly breath is continually committing people to all kinds of miseries; consigning them to the ruthless arms of death, and rendering them thro' life poor, wretched, nervous, and weak creatures…I felt convinced from the severe pains and aches that were rummaging my bones that your worship was settling a severe indisposition upon me, and yesterday morning, ere I was scarcely awake, a head almost raving with the violence of the pain, and a burning fever...[63]

Note in this passage the telescoping of miasma and weather into a single phenomenon. It was not a swamp full of rotting vegetation or an unhealthful or insalubrious location that was the cause of the fever Elizabeth evidently shared with the people of her town: it was the "sickly breath" of the weather itself to which the letter was addressed. In the final paragraph Elizabeth blamed not an overall climate, nor even a whole season for her wretchedness. Only a few days of bad weather, whatever it was, were sufficient to cause her misery—thus shining a light on how fragile people believed their human constitutions were, and how much they saw themselves at the mercy of meteorological forces.

> [A]ll this mischief, you see Mr. Weather, is entirely owing to your being rather sour and disagreeable a few evenings since. Do pray think of some method by which you may redress my grievances; the disorganized state of my nerves will scarcely allow my trembling hand any longer to keep my pen in contact with my paper; so in great haste and without further ceremony I subscribe myself your worship's most unwillingly obedient servant, ELIZABETH E. COMFORTLESS.[64]

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[63] Ibid., 2.

[64] Ibid., 2.

# CHAPTER IX

## "WHEN WILL THE AGE OF WONDERS PASS AWAY?"

There had been cold spells before, but the month of January 1817 seemed extraordinary to the residents of western Pennsylvania. The weather in the previous month had evidently been mild, even pleasant, but with the new year came a long stretch, five weeks by one account, of bone-chilling cold. The landscape—trees, roads, rivers and lakes, the rocky forested hills in which coal and oil would eventually be found decades later—flattened into an unending sheet of white. But the commerce and communication of the burgeoning market economy could not stop for mere weather. Hardy travelers still plied the roads, and stagecoaches still rattled across the icy thoroughfares that connected America's bustling east to its increasingly important western hinterlands.

On January 20, 1817, in Greensburg, Pennsylvania, a stagecoach carrying mail and a few passengers left the icy environs of the town bound for Pittsburgh, 25 miles to the west. The driver of the stage, evidently a veteran of that route, was one James Black. A record of the precise weather conditions on that day has not been found, but somewhere between Greensburg and a place called Steward's Tavern, on the Pittsburgh road, Black froze to death. His lifeless body toppled from the coach seat and fell onto the road. The horses continued on. None of the passengers inside the coach had seen Black collapse, and none of them seemed to realize anything was wrong. The coach continued on into the frigid whiteness for another two and a half miles.[1]

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1 "The Weather," *The Monthly Visitant; or, Something Old*, December 1817; *The Evening Post* (New York, NY), February 6, 1817, 2.

A passer-by discovered Black's body laying in the road. Realizing what must have happened—or perhaps recognizing Black and knowing his occupation—the discoverer of the corpse hastened to catch up with the wayward coach. When he finally caught up with them and stopped the carriage, the passengers were amazed. The incident made the news in several papers in various parts of the United States.[2]

The tale of the frozen stage driver resonated with people; indeed it seems to have become something of an urban legend. In addition to being repeated in various newspapers, word-of-mouth accounts of the incident circulated in various places, with details sometimes changing. A New Englander recounted the story a year later but believed the event had occurred in upstate New York, naming the stage as the one between Albany and Bennington.[3]

The next month was even more brutal, especially in New York and New England. On February 15, 1817, a temperature of 18 degrees below zero Fahrenheit was recorded on the campus of Harvard University at Cambridge, and newspapers reported that the mercury sank to –20° in Boston. The freeze, accompanied in some places by snow (and even one observation of St. Elmo's Fire in Vermont), lasted until the first days of March.[4]

In Worcester, Massachusetts, publisher Isaiah Thomas kept his diary, as he usually did, and recorded the depths to which the thermometer in his front room sank. At one point in January he noted that it was 20 degrees above zero inside his house, 20

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[2] "The Weather," *The Monthly Visitant*.

[3] Estwick Evans, *A Pedestrious Tour of Four Thousand Miles Through the Western States and Territories During the Winter and Spring of 1818* (Concord, NH: Joseph C. Spear, 1819), 28.

[4] Ludlum, 194-96.

below outside. On the coldest day of the spell, at least as measured across the region—February 14, 1817—he noted: "Fair. Very cold. Wind N. Thermometer in the small South room morning ½ past 7 o'clock this morning 14 above 0. Out doors stood at 0. Coldest night this season, and for 20 years past." Yet it was not Thomas's words that communicated the miserable cold of that day, but the way they were written. His handwriting, generally bold and readable, in this entry was tiny and feeble. The ink lay on the page in clumps—it was so cold that it became viscous.[5] One imagines Thomas, bundled in a shawl in his chair, hunched over his tiny diary and blowing into his hands while a cruel and frigid wind whistled outside.

By 1817, seven years after the "Cold Friday" that so stuck in New Englanders' memories, the residents of the American northeast must have been suffering from winter fatigue. The cool and backward seasons and the bizarre anomalies of the Year Without Summer were followed by the harshest winter anyone could remember. And there was, for some people, no end in sight. Heading into a cool spring, upon the occasion of snow that fell in Albany, New York on the first day of June, 1817, a newspaper remarked: "When will the age of wonders pass away?"[6]

The anomalies of the Cold Decade were, in 1817, at their height. In a time so extreme that stage drivers dropped dead from their seats and each winter seemed worse than the one before, some of those awaiting the end of the *age of wonders* were forced to ponder an unsettling possibility: that it might never pass away at all, and the alteration of

5 Thomas, Diary [unpublished version], Vol. 8, February 14, 1817.

6 *Albany Gazette* (Albany, NY), June 2, 1817, 3.

the seasons could be a new normal. The Earth itself might well be changing, falling into frosty darkness from which it might never emerge.

# CHAPTER X

# THE ARGUERS

As much as did weather-watchers, diarists and doctors, educated elites on both sides of the Atlantic who had a particular interest in the Earth's climate as a whole constructed their environmental worlds in dual-layered fashion. Their local layers consisted of the books they read, the papers and editorials they consumed and authored, and the morsels of historical or scientific knowledge—"tropes," I will call them—that they thought they knew. For them, the broader layer was planetary, encompassing the world's climate whose changes, real or perceived, became something of an obsession. Elites who argued about the world's climate not only prepared the ground, intellectually and scientifically, for later substantive discoveries in climatology, but their arguments themselves set an example for climate discourse that has become, in our own time, perhaps more important to us than it was to the Cold Decade elites.

There is an especially representative example of this discourse from the Cold Decade period. In December 1816, at the end of the Year Without Summer, various American newspapers circulated an article that originated in a Petersburg, Virginia paper entitled "On the Cold of the Late Summer." The *New-York Weekly Museum* prefaced the piece by promising it "will be read, no doubt, with some interest, by the lovers of Natural Science." What followed was a lengthy discussion of the past year's anomalies placed not merely in a global context but a historical one. After citing the opinions of unnamed "writers in the public papers" that the climates of Europe and America were growing gradually warmer as a result of deforestation and "the morasses [drying] up"—the classic conception of anthropogenic global warming best espoused by Thomas Jefferson and Hugh Williamson—the equally anonymous author proceeded to tear down these opinions with a grab-bag of pseudohistorical and pseudoscientific factoids, such as:

> East Greenland, or as it is now termed, lost Greenland, which several centuries ago was the residence of many hundred Russian families, is no longer accessible…this country which was once the abode of the human species now lies buried in snow…The history of the antiquities of Iceland, proves that the population of this island, must have been at one period at least four times its present population…Scarcely a year now passes without part of [Lake Como in Italy] freezing…The inhabitants of all the alpine regions in Switzerland, Savoy, the Grisons, the north of Italy and Spain, agree that by the annual increase of the Glaciers, the fields capable of cultivation are diminished, that the winters are lengthened, and the summers shortened.[1]

That the article was wildly inaccurate hardly mattered. Greenland was settled by Norse, not Russians, and was far from inaccessible in 1816; despite the lack of clarity in the demographic history of Iceland, with its first official population estimate having been made in 1703, there is no support for the claim that it once had a population four times as large as that of the early 19th century;[2] and the assertion that there was somehow a consensus of the populations of five countries about glacial advance is so vague as to be unworthy of serious consideration. The article went on to argue that the anomalous Year Without Summer "appears to us to have been caused more by the absence of the usual circulation of the electrical fluid" than by any other cause. The opinions of a "Doctor

1 "On the Cold of the Late Summer," *New York Weekly Museum*, December 14, 1816, 2.

2 Scott A. Mandia, "The Decline of the Vikings in Iceland," http://www2.sunysuffolk.edu/mandias/lia/decline_of_vikings_iceland.html (visited February 12, 2016); "Population of Scandinavia," Tacitus.nu http://www.tacitus.nu/historical-atlas/population/scandinavia.htm (visited February 12, 2016).

Stukely" from London, "Dr. Priestly"[3] and "Signior Beccaria"—presumably Italian physicist Giovanni Battista Beccaria, known principally for his studies of electricity—were asserted as support for this claim, as was the fact "that three preceding years have been remarkable for earthquakes in various parts of the globe."[4] The article's main argument was largely incoherent, but that hardly mattered either. Its message was its mode of argumentation, the aggregation of various isolated details—some literary, some historical, some supposedly scientific—into a synthesis that was supposed to speak to the broader processes of global climate change. In this sense the Petersburg article was a bit of red meat for habitual consumers of climate change polemics: educated men of America and Europe, the kind of people who knew without being told who Dr. Stukely and Signior Beccaria were, and who were likely to be impressed by authoritatively-delivered anecdotes of dwindling Icelanders and ancient freezes in Italy, regardless of their objective historicity.

These people were the *arguers*. They were participants in a long-running intellectual dispute, which had been raging on both sides of the Atlantic at least since the early Enlightenment, about whether the climate of the Earth was gradually growing warmer, gradually growing cooler, or remaining static. The arguers who were active during the Cold Decade, and who sought to leverage or deflect the weather and climate anomalies of the 1810s into their preferred narrative, were unaware of it but by the Year

3 "Doctor Stukely" was William Stukeley (1687-1765), who wrote *The Philosophy of Earthquakes, Natural and Religious* (London: C. Corbet, 1750); "Dr. Priestly" was minister and chemist Joseph Priestley (1733-1804), who wrote a history of the study of electricity. The name-dropping of scientists without bothering to explain who they are—simply assuming that the readers are familiar with them and the general outlines of their work—was a hallmark of literature within the milieu of the arguers.

4 "On the Cold of the Late Summer," 2. The conflation of seismic activity with atmospheric and climate phenomena in 1810s discourse should by now be well-known.

Without Summer the argument was almost at its end. It could not survive the ascendance, then accelerating in the 1810s, of empirical methods of scientific analysis.

The arguers' attempt to reach out and draw in the broader non-local environmental layer found its expression mostly in prognostication. They wanted to predict, and presumably get credit for having correctly predicted, the future trajectory of global climate, thus validating their own assumptions and common understandings of how climate and the environment worked. A key but unconscious element of their triumph was to be the validation of the elite worldviews they shared—mainly that Earth and its environmental system could be understood by gleaning the Bible, classical literature and Enlightenment discourse for relevant clues. The arguers shared an unspoken faith that their common base of knowledge and their cultural position offered the proper vantage point from which to understand Earth's deep history and its long-term future. In a sense the arguers were playing a card game. The players sat down at the table, which operated under a tacit agreement as to the rules, and began dealing out cards (tropes of climate change discourse) in endless attempts to outmaneuver each other. The tropes were well-established, but the events of the Cold Decade gave them new observations with which they could advance their arguments; these observations came from the local layer. The broader layer was where the tropes were expected to work their magic: the aggregate picture of Earth's climate future that the arguers believed the tropes demonstrated.

Though I liken the processes of the arguers to a card game, that analogy does not mean that, to them, the stakes were trivial. Issues of climate and climate change, particularly with regard to the climate of America versus that of Europe, were politically and ideologically charged and had been acutely so since the Revolutionary era.[5] The Cold Decade with its unusual weather anomalies delivered a sort of shock to the intellectual system of climate discourse, potentially altering the game by giving the cooling advocates new and persuasive examples with which to press their case. The Cold Decade, therefore, provided the possibility for the resolution of what the arguers saw as a crucially important question about the world and its environment.

This possibility, however, was not realized. Although the arguers never reached a consensus among themselves about climate change—neither side "won" the game, nor even really came close—their engagement with the broader environmental layer mattered. It helped prepare the ground, scientifically and intellectually, for truly useful climate discoveries in the later 19th century, principally those that ultimately formed modern understanding of anthropogenic global warming through the emission of greenhouse gases. Moreover, the mode of argument that played out between the warming and cooling theorists itself constructed an intellectual space where more consequential arguments about Earth processes could play out. In this sense, the arguers moved beyond simply playing a rhetorical card game, and into the realm of conceptual substance.

### The Game and its Tropes: The Basic Arguments

The arguers generally gravitated into three basic camps. The first were those who claimed the world's climate was getting gradually warmer, possibly but not necessarily as a result of human activity: the global warming thesis. The second insisted the opposite, that Earth's climate was growing gradually cooler: the global cooling thesis. The third

5 Druckenbrod et al., 57.

group—one could label them as "splitting the difference"—was a little more nebulous, except with respect to their refusal to endorse either global cooling or global warming. Some difference-splitters argued that Earth's climate was staying the same, while others would attack one thesis without explicitly supporting the other. It is entirely possible that arguers who attacked one thesis without endorsing another were in fact warming or cooling partisans, but for our purposes here I will treat those who did not explicitly endorse warming or cooling as difference-splitters.

Two cautionary notes should be kept in mind while evaluating warming and cooling arguments. The first is that arguers, whether they believed in warming, cooling or neither, were usually ambiguous in limiting the purported scope of the trends for which they argued. Jefferson, for example, famously described climate change in *Virginia,* without ever expressly tackling the question of whether Virginia was an appropriate bellwether for trends in *global* climate.[6] Cooling theorists similarly purported to argue the "deterioration" of regional climates, for example, England, also without addressing how representative the cooling trends were of global climate.[7] But even the writers who purportedly limited themselves to discussion of climate in a particular place seemed implicitly to assume that the trends they observed had a global, or at least transnational, dimension. An 1818 article on the cooling of Britain, typical of cooling arguments, invariably involved discussion of Greenland ice, glaciers in central Europe and conditions

[6] Jefferson, "Notes on Virginia," 117-21.

[7] *See, e.g.,* "Some Remarks on the Deterioration of the Climate of Britain, With an Attempt to Point Out its Cause," *Journal of Science and the Arts*, January 4, 1818.

at the North Pole.[8] Even Luke Howard, whom I will classify as a "difference-splitter," titled his two-volume work explicitly *The Climate of London*, yet he saw fit to include weather and Earth phenomena from as far away as South Africa, Russia and South America.[9] Given the general conception at this time of weather and climate phenomena as interrelated with a holistic system of Earth, I believe it is not unfair to characterize Jefferson, certainly a *Virginia* warming theorist and a *European* warming theorist, as a *global* warming theorist. There are apparently no examples of Cold Decade climate arguers who expressly caution their audiences against extrapolating their favored theory beyond a strictly local or regional scope.

The second caveat is that arguers were not always interested in the *causes* of climate change, to the extent they even articulated them. Though conceptions of anthropogenic warming as expressed by Jefferson and Williamson were common, for many arguers the overall trajectory—warming, cooling or static—largely commanded their interest, with its causes sometimes remaining a secondary consideration.

An archetypal example of the global warming thesis, and many of the tropes used to support it, appeared in a Maine newspaper, the *American Advocate*, in January 1811. In this article the author "Algernon" set out a lengthy case for long-term global warming, using for support a number of purported historical facts: that the Tiber River in Italy used to freeze in late Roman times, that Gaul and Germany had conditions of "almost perpetual winter," that the inhabitants of the Danube region regularly endured winters comparable to Norway's in the present, and that ice and snow were seen along the shores

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8 Ibid.

9 Howard, *Climate,* II:96, 125, 168-69.

of coasts in Turkey and Asia Minor. These historical facts were drawn from classical literature, specifically Ovid, Varo and Horace, and Algernon also added a layer of contemporary support by quoting French enlightenment writer, the Abbé du Bos, who quoted these same classical accounts, thus placing a modern rationalist stamp of approval upon long-revered ancient sources. "Algernon" treated as self-evident the overall trajectory of global warming observable from these claims: everyone knew that the Tiber no longer freezes, that the Danube region is not like Norway and that perpetual winters no longer prevailed in France and Germany. "We presume to say," Algernon wrote, "such [] phenomen[a] never appears in these times."[10] This article is the simplest form of global warming argument: it cited conditions observed in classical times, drawn from classical literature, and invited the reader to jump to a conclusion.

Another archetypical example of the global warming thesis emerged at the end of the decade, an article published in *Niles' Weekly Register* in 1819. The anonymous author endorsed the Jefferson/Williamson-style thesis of anthropogenic global warming: that forest clearance, cultivation and increased population resulted in shorter, milder winters and generally elevated temperatures. This article also deployed tropes from classical literature, drawing observations from Ovid, Polybius and Columella as to the climatic conditions of various parts of Roman Europe.[11] The writer of the *Niles' Weekly Register*

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[10] Algernon, "Climate," *American Advocate*, January 9, 1811, 2.

[11] "Change of Climate," *Niles' Weekly Register*, August 21, 1819. Polybius (200-118 B.C.E.) was a Greek historian often quoted and discussed by Enlightenment thinkers. Gilbert Chinard, "Polybius and the American Constitution," in *The American Enlightenment*, ed. Frank Shuffleton (Rochester, NY: University of Rochester Press, 1993), 217-37. Columella (the *Niles' Register* article spells it "Colomella") was Lucius Junius Moderatus Columella, who wrote on trees and agriculture in Roman times; he died in 70 C.E. Colomella cited another Roman author, Hostilius Sacerna, whose name appears in other sources on the Roman environment. Ironically, quotes of Columella citing Saserna continue to surface even today on the Internet, being deployed by modern climate change deniers in service of the "climate has always been changing" argument. *See, e.g.,* Bruce Bartlett, "Climate

column eventually restrained himself from piling on further quotations, remarking that those he had already presented were “sufficient to establish the fact, that the temperature of a considerable part of Europe has been so much improved by the industry of man” that beneficial products such as olives, figs and grapes were now common in areas that had once, in classical times, been too cold to support them. “We see then,” the writer concluded triumphantly, “that a benign Providence has given to man for his comfort and happiness, a power over the climate in which he lives.”[12]

The condition of sea ice, particularly around the coasts of Greenland, was of much interest to the arguers. While cooling theorists pointed enthusiastically to evidence of increased ice mass in these regions, as we will see, warmists tried to indicate the opposite. A *Naval Chronicle* article from 1818, which we may regard at least as endorsing a global warming thesis via an oblique invitation to the reader to jump to conclusions, quoted a letter from Copenhagen, Denmark reporting the detachment of great masses of ice from the Greenland coast, a process that according to the letter had been steadily occurring over the past 400 years. “Since 1786,” said the letter, “the report of the whalers have invariably referred to some changes, more or less considerable, in the seas of the North Pole,” noting that whalers could now sail in ice-free waters as far as 83º north latitude. The loosening of sea ice was blamed for “hot winters and cold humid summers” in Copenhagen.[13]

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History,” *U.S. Marine Corps News* (Internet forum), June 27, 2007 <http://www.leatherneck.com/forums/archive/index.php/t-49074.html> (visited September 16, 2016).

[12] “Change of Climate,” 87.

[13] “Polar Ice,” *The Naval Chronicle for 1818* XL (July-December 1818): 97.

These iterations of climate change, together with others I have discussed in previous chapters, involved many common elements that proved central to arguments about climate during the Cold Decade. Recollections and folk wisdom about what climate had been like in the past[14] were validated with quotes and conditions cherry-picked from historical documents, most of them classical or Biblical in origin,[15] that were intended to illustrate the trajectory of climate across various time-scales, usually poorly-defined.[16] The presence of wine and vineyards in particular places was another common trope,[17] and one indeed that has survived into our own time, as the condition and harvest dates of

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[14] *See, e.g.,* Thomas Appleton to Thomas Jefferson, September 27, 1816, in *The Papers of Thomas Jefferson: Retirement Series*, ed. J. Jefferson Looney (Princeton: Princeton University Press, 2013), X:411.

[15] *See, e.g.,* Algernon.

[16] None of the sources I discovered contained explicit discussion of precisely how long and by how much climate could be expected to change over time, whether by human or natural means. Implicit especially in the Jefferson/Williamson style of anthropogenic global warming thesis is an assumption that warming eventually has some sort of natural stopping point, where the climate stabilizes into a static constant that is especially comfortable and useful for agriculture, settlement and other human activity. Jefferson, in his weather book, came as close as anyone to discussing substantively the *rate* of warming, remarking that Italy at least seems to have warmed 1° F for every century. Jefferson, Weather Book, 83. However, it is clear he did not think too hard on the implications of this; if in the eighteen centuries between the birth of Christ and the Louisiana Purchase the mean temperature of Italy rose a full 18º F, that would have meant the climate of Rome, in terms of daily mean temperatures, would have changed in that time more than the difference in daily mean temperatures existing today between Rome and Stockholm, Sweden. "Stockholm Climate Normals 1961-1990," National Oceanic and Atmospheric Administration <ftp://ftp.atdd.noaa.gov/pub/GCOS/WMO-Normals/TABLES/REG_VI/SN/02485.TXT> (visited September 16, 2016); Tabelle climatiche 1971–2000 della stazione meteorologica di Roma-Ciampino Ponente dall'Atlante Climatico 1971–2000, Servizio Meteorologico dell'Aeronautica Militare <http://clima.meteoam.it/AtlanteClimatico/pdf/(239)Roma%20Ciampino.pdf> (visited September 16, 2016). I do not believe Jefferson really considered the implications of such drastic warming. This is to say nothing of the possibility, never mentioned in any 1810s global warming source I could find, that there might not be a stopping point at all, and that human activity might cause temperatures to rise far beyond levels of comfort and habitability—precisely the situation the world now faces as a result of modern greenhouse gas warming.

[17] "...[A]s places now abount in vineyards and olives, where formerly such productions could not be raised." Algernon, 2 (quoting Hostilius Sacerna, citation not given in original).

wine have long given historians and researchers useful proxy data on climates of the past.[18] Dissipation (or, for the cooling theorists, accumulation) of sea ice around Greenland was generally assumed to be a bellwether of overall climate change.[19] The comparison of conditions of the New World to the Old World was a cornerstone of global warming discourse and was itself the departure point for epic transatlantic arguments regarding qualitative comparisons of the two world regions.[20] The warming arguers of the early 19th century also sought to situate contemporary winters—such as several in the Cold Decade that were perceived as abnormally severe—within a context of global warming, arguing essentially that such winters were temporary anomalies that could not deflect the broader trajectory of the Earth's climate toward warmer temperatures.[21] The arguers often name-dropped experts or supposed experts, usually without fully identifying them, as if their readers were simply expected to know who they were from context.[22]

Some of the arguers expressed climate change ideas with reference to various idealized peoples, usually those who lived in cold regions. This brought an ethnographic angle to climate change discourse, though statements about distant tribes and peoples

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[18] *See, e.g.,* Karl Müller, *Geschichte des Badischen Weinbaus* (Schauenberg, Germany: Lahr im Baden, 1953).

[19] *See, e.g.,* "Polar Ice," *The Naval Chronicle for 1818* XXXIX (January-June 1818): 279.

[20] *See, e.g.,* Druckenbrod et al., *passim.*

[21] *Enquirer* (Richmond, VA), February 26, 1811, 3.

[22] Ibid. (referencing a "Dr. Mitchell" who, however famous he might have been in 1812, is now unidentifiable two centuries later).

were invariably broad-brush generalizations. An 1810 article from the *Baltimore Evening Post*, arguing the global warming thesis, made reference to the "Kamtschatkadale" (probably Koryaks, indigenous inhabitants of the Kamchatka Peninsula) and the "Samoiedes" (Samoyedic) peoples of northern Russia, praising them as "seem[ing] more attached to their country than any other people." The article also mentioned the most popular trope in the pseudo-ethnographic category, that being the Laplanders of Finland, envisioned as a jolly tribe of fur-bedecked reindeer herders with skills well-developed for living and thriving in cold climates.[23]

Laplanders were also used as a trope—though negatively rather than positively—in an *Essex Register* editorial in July 1816, at the height of the Year Without Summer anomalies, as an example generally tending to disprove global cooling. "If we admit that the north has been the theater of the ancient fables," wrote the author, "and that the arts have come form these countries," a cooling world would mean that Laplanders, living in the coldest countries, should be "the most enlightened people," presumably because their country, now the coldest, must have been the area of Europe that was temperate earlier than any other, thus affording the Laplanders more time than any other Europeans to perfect their "arts."[24] In the *Essex Register's* iteration, Laplanders were primitive and backward, and their obvious backwardness disproved global cooling. The idea that climate determined both the racial and moral character of peoples was widely assumed in

23 "Geographical Hints and Remarks," *Vermont Centinel*, September 28, 1810, 1.

24 *Essex Register* (Salem, MA), July 24, 1816, 2.

the Cold Decade; the idea appeared in scientific textbooks of the era aimed at children[25] and was deeply rooted in Enlightenment climate discourse, such as the writings of Abbé du Bos.[26] To the arguers, races and peoples, whether idealized or denigrated, were products of particular climatic conditions.

Arguers in favor of global cooling were less numerous than warming theorists, but the events of the Cold Decade gave their cause a boost, however temporarily. Cooling theorists used many of the same tropes as the warmists did. The example at the beginning of this chapter, already discussed, was especially rich in tropes. A letter to the editor of the scientific periodical *The Portico* in December 1816, summing up the Year Without Summer events, directly challenged the Jefferson/Williamson style global warming thesis with numerous assertions of increased sea ice in various quarters. From the North Atlantic between Greenland and Norway, to Hudson and Baffin Bay in Canada and off the Grand Banks of Newfoundland, the author (one "Observator") argued, ice was everywhere increasing, and had been since at least the 1750s, though the author invariably referenced the extinction of European colonies in Greenland which occurred some time earlier.[27] "Observator" asserted:

> Incredible bodies of ice were floated last spring [1816] to the south, and have been seen as far south as the 38th degree of north latitude, chilling

[25] *See, e.g,* Tom Telescope, *The Newtonian System of Philosophy, Explained by Familiar Objects, in an Entertaining Manner, for the Use of Young Persons* (London: J. Walker, 1812), 95.

[26] Fleming, *Historical Perspectives*, 12-13 (citing the Abbé du Bos's *Réflexions critiques sur la poësie er sur la peinture* (1719)).

[27] Observator, "Observations on the Weather of 1816," *The Portico, a Repository of Science & Literature*, January 1, 1817, 2-3. The former Norse colonies were certainly extinct when Danish expeditions resumed contact with Greenland in the 1720s. Finn Gad, *The History of Greenland* (Montreal: McGill-Queen's University Press, 1973), II:45.

> the air and the whole Atlantic ocean—This, and this alone has been the cause of the inclemency of our last summer.[28]

Increased ice mass was also a preoccupation of an 1818 article in *The Journal of Science and the Arts*, with much focus on Greenland; here too the disappearance of European colonies on that island, which the author claimed occurred at the beginning of the 15th century, is paramount. This article also dealt in the trope of wine in England, asserting that grapes "can scarcely be brought to ripen a scanty crop under walls exposed to the sun...and it would be folly to attempt its growth in the method of a vineyard."[29] Insisting even that America has become so cold that "Indian corn will no longer ripen in New England"—probably an exaggeration of stories of frost-damaged corn harvests of 1816—the author declared confidently that global cooling "appears demonstrated by the most irresistible historical evidence."[30] A South Carolina article from 1816 drew specific attention not merely to the Year Without Summer events but other Cold Decade seasons, claiming that "since 1812, the seasons have been very unlike what they had formerly been." Arguing for global cooling, the editorial quoted from the 1798 memoirs of "Lord Dreghorn" (John MacLaurin, the Earl of Dreghorn, a noted Scottish jurist), whose conversations with his brewer—a source of folk wisdom, the venerable "oldest person

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28 Observator, 3.

29 "Some Remarks on the Deterioration of the Climate of Britain, With an Attempt to Point Out its Cause," *Journal of Science and the Arts*, January 4, 1818, 2-3. This statement is demonstrably false; vineyards and wine production have occurred in England without interruption since Roman times. "Medieval Warmth and English Wine," *RealClimate*, July 12, 2006, <http://www.realclimate.org/index.php/archives/2006/07/medieval-warmth-and-english-wine/> (visited April 20, 2017).

30 "Some Remarks," 1.

living" or at least similar to that trope—convinced him that the planet was cooling. This story also deployed the trope of wine, although in France, not England: a particular kind of champagne was now incapable of production due to climate change. In a rare example of an argument concerned with cause, Dreghorn's opinion, endorsed by the South Carolina editor, was that the great Lisbon earthquake of 1755 was somehow the genesis of these changes.[31]

Observations of sea ice and assertions about the climate of Greenland, past and present, were at the center of cooling theorists' arguments. One should take notice of the commonalities between the tropes used by warmists and coolists: history, usually classical or medieval; intense concern with polar regions; and appeals to name-recognized experts. Malachi Foot, discussed in the last chapter dealing with doctors, was also an arguer, and he was a global cooling theorist. His 1817 essay in the *Medical Repository* began with observations on the Year Without Summer anomalies, and then dealt all of the above tropes: the "melancholy fate of the infant colony of Norwegians at East-Greenland," a "permanent accumulation of ice all over the Arctic regions," and citations of contemporary, recent past and Enlightenment personalities such as William Herschel, Adam Smith and French astronomer Jérôme Lalande.[32] These examples should illustrate that the intellectual common ground between warming theorists and cooling theorists was considerable—almost total. They saw the same things, read the same books and cited the same authorities, but they came out differently on the ultimate outcome.

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[31] "Climate of the U. States," *Camden Gazette* (Camden, SC), September 12, 1816, 1.

[32] Foot, 1-4.

The "difference-splitters"—those arguers unwilling to endorse warming or cooling unequivocally—often tried to speak from a more objective-seeming omniscient consideration of the science, but they too dealt in many of the same tropes. Consider the *Edinburgh Review* article from June 1818—which also criticized the weather-watchers[33]—that presented a lengthy analysis of five recent works that each dealt to some degree with questions of polar ice, Greenland and climatic conditions in the far North Atlantic.[34] After dealing extensively with questions of whether polar ice was growing or shrinking (the author concluded it was difficult to tell for sure), the article went on to discuss the 1816 anomalies, historical observations from Rome, Germany, Italy and other parts of Europe, wine in England, and the extinction of European colonies in Greenland, which the author dismissed largely as "a fable."[35] Regarding the warming vs. cooling debate, closely related to arguments about polar ice, the author noted:

> On the hypothesis that the quantities of ice which encumber the Arctic seas have been accumulating for a long succession of years, it is assumed as a fact, that throughout Europe a milder and more genial climate had formerly prevailed. A closer inspection of the details, however, will show this supposition to be destitute of any solid support. We hear continual complaints, indeed, of the altered condition of the seasons, especially from elderly persons, whose bodily frame has become more susceptible to the impression of cold. But similar lamentations have been repeated by the

33 *See* Chapter IV.

34 "Polar Ice, and a North-West Passage," 5. The five works reviewed were Daines Barrington, *The Possibility of Approaching the North Pole Asserted* (New York: James Eastburn & Co., 1818); William Scoresby, "On the Greenland, or Polar Ice," *Memoirs of the Wernerian Natural History* Society 2:261-338 (1818); Hans Egede, *A Description of Greenland* (London: T & J Allman, 1818); John Laing, *A Voyage to Spitzbergen* (Edinburgh: Adam Black, 1818), and Bernard O'Reilly, *Greenland, the Adjacent Seas, and the North-West Passage to the Pacific Ocean* (London: Baldwin, Cradock & Joy, 1818).

35 "Polar Ice, and a North-West Passage," 1-23, 34-37. The author did not dispute that European colonies had existed in Greenland, but asserted that arguers who employed this trope tended to confuse the *eastern* Greenland colony with the *western* one, and the supposed conclusion that Norse misfortunes on the island demonstrated global cooling was the "fable." Ibid., 37.

> poets and the vulgar from the earliest times...[Citations to various historical examples of both cooling and warming]...On glancing over these slight notices, it is obvious that no material change has taken place for the last thousand years in the climate of Europe.[36]

Even if the *Edinburgh Review* piece is regarded purely as a logical and scientific debunking of warming and cooling arguments, it is interesting to note the degree to which its author allowed the partisan arguers to set the terms of the debate. Polar and sea ice, Greenland colonies, the cold summer of 1816, Roman history, wine in England, observations of weather watchers: these are all the same tropes used by the arguers against each other, different in this iteration only in the conclusion they supposedly support.

Luke Howard, the British chemist and weather watcher I have already discussed, was a difference-splitter, arguing that climate was neither warming nor cooling overall: "I should venture to suppose, that our Climate is likely to remain for ages what it now is; and further, than in its great or leading features, it differs little from what it was, when the present elevation of [the British Isles] above the sea was first established."[37] Yet Howard's 1818 *Climate of London* is literally filled with arguers' tropes, most apparently drawn from contemporary news items. He collected accounts of cold "worse than the oldest person alive recollects," Year Without Summer anomalies, reports of increasing sea ice in the North Atlantic, and numerous other weather events that were easy grist for

36 Ibid., 22-23. The author exhibited perhaps a slight bias toward warming, noting, "But we may conjecture, from the facts produced, that it [the climate] has gradually acquired a milder character, at least its excessive severity appears, on the whole, to be of rarer occurrence." Ibid., 23. This is hardly a ringing endorsement of the warming thesis, which is why it is more appropriate to classify the *Edinburgh Review* author as a difference-splitter.

37 Howard, *Climate,* I:xxxiv.

the mills of both warming and cooling theorists.[38] The only difference was that Howard did not state or invite conclusions from these items. Perhaps by presenting "both sides" he intended an overall demonstration that weather was variable, and that coming out strongly in favor of either warming or cooling, based on particular tropes, necessarily involved cherry-picking to reach a predetermined result.

A lengthy tour of climate arguers' tropes, especially those from historical and literary sources, was the principal preoccupation of linguist and American revolutionary Noah Webster in his *Dissertation on the Supposed Change in the Temperature of Winter*. A paper that he originally gave before the Connecticut Academy of Arts and Sciences in 1799, amended with additional remarks in 1806, Webster's *Dissertation* was reprinted and widely disseminated again at the beginning of the Cold Decade. While most of the *Dissertation* was a broadside attack on the warming theories of Samuel Williams, who set forth his theories in *The Natural and Civil History of Vermont* in 1794 (and also reprinted in a new edition at the beginning of the Cold Decade), Webster spared few high-profile warming theorists in his campaign to prove them wrong. He singled out the Abbé du Bos, the Comte du Buffon, David Hume, British historian Edward Gibbon and Thomas Jefferson for similar treatment. The *Dissertation* was a catalogue of climate tropes: conditions in the Holy Land drawn from the Bible; weather described by classical writers including Ovid, Pliny, Polybius and Virgil; whether and how often the Tiber and Danube rivers froze in ancient times; the impression of Gaul as a "cold" country; Laplanders; unusual winters or summers in medieval times; the observations of weather watchers;

[38] Ibid., II:239, 297, 371, 378, III:11.

“the observations of elderly and middle-aged people”; cultivation of wine.[39] Indeed, sea ice and the Greenland colonies were the only significant tropes that Webster did not employ.

While he was eager to attack the global warming hypothesis, Webster did not endorse global cooling, and instead maintained steadfastly that climate was not really changing much at all. As to the Jefferson/Williamson style claim of anthropogenic warming from clearing and cultivation, Webster admitted that “the wind being more variable, snow is less permanent, and perhaps the same remark may be applicable to the ice of the rivers...[b]ut we can hardly infer...that there is, in modern times, an actual diminution in the aggregate amount of cold in winter, on either continent [Europe or North America.]”[40] While he spent a great deal of energy tearing down warming, Webster was careful not to give any useful ammunition to cooling theorists.

At least so far as historical weather anomalies were concerned, the *Edinburgh Review* offered a lengthy list of events, seasons, assertions and factoids that can only be described as a menu—perhaps offered up as a helpful aid to warming and cooling theorists alike as they rhetorically battled each other. Presented in no specific order or methodology, the list, published in 1819, offered short blunt items like, “In A.D. 401, the Black Sea was entirely frozen over,” or “In 1691, the cold was so excessive, that the famished wolves entered Vienna, and attacked the cattle, and even men.” All individually unsourced—though the *Review* claimed they were “collected from a German book”—

[39] Noah Webster, “Dissertation on the Supposed Change in the Temperature of Winter,” *Connecticut Academy of Arts and Sciences* 1 (1810): 1, 7, 9, 12, 17, 20, 26, 29, 37, 40, 48, 53, 57, 58, 62, 63-64.

[40] Ibid., 68.

many of the factoids were so vague that they did not even identify a location, such as, "In 763, the summer was so hot that the springs dried up," and "In 1447, the summer was extremely hot." This potpourri of factoids was at least fairly balanced in terms of presenting examples of extreme cold (frozen rivers, harsh winters) and extreme warm (hot summers, droughts) and its author did not offer any analysis that hinted at a conclusion. Events of the Cold Decade appear on the list: "In 1809, and again in 1812, the winters were remarkably cold," and "[O]f the same character [hot and dry] was 1811, famous for its excellent vintage, and distinguished by the appearance of a brilliant comet."[41] The *Edinburgh Review* list is a telling diagnosis of the climate debate, making it appear all the more like a rhetorical card game in which individual facts or assertions were collected, catalogued and flung on the table. The *Review* offered the players useful cards in a single helpful deck.

## Rules of the Game: The Climate Debate Before 1810

If the Arguers were playing an intellectual card game, the rules and parameters of the exercise were established long before the Cold Decade. The climate debate as it existed in the 1810s was merely the last act of a long discussion among privileged men of Europe and America who cultivated interests in scientific subjects—incidentally the same soil that ultimately grew the weather watchers. While Western thinking about climate had roots even earlier, the Enlightenment was the era in which the climate card game assumed the form it would eventually take in the Cold Decade.

[41] "Miscellany: Remarkable Facts," *Edinburgh Review*, December 17, 1819, 3.

At the root of the climate debate was the presumed link between climate on Earth and the culture and character of the peoples who lived upon it. This idea stretched back, predictably, to classical times, appearing in the works of Hippocrates, and was also explored by Catholic bishop Albertus Magnus (St. Albert the Great) in the 13th century and French philosopher Jean Bodin in the 16th. These thinkers minted the trope of comparing contemporary weather conditions to mentions of weather and climate in ancient writings. Modern historians have also credited them with establishing "climatic determinism."[42]

The Enlightenment variety of climate discourse began to awaken in the 17th century. In 1680 French-born traveler John Chardin began publishing, in English, his famous diaries of travels in the Near East. He compared various groups of inhabitants in the region and credited their apparent prosperity (or lack thereof) to climatic factors, especially whether they had good or bad air.[43] Chardin influenced the Abbé du Bos, a French thinker whose 1719 book *Réflexions critiques sur la poësie et sur la peinture* ("Critical Reflections on Poetry and Painting"), which linked artistic and cultural achievements to the quality of air and "emanations" from the Earth, in turn influenced Voltaire, David Hume and the Baron de Montesquieu. These thinkers, especially Montesquieu, began to fuse observations on the prosperity of peoples and their relationship to climate with a sort of political, moral and even racial sensibility. Climate was a major influence on whether peoples developed art and literature, or whether they

[42] Fleming, *Historical Perspectives*, 11-12.

[43] Sir John Chardin, *Travels in Persia* (London: Argonaut Press, 1927), 134, quoted in Fleming, *Historical Perspectives*, 15. Fleming suggests that Chardin's views on climate may have been influenced by Arab sources, especially 14th century historian Ibn Khaldun.

could govern themselves according to reason and civic virtue. From these Enlightenment thinkers at the end of the 18th century—the political and intellectual cradle of the American and French Revolutions—came climate ideas that ultimately flowered in the embryonic form of the anthropogenic global warming argument that would later be elucidated by Hugh Williamson and Thomas Jefferson.[44]

Large-scale colonization of the New World by Europeans raised questions of climate to new heights of political, cultural and economic importance. Being the first Europeans on the scene, the Spanish were the first to encounter the puzzle of New World climate conditions that challenged expectations derived from classical thought, especially that of Aristotle.[45] A century later when the British began their colonial projects in earnest they encountered the same problem. They did so just as Enlightenment debates about climate and climate change were then raging in the pages of books and the fashionable salons of Paris—an opportune time for the issue to achieve prominence in intellectual circles. For the English, however, whether New World climates were "better" or "worse" than European ones was not merely an exercise in rhetoric. Climate factors directly affected the ability to attract settlers to North America, which made climate vital to the economic and political viability of the British colonies. It may be that the theory of anthropogenic warming ultimately championed by Williamson and Jefferson arose as a

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[44] Ibid., 12-19.

[45] Sam White, "Unpuzzling American Climate: New World Experience and the Foundations of a New Science," *Isis Department of Science and Technology Studies* 106, no. 3 (2015), 544-50.

solution to the problem of how to convince potential settlers that North American climates would, by virtue of their labor, eventually become comfortable and profitable.[46]

Cotton Mather was among the first prominent native-born Americans who espoused this primitive theory of warming, remarking that, "Our cold is much moderated since the opening and clearing of our woods."[47] Others including Benjamin Franklin expressed general agreement with the warming theory, while appreciating that not enough weather observations had yet been compiled in America to prove it.[48] Colonials had, however, been on the case since the earliest days. William Bradford began keeping a weather diary virtually upon his arrival at Plymouth Colony in 1620, noting the character and severity of the winters.[49] In these activities we see the beginnings of weather watching as a pastime—and a more serious concern—in British America.

The warming theory quite naturally spawned a contrarian camp. Cooling advocates were active at the latest by the time of the American Revolution. Some believed, again on the basis of personal observation, that the climate was growing cooler as a result of deforestation and cultivation. Dr. Johann David Schoepf, a surgeon who accompanied the crown's Hessian mercenaries to America during the Revolutionary War, published a book in 1780 expressly attacking the warming thesis and pillorying the

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46 Fleming, *Historical Perspectives*, 19-27.

47 Ibid., 24 (quoting Cotton Mather, "Essay XIX. Of Cold," in *The Christian Philosopher* (London, 1721), 81).

48 Ibid., 24-25.

49 William Bradford, *Mourt's Relation, or Journal of the Plantation at Plymouth*, ed. Henry M. Dexter (Boston: John Kimball Wiggin, 1865), *passim*.

"credulous Americans" for being gullible enough to believe it.[50] By the Revolution the issue of climate change was now charged, at least for Americans, with the highest political and ideological urgency. Climate went to the very heart of whether the American republic could succeed and exist as a world power on equal terms with European nations.

These were clearly the stakes for Thomas Jefferson and James Madison. Their interest in climate and climate change has already been discussed: Jefferson's long intellectual feud with the Comte de Buffon involved the ultimate question of whether America could be viewed as a peer to Europe. It seems to be no accident that Jefferson and Madison's interest in weather grew in tandem during the 1770s, the decade in which both were involved in fermenting political revolution, and especially the 1780s, when the fledgling American republic was being refined and established as an actor on the world stage in its own right. Climate was thus linked to the success of the experiment of the Revolution.[51] Webster, who carried the climate debate into the Cold Decade with the reprint of his *Dissertation*, was no less ardent a revolutionary than Jefferson or Madison, but his attack on warming theorists may have been intended to set the tone of science and observation in the new republic on a more empirical and less emotional (or literary) footing. His critiques of "bad logic," spurious deductions and poor citations seemed to be a call to clear away the clutter of unscientific thinking and may well have set the stage for the more scientific evaluations of climate that followed the Cold Decade.[52]

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[50] Fleming, *Historical Perspectives,* 30-31 (quoting Johann David Schoepf, *The Climate and Diseases of America during the Revolution*, trans. James Read Chadwick (Boston, 1875), 26).

[51] Druckenbrod et al., 57-59.

[52] Fleming, *Historical Perspectives*, 45-47.

Fresh Cards: The Opportunities of the Cold Decade

While certainly not universally believed, the warming theorists seemed to be more numerous and accepted prior to 1810, to the point that their assertions were regarded as "popular opinion."[53] The events of the Cold Decade were, at least for the cooling advocates, a welcome infusion of new tropes that could be deployed in the rhetorical climate debate. In other words, the Cold Decade dealt the cooling arguers new "cards" that had at least the potential to put warming advocates temporarily on the defensive. The cooling advocates' conception of the dual-layered environmental consciousness viewed occurrences at the local layer as indicative of trends that they believed were changing the broader layer. Indeed, the Cold Decade anomalies were really the only external events that had any potential of changing the trajectory of the climate debate that had, by then, been going on for over a century.

Malachi Foot, already discussed, made use of Cold Decade events that he wove into a cooling argument, citing with prominence "the unexampled coolness of the summer thus far" (1816).[54] The *Journal of Science and the Arts* article from 1818 arguing for the "Deterioration of the Climate of Britain" concluded a lengthy discussion of Greenland and North Atlantic ice trends with specific sightings of icebergs at 42° North—about the latitude of Boston—in the summer and fall of 1816, supposing that "the extreme chillness of that season may in great measure be referred to these visitors from the north."[55] As noted before, the South Carolina editorial of September 1816 placed the

[53] Webster, "Dissertation," 1.

[54] Foot, 2.

[55] "Some Remarks," 7.

Year Without Summer anomalies into the context of a global cooling trend observed especially since the year 1812.[56] A Massachusetts arborist reached a conclusion of climate change, probably cooling, no later than 1814 by observing the decline of peach and apple trees as well as wheat harvests in recent seasons.[57] The sheer ubiquity of observations of anomalous weather during the Cold Decade, even without their observers explicitly linking the anomalies to a process of broader climate change, cannot fail to have been challenging to warming advocates, who were obliged to try to contextualize events and seasons, even unusual ones, as temporary affectations that would eventually pass.[58]

Despite the new opportunities offered cooling theorists by the events of the decade, as it turned out these opportunities were not enough to enable the cooling theorists to seize control of the debate or to change significantly the popular conception of a warming climate. For one thing, the Cold Decade anomalies were transient. While notable weather events and cold winters persisted until the very end of the decade, the extreme anomalies of 1816-17 did not become a "new normal" as some had feared, and a few weather observers opined that seasons were returning to their previous patterns. John Pintard, a New Yorker, wrote in January 1820 that "The winter has been more uniform & like an old fashioned winter, than any that has occurred in many years."[59] Perusing

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56 *Camden Gazette* (Camden, SC), September 12, 1816, 1.

57 R. Peters, "Observations on the Remarkable Decay of Peach Trees, of Late Years," *Massachusetts Agricultural Journal* III, no. 3 (January 1815), 254-55.

58 *Enquirer* (Richmond, VA), February 26, 1811, 3.

59 Ludlum, 196 (quoting John Pintard, *Coll. N.Y. Hist. Soc.* 70 (1937), 264).

continuous records of meteorological observations, such as Leonard Hill's at East Bridgewater, Massachusetts, there is less a sense of the weather careening between extremes at the end of the decade than in its middle and especially the 1815-17 period, and heat waves and "hot months" appear with greater frequency in 1818-20.[60] Scientific data, particularly tree-ring densities, show a dramatic resurgence after 1819, which corresponds to a return, generally speaking, to baseline seasonal temperatures.[61] This pattern of general recovery is probably one reason why cooling theorists were not able to parlay their new "cards" into a rhetorical victory. If they were correct, wouldn't the conditions of 1816-17 persist, or at least recur with greater frequency?

Another reason why cooling theorists could not convert on their fresh opportunities was simply a matter of unfortunate (for them) timing. As I will discuss in a moment, by 1820 the climate debate as it had existed since the Enlightenment was nearly finished, and it did not end in victory for either side. Had the debate gone on for several more decades, perhaps tropes pertaining to the Cold Decade might have entered permanently into the cooling theorists' repertoire, to be repeated as venerated truths for years, but as events played out there was simply no time for that. The debate was almost over.

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[60] Hill, 56-85.

[61] Briffa, K.R., et al., "Influence of Volcanic Eruptions on Northern Hemisphere Summer Temperature Over the Past 600 Years," *Nature* 393 (1998): 451.

The Players and their Privileged Positions

Throughout this analysis I have relied upon the analogy of the card game: players engaged in a contest with tacitly agreed-upon rules, cards that generally conformed to one another in character if not in specific content, and a competitive spirit to win the argument and discredit the opponents. That the climate debate assumed these characteristics at all is a telling reflection upon the players and their positions. That said, one must not trivialize the stakes for which they were playing.

The arguers, whether they advocated warming, cooling or neither, shared a number of characteristics. They were white male elites who engaged each other on a common playing table, their shared literary and intellectual background informed principally by classical Western education. They assumed that the knowledge with which they were familiar—Greek and Roman writers and philosophers, the Bible, and writings of Enlightenment-era figures like Hume, Voltaire and Montesquieu—provided them the proper vantage point from which they could observe, analyze and ultimately pronounce judgment upon the long-term future of the Earth's climate. The arguers did not seem to doubt, at least not seriously, that their shared knowledge base provided them with the proper credentials to understand the vastly complex systems of Earth and its environment. The few expressions of doubt that do appear, such as Jefferson's, were usually couched in terms of a call for empirical scientific data to prove definitively what they thought they already knew by unscientific means.[62] Missing from the arguers' debates was  serious engagement with epistemological questions: *how do we know what we know, and is what we know enough to tell us what's really going on?* This lack of

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62 *See, e.g.,* Jefferson, Weather Book, 83.

introspection suggests the arguers' self-assuredness that they understood how the world worked and perhaps their innate trust in the supposed rightness of the priviliged intellectual and socioeconomic positions from which they argued.

In addition to evincing a surprising lack of self-doubt about the limits of their understanding, the arguers were also curiously circumspect about the end result of the changes they foresaw, or the time-scales on which they could be expected to occur. Arguers, whether they believed in warming or cooling, generally did not get very specific about the pace of change they expected to see in the Earth's climate, nor did they typically paint more than generalized pictures of what future climate conditions might be like.[63] A natural implication of their arguments, however, was that climate might continue to change indefinitely, and that a world that was either uncomfortably warm or uncomfortably cold was a possibility—yet the arguers were curiously reluctant to engage with this implication. In our modern era of anthropogenic global warming, future predictions of an uncomfortably or disastrously climate-changed planet are crucial to our understanding of the phenomenon. This element is notably lacking from Cold Decade climate discourse. Take, for instance, the *Camden Gazette*'s position on global cooling:

> All seem disposed to hope that the seasons will return again such as they were in former years, but if they do not, it may be a matter of no consequence. Vegetables receive new constitutions when transplanted to an uncongenial soil or climate, so will the habitude our bodies be

[63] "Algernon," for example, a global warming theorist writing in 1811, was about as specific about the future as arguers came. Algernon reasoned that climate changed in pace with increase in population, and speculated as to what the population of the United States would be in 20 years, i.e., in 1831. His supposition was 8 million. Algernon, 2. The actual figure as recorded in the 1830 census was 12.8 million, including slaves. U.S. Census Bureau, "Population, Housing Units, Area Measurements, and Density, 1790 to 1990," <https://www.census.gov/population/www/censusdata/files/table-2.pdf> (visited April 20, 2017). However, Algernon asserted that climate had a natural point of stability, roughly "a temperature resembling that of France and Spain," and the speculations on the pace of climate change were germane only to predicting how quickly the climate of the United States would reach that equilibrium. Algernon, 2.

> doubtless changed to suit the changes of the seasons. The first effects of this natural revolution have already begun to disappear, and in a short time we shall have little to fear except from the effects of a counter-revolution, that will require our systems to relapse to their former tone.[64]

The message is clear: *Don't worry about climate change—nature will adapt, and you will too.* Nowhere in Cold Decade climate discourse is there anything comparable to the sense of anxiety or even apocalypse that accompanies modern discussions of anthropogenic global warming and the implications of increasing temperatures and sea level rise.[65] The *Camden Gazette's* position, which seems typical among the arguers, seemed ot assert a deep-rooted belief in natural resilience, perhaps as a result of there being so many fewer examples of potential global environmental holocausts that one could envision in the early 19th century. Or it may have been the result of a greater general trust in God or "providence" that the world in which they lived was designed in such a way as to preclude the possibility that it could become hostile to human life. Either way, the arguers seemed remarkably unconcerned with the broader implications of the changes about which they argued.

Regarding conceptions of time, it is notable that the Cold Decade climate arguments occurred just after new ideas of geologic time-scales—what we might call a conception of "deep time"—had begun to gain currency in American and European scientific circles at the end of the 18th century. The Comte de Buffon, the old enemy of Jefferson and Madison, had compiled in 1775 a table in which he tried to calculate how

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64 *Camden Gazette* (Camden, SC), September 12, 1816, 1.

65 *See, e.g.,* James Hansen, Makiko Sato et al., "Ice melt, sea level rise and superstorms: evidence from paleoclimate data, climate modeling and modern observations that 2 C global warming could be dangerous," *Atmospheric Chemistry and Physics* 16 (2016), 3762.

long not merely the Earth but other planets in the solar system had been in existence, based upon how long he thought the process of planetary cooling took. He argued that the Earth was 74,832 years old, considerably older than the traditional 6,000 year time-scales derived by early modern "chronologists" from the Bible.[66] Buffon was one of many writers and thinkers who were pushing the imagination of the time scales of Earth beyond their traditional limits. Historian of science Martin J.S. Rudwick argues that it is tempting, but incorrect, to view the intellectual expansion of time scales as a simple conflict between Biblical worldviews and scientific understanding. In fact the complexities of competing worldviews—even the heavily theological ones were not always literal in the sense that we conceive of religious fundamentalism in the United States today—brushing up against evolving scientific discoveries, such as late 18th- and early 19th-century studies of volcanic and geologic strata, made for a contentious and variable intellectual landscape when it came to thinking about deep time.[67] The period surrounding the turn of the 19th century, including the Cold Decade, was also a time when the seeds that were to flower in the development of evolutionary theory in biology were germinating in Europe, especially Germany,[68] and a comprehension of deep time as applied to biological organisms is a prerequisite to understanding evolution and natural selection.

[66] Rudwick, 115-128 (Buffon quoted, 128).

[67] Ibid., 118-19.

[68] Ibid., 16.

Deep time would ultimately achieve its ascendancy in climate theory later in the 19th century, as the late Victorian climate thinkers descended into their characteristic obsession with the study of ice ages and the oscillation of Earth's climate from glacial to interglacial periods, as exemplified by writers like James Croll.[69] The beginnings of these currents were present in the background against which the arguers operated, and one can surmise that their general lack of concern with the long-term implications of climate change, whether warming or cooling, may have been rooted in tacit assumptions that potentially catastrophic changes, if they occurred at all, would happen on time-scales long enough to permit humans and other species to adapt to them.

### Throwing it in: The End of the Debate

Despite their best efforts to defeat each other rhetorically, nobody really "won" the great climate change card game. Ultimately it was resolved after the Cold Decade ended, but not in the way that any of its participants might have imagined. The end of the game arose indirectly by processes that were set in motion during the 1810s—though not necessarily by the arguers themselves.

Of all of the arguers, Jefferson's prediction of how the debate might end probably came the closest. We have seen that one of his motivations in keeping his weather book was to gather enough empirical data to enable some type of statistical analysis that might show climate and weather trends—an analysis in which Jefferson himself engaged in at

[69] *See, e.g.,* James Croll, *Climate and Time in their Geological Relations: A Theory of Secular Changes of the Earth's Climate* (New York: D. Appleton & Company, 1875).

least a rudimentary fashion once he completed his observations in late 1816.[70] His sense that empirical observation and extrapolating from data would ultimately replace anecdotal evidence and reliance on tropes like "the memory of the oldest person living" turned out to be correct. Once there was a significant body of meteorological data that could be subjected to statistical analysis, climate change discourse was fundamentally transformed. This transformation, in the view of climate historian James Fleming, "led to the emergence of a recognizably modern climatology."[71]

This is the sense in which the activities of the weather watchers intervened in the literary world of the arguers. I have already discussed the links between Jefferson and Josiah Meigs, the weather watcher who later became President of the University of Georgia.[72] As Surveyor General for the Northwest Territory, a job to which he was appointed by President Madison at Jefferson's recommendation, Meigs sought to establish a chain of Army weather stations taking systematic meteorological readings, some of which Meigs published at the end of the Cold Decade.[73] While Meigs's efforts did not catch on into a systematic institutional procedure, something similar was attempted with more success by Joseph Lovell, a U.S. Army surgeon who eventually (1818) became surgeon general. Lovell began keeping his own weather diary during the War of 1812, and due to the perceived link between weather and disease, Lovell's

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[70] Jefferson, Weather Book, 83.

[71] Fleming, *Historical Perspectives*, 45.

[72] *See* Chapter IV.

[73] Meigs, 82-84.

example was praised as prudent procedure for all Army post surgeons. Once Lovell got to the top of the Army medical bureaucracy himself he mandated the practice as official policy. From these observations, a body of meteorological data began to emerge.[74]

Lovell's compilation of meteorological registers, spanning the years 1822 to 1825, were first published by the Army surgeon general's office in 1826. A year later the *American Journal of Science* published a table of weather data drawn from Lovell's observations. Alexander von Humboldt himself praised Lovell's methods and the new U.S. Army methodology, recommending that other nations, especially Russia, adopt it themselves. If Lovell's practice caught on, Humboldt argued, "then all of climatology would gain a new and improved stature in a few years."[75] The institutionalization of weather watching was recognized at the time as an important factor in bringing the study and discussion of climate into a new, more empirical and scientifically-based realm.

This new realm did not validate the theories of either the warming arguers or the cooling advocates. Indeed, the earliest important climatological study relying upon empirical data concluded that climate was static. In 1836 Dr. Thomas Lawson, another U.S. Army surgeon general, appointed Dr. Samuel Forry to synthesize the data that was by then being systematically collected by Army post doctors.[76] In a study published in the *American Journal of Science* in 1844, Forry, examining vast amounts of meteorological data collected from all over the United States and its expanding frontier, argued that the

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[74] Fleming, *Meteorology*, 13-15.

[75] Ibid., 16 (quoting Alexander von Humboldt, "Uber die Haupt-Ursachen der Temperatur-Verschiedenheidt auf dem Erdköper," July 3, 1827).

[76] Ibid., 68.

data “demonstrat[ed] the harmony of the laws of climate throughout the globe,” and that perceived differences in climate—or perceptions of climate change—were rooted in unscientific observations and comparison of unlike point-source examples.[77] Forry was essentially claiming that climate was static and generally uniform because it was subject to natural laws that were validated by data. Because meteorological data—beyond the putterings of amateurs like George Mackenzie—now existed, climatological conclusions drawn from it were generally more credible than those of the arguers 30 years before. Indeed, studies like Forry’s led the way for the foundation of the meteorological project, aimed at explaining the behavior of storms, undertaken by the Smithsonian Institution in 1846 under its first secretary, Joseph Henry. The Smithsonian project, in the words of Fleming, “linked amateurs and professionals in a task that encompassed the entire United States for twenty-five years,” and became the basis of a truly national system of weather study.[78] New understandings of weather and climate rendered both weather watchers and arguers obsolete, or at least brought their practices into the fold of empirical science.

Arguments about global warming or global cooling, based on essentially a literary understanding of climate and the environment, did not continue much beyond the Cold Decade. The Victorian era, with its new developments of professional scientists and telegraph communication, shifted the focus from broad understandings of climatological processes to useful weather forecasting.[79] One can conceptualize the Cold Decade as the

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[77] Samuel Forry, “Researches in Elucidation of the Distribution of Heat over the Globe, and Especially of the Climatic Features Peculiar to the Region of the United States,” *American Journal of Science* 47 (October 1844): 227, 1.

[78] Fleming, *Meteorology*, 86.

[79] Anderson, *passim*.

last moment, in terms of scientific thinking and environmental consciousness, before the Victorian era began. The Cold Decade was the time when the arguers' game was played out as far as it would ever go—and the debate as mature as it would ever become.

Conclusion: Preparing New Ground

As we have seen, the arguers' debate was essentially literary. It emerged from a pool of knowledge gleaned primarily from the literary texts with which the arguers were commonly familiar; it engaged science only sporadically and without much intellectual commitment; and it assumed as a departure point that literary sources and the vantage point they offered was an accurate lens through which to view the physical world. Even with an infusion of new "cards" in terms of the anomalies of the Cold Decade, the global cooling advocates couldn't win the game, but conversely the warming advocates couldn't quite vanquish them either. Essentially, the inconclusiveness of the climate debate demostrated its inadequacy to explain the world and the environment accurately. People who wanted to understand the climate trajectory of the planet had to change the rules—or play an entirely different game.

This was one sense in which the arguers' efforts to understand the broader layer mattered. They prepared the ground, intellectually speaking, for a new understanding of climate, one based on empirical science and systematically-collected data. Although the increasing availability of weather data in the 1810s and the decades that followed meant that there was a growing basis for a different, i.e. non-literary understanding of climate, by no means does it seem inevitable that an empirically-based view of climate change would have taken hold in the public consciousness without the limits of the literary view having first been reached. In other words, the arguers had to fail in order to inspire their successors to find a new way to conceive of climate and the planetary environment.

Another sense in which the arguers mattered was the intellectual space they created for argument itself about climate change. If one does not think too closely about the limits of their privileged world-views or the scientific shortcomings (by modern standards) of their knowledge about climate and the planetary environment, the rhetorical volleys of the Cold Decade arguers resemble, at first glance, modern arguments about how, why and how much the Earth's climate is changing.[80] Although theories and supposistions about whether the Earth was growing warmer or colder had been going on since the early Enlightenment, as we have seen, the arguers of the Cold Decade built a sphere of public debate about climate that was beyond the purview of Paris salons or the writings that emerged from them. The act of arguing about climate change, in public, legitimized public argument about climate. Given that climate and climate change had deep implications in the early 19th century—for the success of the American republican experiment, chief among them—the arguers' game was not trivial, nor did it leave an unchanged intellectual world when it was over.

One can see the gradual turning away from the traditions of the arguers beginning even in the Cold Decade itself, and certainly beyond it. I have already discussed the increased cachet and prevalence of "meteorological registers" and similar tools in the

[80] This first-glance observation also, quite obviously, falls apart when one considers the deeper implications of the modern climate "debate," that being, the scientific and most of the policy community arguing for the proven scientific fact of anthropogenic global warming on one side, and the other a disingenuous industry-fueled machine of denial largely divorced from scientific reality. In this chapter I pose global warming theorists and cooling advocates of the Cold Decade as roughly co-equal in their knowledge and equivalent in their motives; clearly this is not the case in today's "debate."

second half of the 1810s, in professional publications and in popular newspapers alike.[81] In general, graphs and maps displaying scientific data, whether meterological, geological or otherwise, were quite novel in the 1820s, and are a hallmark (at least in the view of some historians of science) of what might be termed "Humboldtian science," which rejected the "quasi-philosophic speculation" typical of literary-minded arguers like Thomas Jefferson.[82] The repeated attempts by official bodies such as the U.S. Land Office and the U.S. Army to develop systematic meteorological regimes are themselves evidence of a general abandonment of the traditions of the arguers.[83] Cherry-picking data from the Bible and the works of Ovid was quickly an obsolete means of understanding the world, and seemed absurd even by the early Victorian period, barely twenty years after the end of the Cold Decade. The empirical tradition that replaced the arguers' literary sensibilities ultimately led, beginning in the middle of the 19th century, to the discovery of the greenhouse effect and the understanding of anthropogenic global warming. In this way, the arguers and their rhetorical card game represented an important step toward modern climate science.

The arguers embody the dual-layered view of the environmental world. Their local layer was populated with literary tropes and literary knowledge. The immediate environment around them was filled with books: classical Greek and Roman texts, the Bible and the works of the great Enlightenment philosophers and thinkers. From this

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81 *See* Chapter IV.

82 Cannon, 95, 102.

83 Fleming, *Meteorology*, 13-22.

intellectual redoubt the arguers cast about for real-world examples, some contemporary but many from history, that they thought were relevant to weather and climate phenomena. The arguers' broader layer was the world's climate as a whole, the dynamic system they were trying to understand and explain from behind their walls of books. The arguers' attempt to reach out, define and tame that broader layer manifested itself in the generation of a long-standing argument, rooted in literary and intellectual tradition and societal privilege, about the conditions and trajectory of global climate.

The anomalies of the Cold Decade might have given the arguers (or at least one group of them, the global cooling advocates) the cards they needed to win the debate. This did not happen, however, because the argument was fundamentally disconnected from scientific and environmental reality. The scientific professionals who were moving toward empiricism and systematization of observation realized the uselessness of the arguers' debate, but the arguers' efforts did help clear the way for meaningful advances in the understanding of weather and climate. And in establishing an intellectual space for legitimate argument about climate, which given the scientific discoveries of the 19$^{th}$ and 20$^{th}$ centuries *would* eventually be connected to scientific and environmental reality, the arguers set a table of intellectual and conceptual engagement about the Earth's climate. It is we—future generations of climate change thinkers and discoverers—who ultimately sat down to dine at that table.

## CHAPTER XI

## "WHILE OTHER SHIPS WERE BECALMED, AND LIFELESS"

At a little after nine o'clock on the morning of May 24, 1819, a rather ordinary-looking sailing ship—except in one extraordinary and historic way—left the wharf along West Broad Street in Savannah, Georgia bound for a lengthy transatlantic voyage. Although the sailors aboard the ship, called the *Savannah*, spread the vessel's square sails as usual in preparation for departure, a gangly black pipe protruding from the deck, its top canted at a strange crooked angle, had been belching thick black coal smoke for some time. Below decks a gang of stokers frantically shoveled coal into the ship's primitive boiler. *Savannah* was a steam ship, and this voyage across the Atlantic at the end of the Cold Decade would eventually be marked as the beginning of a new era in the history of maritime commerce and of technology.[1]

There were not many people on hand who could boast later about having participated in it. The *Savannah* was built to be quite luxurious, with 16 private staterooms fitted with velvet curtains and mirrors framed in rosewood. A central room, the State Cabin, sported mahogany wainscoting and a thick green baize tablecloth where passengers would enjoy fine meals during their voyage. In fact none other than the President of the United States, James Monroe, together with Secretary of War John C. Calhoun and several other dignitaries, had dined aboard the *Savannah* in the State Cabin during a short demonstration excursion around Savannah Harbor two weeks earlier. However, not a single passenger had paid for the privilege of taking the first transatlantic

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[1] Braynard, 112-14.

voyage that was to be accomplished partially by steam.[2] One Charles H. Campfield, an observer apparently on hand at the dock to watch the departure of the *Savannah*, later recorded:

> Notwithstanding the elaborate and sumptuous manner in which the ship was provided in all respects for the accommodation of passengers, none offered or seemed disposed to encounter (as they then thought) the extraordinary hazards of the voyage. So the heroic and confident [Captain Moses] Rogers alone put to sea.[3]

The *Savannah* was a 380-ton hull, built in New York as an ordinary sailing vessel, and fitted with a steam engine and boiler fashioned at two New Jersey iron works. Her paddle wheels were detachable and could be folded and stowed on deck when not in use. Needless to say, *Savannah* did not cross from Georgia to Liverpool exclusively under steam power, but exactly how much of the time Moses Rogers used the paddle wheels is not entirely clear. The figure of 80 hours, out of a 27-day (648-hour) crossing, has appeared in some histories, as does the much higher estimate of 185 hours.[4] The rest of the crossing was under ordinary sail.

Ultimately, the question of how much of the voyage was conducted under steam power is largely irrelevant, as the *Savannah*, despite being merely another incremental step in the rapid and continuous progression of maritime steam technology in the decades of the 1800s and 1810s, was certainly anointed in history and popular memory as the first

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2 Ibid., 66-67, 104-05, 112-14.

3 Statement of Charles H. Campfield, in Charles H. Campfield Notes, *Savannah* file, New York Historical Society, New York, NY, quoted in Braynard, 113.

4 Fairburn, II:1314; Braynard, 139.

transatlantic steam vessel. The significance of *Savannah's* achievement was as much environmental as technological: a steam ship, at least theoretically, freed its owners and navigators from the vicissitudes and tyrannies of marine weather, especially unworkable wind conditions. Indeed Moses Rogers, eventual captain of the *Savannah*, had in 1817 established a steamboat link between Savannah, Georgia and Charleston, South Carolina with a vessel called the *Charleston*. In an advertisement for the service, Rogers noted: "Bad weather may sometimes interfere with the regularity of this arrangement, *but it is supposed it will be seldom*."[5] Observers of the ship sometimes referred to its weather-defying capabilities. After a steam-powered trial around Charleston Harbor in April 1819, an anonymous letter-writer who was on board the ship noted:

> I was partially tempted to wish for a gale to witness the operation of securing the wheels, which process occupies the space of twenty minutes. On Thursday evening we anchored off Charleston bar, took in a pilot, and the next morning came up to the city without a sail, as rapid as if under every one before a fair breeze, while other ships were becalmed, and lifeless, if I may use the term.[6]

At one point on the famous transatlantic voyage, on June 11, 1819, while under sail, Captain Rogers found himself becalmed somewhere far out of sight of land. Although the vessel was then apparently low on coal, the log recorded, "At 10 A.M. took in sails and set the wheels to going with steam." For the first time on planet Earth, the captain of an oceangoing vessel used industrial technology to overrule conditions dictated by the weather and the environment.[7]

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[5] *Savannah Gazette*, December 15, 1817, quoted in Braynard, 23 (emphasis added).

[6] *Charleston Courier*, April 17, 1819, quoted in Braynard, 94.

[7] Braynard, 121.

The *Savannah*'s historic voyage at the end of the Cold Decade underscores why the period is unique in the historical appreciation of environmental consciousness in the 19$^{th}$ century. The moment before Rogers gave the order to assemble the paddle wheels and build up steam to move his becalmed ship was the final moment of a very long epoch in humankind's complex relationship with the sea as a means of commerce and human activity. In 1819, for the first time, humans finally had the option to overrule the weather as the ultimate arbiter of travel across the ocean.

# CHAPTER XII

# THE TRAVELERS

The dual-layered environmental world-view of the early 19th century, local and broad, is especially evident—and consequential—in the consciousness of people who traveled the world during the Cold Decade. In the 1810s, as in other times, the act of traveling the world was synonymous with the state of knowing it. People who intimately knew their local surroundings sought to reach out and define the non-local layer by traveling to different places and comparing those places to their own localities. Travel was a spatial and experiential form of knowing, which stands in contrast to some of the more theoretical forms of knowing and world-constructions that I have examined. The key to the concept of understanding how travelers sought to define the broader layer is the equation of traveling to a place with knowing it and constructing it in one's mind. The climate and weather of the places to which they traveled was an essential part of this construction.

For American and British travelers, this experiential process of defining the broader layer had a crucial consequence. It built empires—not literally through settlements, railroads or colonial administration projects, which would come later, but conceptually, by creating patterns of mind through which the physical and political construction of empires became possible. Traveling and knowing new and distant places, especially their climate conditions, was part of the emergence of a new imperial worldview. In the United States this world-building focused on frontiers, whether new or distant, to which American power, culture and values could ultimately be projected. In

Britain the world-building was similar, but with an emphasis on the connection and subordination of distant places to the mother country. Traveling, and the knowing and understanding of the weather and climate of new places, figured into imperial and colonial projects by connecting readers of travelogues and travel writings to these distant places, thus creating a much-broadened single universe into which their civilizations could expand. In short, traveling to and knowing the weather and climate of distant places was a prerequisite for fitting those places into imperial nations.

This too is an argument in favor of the 1810s being a significant period of historical study. In the Introduction I posited the concept of the Cold Decade being, scientifically speaking, the "last moment" of one way of looking at the world just before another began to take over and I have referred to this concept several times as a justification for directing particular study to the second decade of the 19th century. In addition to science, the "last moment" analysis can also be applied to imperialism and colonialism. The decades subsequent to 1820 saw the rapid development of ideas, processes and technology—such as nationalism, industrialization, modern global markets, the telegraph, the railroad, anti-malarial drugs—that were the necessary foundations of European and American imperialism that reached its zenith at the end of the 19th century. If the 1810s are viewed in a macro sense as the final pause before the reign of Queen Victoria and the gradual ascendance of industrial Europe and the United States, it is the place in time to look to observe the ideas and practices of colonialism and expansion as they were in the last moment before these new developments began to change how nations and societies defined themselves, their possessions and their roles in the world. The Cold Decade occupies a space in time at the end of the era when distant lands were known and understood as much (or, in some cases, more) by the experiences of travelers and settlers than by actions of governments, armies and colonial offices. Environmental and climate narratives form a central part of this act of knowing and world creation.

Travelers and their various means of knowing and constructing their worlds give us a key insight into the environmental consciousness of the early 19th century. What I term “travelers” are people who traveled from one place to another within the Cold Decade and who made some significant expression, cognizable to the historical record, about the weather and climate of a particular place. Travelers often compared climates, noting the contrasts and similiarities between their destinations and their homes or other places they’d been. In some cases travelers, often boosters of settlement particularly in the United States, sought to free people from the vagaries of one climate and encourage them to move to another. Through their own journeys, these travelers provided examples for others who might seek to escape one environment and reestablish themselves in a more favorable one. Traveling was, in a sense, the most literal and physical form of world construction that people of the Cold Decade could do, but it still had a significant conceptual and intellectual element.

Travels in the Cold Decade, like many other activities and conditions in this era, implicated the climate and weather anomalies of the time. Efforts to understand, appreciate and explain what was happening to the climate in the Cold Decade sometimes involved the comparison of contemporary conditions to those of other places—the Arctic or mountain regions, for instance—as a means of qualifying the weather events of the time. In other contexts, such as the Western booster situation, as we will see, people sometimes decided to travel or migrate specifically to escape Cold Decade conditions, perhaps fearing or presuming that the weather anomalies were a "new normal." In a few instances, the records left behind by travelers establish as a factual matter that Cold Decade anomalies were truly global, and not just an affectation of Europe, North America or the Atlantic world.

Essential Character: Climate as Knowing and Description

For people who traveled, the climate of a new place was an essential ingredient of that (or any) place. Travelogues were a popular form of literature in the early 19th century, and elements of travelogue-style literature frequently crept into private correspondence, diaries and other forms of written record. Travelers saw an essential part of their role as communicating the essential character of a place to those back home or others who did not go on the journey. Analyzing and understanding climate was a key part of this role.

The mere titles of some travelogue books and pamphlets from the period communicate the centrality of climate to the experience of traveling. Take, for instance, the book published in London in 1819 by William Cobbett, English publisher, muckraker and eventual political reformer: *A Year's Residence in the United States of America, Treating the Face of the Country, the Climate, the Soil, the Products, the Mode of Cultivating the Land, the Prices of Land, of Labour, of Food, of Raiment; of the Expenses and Housekeeping, and of the Usual Manner of Living; of the Manners and Customs of the People; and of the Institutions of the Country, Civil, Political, and Religious.*[1]

[1] William Cobbett, *A Year's Residence in the United States of America, Treating the Face of the Country, the Climate, the Soil, the Products, the Mode of Cultivating the Land, the Prices of Land, of Labour, of*

Cobbett, who fled to the United States more than once to escape charges of libel and sedition in England, in his title listed *climate* as the second of his subjects. He lived on Long Island in 1817 and 1818. The very first page of his memoir—indeed, the first sentence, following the customary verbose prefaces and introduction—concerned climate: "LONG ISLAND is situated in what may be called the *middle* climate of that part of the United States, which, coastwise, extends from Boston to the Bay of Chesapeake."[2] For Cobbett, climate was intimately connected with geography. After describing the general physical arrangement of Long Island, he noted the following:

> Having now given a sketch of the face of the country, it only remains for me to speak in this place of the *Climate* and *Seasons*, because I shall sufficiently describe the *Soil*, when I come to treat of my own actual experiences of it. I do not like, in these cases, *general description*. Indeed, they must be very imperfect; and, therefore, I will just give a copy of a *journal*, kept by myself, from the 5th of May, 1817, to the 20th of April, 1818. This, it appears to me, is the best way of proceeding; for then, there can be no deception.[3]

Cobbett then proceeded to lay out the entirety of his daily journal from this period, which, like diarists or weather watchers, was often concerned with weather conditions. Cold Decade anomalies invariably crept into this account. In June, for example, he noted that he "saw a man, in the evening, *covering* something in a garden. It was *kidney-beans*, and he feared a *frost!*"[4] Cold winds in spring and summer, the

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*Food, of Raiment; of the Expenses and Housekeeping, and of the Usual Manner of Living; of the Manners and Customs of the People; and of the Institutions of the Country, Civil, Political, and Religious* (London, 1819).

2 Cobbett, 1 (emphasis in original).

3 Ibid., 4.

4 Ibid., 5.

presence (or absence) of fires in the fireplaces of indoor parlors, and the appearances of fields and behavior of animals were all noted, and the appropriateness of these items as bellwethers of climate was evidently expected to be as self-evident to Cobbett's readers as it was to the author himself. Cobbett seemed especially attentive to dramatic changes in weather, from cold to hot and vice-versa, a common effect particularly in the later stages of the decade. One of his more evocative notations came from an experience in Philadelphia in the late winter of 1818:

> Same weather [fair, clear]. *Very warm.* I hate this weather. Hot upon my back, and melting ice under my feet. The people (those who have been lazy) are chopping away with axes the ice, which has grown out of the snows and rains, before their doors, during the winter. The hogs (best of scavengers) are very busy in the streets seeking out the bones and bits of meat, which have been flung out and frozen down amidst water and snow, during the two foregoing months.[5]

Cobbett's book was a classic example of what one might term a climate travelogue. Concerned with the character of a place and the habits of its people, his experience of knowing Long Island and other American locations was inseparable from, and indeed based upon, an appreciation of weather and climate conditions. Those conditions were intimately connected with the habits of the local inhabitants both human and animal—such as Philadelphians' custom of throwing meat scraps onto their doorsteps in winter, ultimately to be consumed by urban scavengers. Cobbett's book was published in England and obviously intended for British audiences. His task, then, was to create an environmental world of the United States in the minds of his readers, and weather and climate were vital to this construction.

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5 Ibid., 28 (emphasis in original).

English botanist William Jackson Hooker presented another archetypical example of the travelogue, which included climate and weather components. Hooker, the quintessential early 19th-century naturalist, undertook an expedition to Iceland in the summer of 1809, within months after the Mountain X eruption that opened the Cold Decade. His detailed descriptions of the people and especially the culinary delights of Iceland—which included tern eggs, "Waffels" and rancid butter—painted a colorful picture of Icelandic life and hospitality, and one that doubtless brought this mysterious locale alive to his readers.[6] But climate and weather were a key part of this picture. Hooker described Iceland's climate as being "not so settled as that of equal latitudes upon continents," stressing the sometimes dramatic swings in temperature between seasons and even within seasons themselves. Borrowing a trope from the arguers, he was concerned with Iceland's historical climate shifts, discussing memorable cold snaps and attendant increases in sea ice going back as far as the middle of the 14th century. He remarked upon occasional large-scale incursions of polar bears from Greenland during times of extreme cold, to which natives responded by forming hunting parties, "lest so unwelcome a visitor should fix himself permanently among them."[7] And he noted weather trends and anomalies that he himself experienced:

> The year 1809 was particularly unfavorable: I recollect that in the early part of that summer Fahrenheit's thermometer varied in the course of the day from about 41° to 45°, seldom rising to 50°, and only once to 60°. Mr.

[6] William Jackson Hooker, *Journal of a Tour of Iceland in the Summer of 1809* (London: Vernon, Hood, Sharpe, Poultry & W. Miller, 1811), 55-59.

[7] Ibid., lvi-lix. Probably the focusing of sunlight upon the thermometer raised the reading; it is unlikely that the ambient air temperature in Reykjavik actually reached that high. According to modern records, the highest temperature recorded in Iceland was 86.9° F in June 1939. "Íslensk veðurmet," <http://www.vedur.is/vedur/vedurfar/upplysingar/vedurmet/> (visited April 25, 2017).

> Savigniac, however, assured me, that at Reikevig [Reykjavik] one day the thermometer, exposed to the sun, rose to 100°. In the beginning of August there were severe frosts, and much snow fell in the vallies and plains, even in the most temperate parts of the island.[8]

Another traveler, Scottish missionary Ebenezer Henderson, also wrote of his own travels to Iceland a few years later. Two specters relevant to the Cold Decade—volcanism and climate—suffused Henderson's travelogue, even when he was not writing explicitly about them. When he did address climate, beginning with the impressions formed by the perceived historical mismatch of the names "Iceland" and "Greenland," it was, as in other travelogues, to employ climate, seasons, weather and temperature as part of the overall picture of a place communicated to those who had never been there. Henderson, like Hooker before him, also noted Cold Decade trends he experienced. Although he characterized the winter of 1814 as "uncommonly mild," at least in the estimation of native Icelanders, Henderson remarked upon "a vast quantity of Greenland ice" that jammed up in Icelandic bays in two great waves, the first in spring 1816, the second a year later in 1817.[9] Again, as with Hooker, descriptions of climate and weather were central to the knowing of a place and the transmission of that knowledge to readers who did not accompany the traveler on the journey.

The more exotic and far-removed a land from typical European or American experience, the more climate and weather seemed central to the knowing of it. At the Cape Colony, in what is now South Africa, one Lieutenant Colonel Richard Collins

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8 Hooker, lvi-lvii.

9 Ebenezer Henderson, *Iceland: Or the Journal of a Residence in that Island During the Years 1814 and 1815* (Edinburgh: Waught & Innes, 1819), 275-76.

meticulously chronicled a tour he made through the country in 1809, which ultimately wound up in the official colonial records of the colony. One expects the usual travelogue material that one finds in Collins's account: the appearance and customs of natives, encounters with wild African animals, and descriptions of majestic mountains and picturesque savannas. Weather and climate also wove throughout the journal. Collins's picture of a mountain called Winter Berg included details such as "at most time buried in clouds," which rendered the place "as cold as its name implies."[10] Collins compared climates of differing parts of the Cape Colony, in terms of typical rainfall, "in order to show the difference between the climate at the Cape and near the north-eastern boundary at this period of the year."[11] Interestingly, he also observed a series of spectacular sunsets that he declared "more beautiful than any I had before seen in this climate," comparing them to the appearance of sunsets on the North Atlantic.[12] Collins was writing in July 1809, only a few months after the Mountain X eruption—just as volcanic particulates from that eruption had worked their way throughout the world's atmosphere.

Even accounts of travels closer to home, not necessarily intended to be read by others, often involved climate and weather as a means of knowing a place. Samuel Postlethwaite, a farmer and cotton grower in the American South, kept journals of two voyages he took in the winter of 1811 from Natchez, Mississippi to Saline Bayou,

[10] Richard Collins, "Journal of a Tour made by Lieutenant-Colonel Richard Collins to the North-Eastern Boundary, the Orange river, and the Storm Mountains" [July 1809], *Records of the Cape Colony from May 1809 to March 1811, Copied for the Cape Government, from the Manuscript Documents in the Public Record Office, London*, ed. George McCall Theal (London: William Clowes and Sons, Ltd.), 1900, VII:31.

[11] Ibid., 28.

[12] Ibid., 23.

Louisiana to sell his produce. His simple descriptions were full of weather and climate matters. He described icicles, a foot long, hanging from the banks of the Mississippi as the barge he was sailing on, the *Perseverance*, glided past. Interspersed with travelogue-style narratives of bayou peoples he encountered and plantations he saw along the river, he recorded wind, thunderstorms, rain showers, waves on the river, and one particular morning he described as looking “disastrous.” Postlethwaite curiously ascribed human emotions to the weather, comparing winds and waves to “the rage and revenge of Hamlet” and conceptualizing a storm as a tempestuous lover.[13] Indeed it is these details that make Postlethwaite’s winter voyage on the Mississippi so interesting and vivid for the reader. Weather, in this travelogue, was the most important character in the story of these places—a story that was not ostensibly *about* weather, but about a journey from one place to another.

J.T. James, a British traveler to Sweden and Russia in 1813, similarly wrote of weather extremes as a way to illustrate the customs and conditions of people of St. Petersburg, rich and poor. He traveled from Stockholm, where he noted “the rigour of the season,” to the Russian capital where the cold was much worse—74° below zero Fahrenheit by one estimation, “at least eight or ten degrees lower than in an ordinary year.” James described the police of St. Petersburg establishing large public stoves in outdoor areas in various parts of the city, and noted that in at least one instance the cold was “extremely advantageous to the poor”: because it never thawed, the food they bought from the marketplaces could be preserved indefinitely. As for the rich, they heated their

[13] Samuel A. Postlethwaite, Journals of 2 trips via barge from Natchez, Miss. to Saline Bayou, La. & Return Trips, February 11, 19, March 2, 22-23, 24, 1811, Postlethwaite Collection, Huntington Library, San Marino, CA.

rooms to a constant temperature of 14° (presumably Celsius, about 57° F—still uncomfortable by modern standards) by the use of indoor stoves, which James wrote "serve[d] effectively to restore the perspiration." In addition to noting abnormally cold conditions, James's account, perhaps written for publication, defines wintertime St. Petersburg as a place where weather and climate conditions define one's daily actions and are even reflected in their socioeconomic status.[14] This is a powerful way of using weather and climate to know and define a foreign place.

Knowing a place through its climate also meant knowing the sickness or health of its inhabitants. As I showed in the chapter on doctors, people often regarded individual places as sickly or healthy by reference to the climate that prevailed there. Samuel Whitcomb, a Massachusetts-born bibliophile and traveling book salesman, provides an example of this in a private travelogue—a private diary not meant for publication. Employed by a Boston publishing house to sell a book called *Public Documents and State Papers* on the Western frontier after the War of 1812, Whitcomb's travels took him to various places in the South and West, and brought him into brief contact with important figures such as Thomas Jefferson and Andrew Jackson. In 1818, traveling a newly-opened road from Chillicothe, Ohio to points farther west, he described the local lands as "very fertile, but quite sickly. Some people are removing back to the East."[15] A few weeks later, Whitcomb described Brookville, Indiana:

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[14] J.T. James, *Journal of a Tour in Germany, Sweden, Russia, Poland During the Years 1813 and 1814* (London: John Murray, 1816), 326-27.

[15] Samuel Whitcomb, Samuel Whitcomb Diaries 1818-1845, July 10, 1818, Massachusetts Historical Society, Boston, MA.

> The only objection to the place is that a puking complaint prevails at certain seasons, which is feared to originate from the water. The people drink River water too much, fetching it up in Barrels & letting it stand too long. Mr. B. thinks that the sickness proceeds from intemperance & carelessness, more than the Water.[16]

It is noteworthy that he made this observation in the course of what he called “a very warm Summer for this climate.”[17] Whitcomb was a traveler who defined these places, Chillicothe and Brookville, in terms of their relative health, or lack thereof, but those conditions were determined or at least strongly influenced by environmental factors, including weather and climate. Whitcomb’s journal is a travelogue that conceived of health and disease as part of the character of a place.

From Alexander Beatson, Governor of the desolate British island colony of St. Helena, came a travelogue with a dual purpose: originally produced as an official document, it was ultimately offered to the general public as a published book. Beatson addressed his lengthy 1816 report on St. Helena “to the Honourable Court of Directors for the Affairs of the United East India Company,” his employer, but he also noted that “investigations of this nature could only be interesting to a few...I have therefore endeavoured to adapt it to a more general class of readers.” Beatson organized his book to communicate St. Helena to the British reading public by knowing its geographical and geological facts, “Mineral and Vegetable Productions,” its suitability as a military fortress, and, naturally, its climate and weather.[18]

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[16] Ibid., August 2, 1818.

[17] Ibid., July 14, 1818.

[18] Alexander Beatson, *Tracts Relative to the Island of St. Helena* (London: W. Bulmer & Co., 1816), title page, viii.

In exploring the climate of his colony, Beatson was basically a weather watcher. He kept a rain gauge and recorded rainfall in a chart that he called a "Meteorological Journal," in an attempt to divine a pattern of especially rainy seasons. To aid in this effort Beatson pored through correspondence from past governors of St. Helena to the United East India Company going back to 1711, prying out references to rain, flooding or other unseasonable weather events. Beatson even employed the classic aphorism of climate knowlede of the period, beginning his chapter on the island's climate with the words "It is generally believed by the oldest inhabitants of St. Helena, that the rain of late years, has fallen in less quantity than in former times." He ascribed the climate change to anthropogenic factors: specifically, deforestation.[19] As we will see, Beatson also employed a common rhetorical tactic of travelers and travelogue writers—the comparison of foreign climates to ones he expected his readers to know well—but in its most basic sense, Beatson's "Tracts," compiled originally as official records of his tenure as governor, served to define a place little-known by most of his audience in terms of its climate and environment. Though far less adventurous and colorful than the accounts of Richard Collins, another employee of the British colonial service, Beatson's account mirrors it in this key way.

Beatson's book on St. Helena also occupies a sort of middle ground between travelogues intended purely for the casual interest of general readers, and purely occupational documents compiled in the course of an official duty. The latter category is illustrated best by the logbooks of ships, which routinely recorded weather conditions, especially wind, as an indispensable part of their function. Consequently, ships'

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[19] Ibid., 88-93.

logbooks—never intended for a general audience—include weather and climate data as an integral part of the process of traveling from one place to another on the sea. Invariably, glimpses of Cold Decade anomalies appeared in the logbooks of ships. In June 1816—the day after the snowfall in New England that stood out as one of the most notable weather events of the Year Without Summer—the ship *Minerva* was almost in the center of the North Atlantic. Its master, James Magee, noted in the log that the weather had been "most uncomfortable" for four days, with strange winds and bitter cold rain that soaked the ship completely between decks. "I have been the more puzzled," he wrote, "at the long continuance of the wind from the south and SE quarter, as I have never known these winds to prevail more than 23 hours...I am sick at heart of it."[20] In the *Minerva*'s travels, Magee defined this lonely patch of the North Atlantic as a miserable, foggy and unusually inclement place.

Indeed, ships' logbooks have proven to be a boon to the understanding of how the weather anomalies of the Cold Decade, and especially the Year Without Summer, unfolded globally. As ships traveled all corners of the oceans during 1816, their logbooks, which all include weather data and observations, have proven valuable in charting the progress of various weather systems throughout the world during that year. Historian Michael Chenoweth mined and analyzed weather data from 227 ships' logbooks recording oceanic weather conditions in 1815-16, and was able to reconstruct from them the progress of El Niño events, below-normal air and sea temperatures in both the Atlantic and Pacific Oceans, a severe drought in Brazil, and an unusually active

[20] James Magee, Jr., Log of the Ship *Minerva*, June 8, 1816, Massachusetts Historical Society, Boston, MA.

Atlantic hurricane season. Among the numerous logs that painted this global picture were those of the *Barclay*, an American whaling ship that visited the Galapagos Islands in March 1816, a ship called the *Rurik* that plied the waters off Easter Island about the same time, and an East India Company merchantman, the *Hope*, whose log noted temperatures in the harbor of Canton, China. This raw data was supplemented with observations from various shore stations including meteorological reports in British newspapers in India.[21] The travelers who recorded this data in the course of their official duties were probably unconscious of doing so at the time, but collectively they were defining the features of the places they visited in terms of weather and climate, each one creating a tiny tile that would become a vast global mosaic of historical environmental knowledge about the Cold Decade. In this sense a modern historian reached out and defined the travelers' broader layer for them, but it is much the same process of knowing by traveling.

## Here and There: Understanding Place by Comparing Climates

Comparison of climates was one of the tools travelers used most commonly to define the new environments in which they found themselves. Necessarily this act of comparison had the effect of defining whatever climate they were comparing their new environments to. In other words, climate and weather, and the comparison of climate and weather conditions of "there" to those of "home" (or some other place), was a means of understanding one's own place and the environmental context in which it existed.

[21] Michael Chenoweth, "Ships' Logbooks and the 'Year Without a Summer,'" *Bulletin of the American Meteorological Society* 77, no. 9 (September 1996), 2077, 2081-83.

A particularly epic travel narrative of the Cold Decade was penned, years later, by one Captain Charles H. Barnard, a New York sealer who found himself marooned on the desolate Falkland Islands during the War of 1812 by the very shipwrecked British sailors he attempted to save when he and his crew happened upon their camp. Barnard ultimately spent nearly two years, much of them alone, on various islands in the Falklands group, and invariably compared himself to Alexander Selkirk, the famous Scottish castaway on whom Daniel Defoe's novel *Robinson Crusoe* is based. A comparison involving climate lay at the very heart of Barnard's story. He clearly expected the reader to understand who Selkirk was and what he had endured, and to position his (Barnard's) predicament as even more extreme and dangerous than Selkirk's, chiefly because of the Falkland Islands' harsh climate. Early in his narrative Barnard wrote:

> My similarity of situation to that of the celebrated Selkirk extended only to a few particulars; the difference was all in his favour. He voluntarily landed on the beautiful island of Juan Fernandez [in the South Pacific], situated in a delightful climate, where spring and summer form the whole year, uninterrupted by the roaring of the wintry winds, the dipping frosts, snow and hail falling on a body weakened by the want of sufficient food, and only protected by tattered garments; a shelter, or rather an imitation of one, that could neither exclude nor withstand the fury of the storms of these tempestuous latitudes.[22]

Climate comparison was the whole reason Barnard's story resonated. Whether the conceptualization of Selkirk's South Pacific climate was entirely accurate or not, the

[22] Barnard, Charles H., *A Narrative of the Sufferings and Adventures of Captain Charles H. Barnard in a Recent Voyage Round the World, Including an Account of this Residence for Two Years on an Uninhabited Island* (New York: J.P. Callender, 1836) 7-8. In 1704, Selkirk, sailing master aboard the English privateer *Cinque Ports*, elected to get off the ship at the Juan Fernandez Islands fearing that it was unseaworthy and its captain was dooming the crew to inevitable death by his foolhardy decisions. Selkirk spent four and a half years on the island and was ultimately rescued in 1709. Defoe's *Robinson Crusoe* was published a decade later. Robert Kraske, *Marooned: The Strange but True Adventures of Alexander Selkirk, the Real Robinson Crusoe* (New York: Clarion Books, 2005).

contrast between its easy salubrious nature and the harsh reality of the icy Falkland Islands positions Barnard as an even more extreme and pitiable victim than Selkirk. Later in Barnard's narrative, after he was rescued from the Falklands, the notion of climate comparison became climate exchange: he ultimately sailed to Hawaii on his roundabout journey home. He there made the ultimate climate comparison, proclaiming that the Hawaiian Islands, then known as the Sandwich Islands, "enjoy the most delightful and salubrious climate imaginable, and are certainly not surpassed in those respects by any climate on earth."[23] Thus Barnard's travels took him from what he judged to be the worst, or one of the worst, climates on Earth in comparison to all others, to the exact opposite, the *best* climate in the world to which none other could ever measure up. He never stated it, but it is clear that his home climate, New York City, hovered somewhere between these extremes.

Climate comparisons naturally interested botanists and agriculturalists. In the *Massachusetts Agricultural Journal* in 1816 there appeared a tract titled "Difference of Seasons in Sweden, England and Massachusetts," whose author, one J. Lowell, compared the traditional blooming times of goosberry, apple trees, lilies of the valley, red currants, peaches, cherries and various other trees and crops. In addition to comparing climates and seasons among these three locations, Lowell compared seasons to each other, noting that 1816, at least as compared to 1813 and 1815, saw these plants bloom from five to ten days earlier than previous seasons, presumably in all three locations.[24] Here we see both

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23 Barnard, 238.

24 J. Lowell, "Difference of Seasons in Sweden, England and Massachusetts," *Massachusetts Agricultural Journal* IV, no. 2 (June 1816), 136-38.

the attempt to know the climate of places through a comparative examination of their flora, and also an attempt to quantify, at least in one small measure, the unusual nature of the Year Without Summer.

As we have seen, people of the Cold Decade often considered earthquakes and seismic phenomena to be closely related to, if not part and parcel of, climate and weather conditions.[25] The condition of oceans and seas was also thought to be related to these phenomena. On December 4, 1810, and again in the month of June 1811, violent earthquakes were felt at the Cape Colony in what is now South Africa. A British naval observer wrote that "the sea was so agitated on this coast [at Zonder-End, 80 miles away], that it rose and fell very much in a most rapid succession several times." These conditions were expressly compared to earthquakes and sea agitation thousands of miles away, in England, where quakes were felt at Portsmouth, Portsea and Gosport on November 30, 1811.[26] It is an interesting and curious coincidence that the convergence of weather and earthquakes, specifically in the context of geographical comparisons, appears several times in the last few months of 1811 and first of 1812. At that same time an American woman, Anna Maria Thornton of Virginia, wrote to her sister Clara Baldwin, then living in Paris. After remarking that their "very unpleasant winter" had spelled a long period of ill health for her husband, Thornton noted, "We have had some awful visitations in the shape of Comets, Eclipses, Earthquakes & Fires."[27] She remarked

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[25] *See* Chapter IV.

[26] Letter from "Mulciber," *The Naval Chronicle for 1812* XXVII (January-June, 1812): 316-17.

[27] Anna Maria Thornton to Clara Baldwin, March 15, 1812, Baldwin Family Papers, Barlow (Anica) Preble, Box 2, Huntington Library, San Marino, CA. The "Fires" certainly refers to the great Richmond theater fire of December 26, 1811, which Thornton specifically mentioned.

that "Earthquakes have been so numerous that we have almost become accustomed to them & speak of them as common events." But Thornton also observed that her sister must also have been experiencing earthquakes, as she had noticed that newspapers were reporting quakes in England, France and Germany—the England tremors perhaps the same ones that agitated the sea at Portsmouth.[28] Here is, not a travelogue, but a private transatlantic conversation linking and comparing environmental conditions in Europe to Virginia, involving both the earth and the sky. Though not explicitly a comparison, it is noteworthy that one of the most in-depth accounts of one of the New Madrid earthquakes in Missouri—which occurred in this same period, December 1811, and to which Thornton seemed to obliquely refer—was written as essentially a travel narrative, by a farmer traveling the Mississippi from Pittsburgh to New Orleans to bring his goods to market.[29]

Climate and weather comparisons also occurred in more subtle ways, sometimes when travelers knew of weather conditions that occurred in one place that did not occur, or very seldom occurred, in other places. In 1815 and 1816 British clergyman and composer Charles Ignatius Latrobe toured the Cape Colony on a junket to found a new mission there, and he recorded his travel experiences in a travelogue journal that was later published in London. While visiting Groenekloof, near not far from Cape Town, a hard freeze—rare in South Africa—occurred, probably as a result of Cold Decade climate shifts. Latrobe recorded:

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[28] Ibid.

[29] Valençius, *Lost History,* 17-33 (quoting William Leigh Pierce, "New-York, Feb. 11, Earthquake," *Hampshire Federalist*, February 20, 1812).

> As I was making a sketch of the rocks behind the stables, Sister Schmitt's school-girls came towards me, one carrying a plate, with a piece of ice in it, fast melting in the sun. They asked me, whether the water, flowing from the ice, might be drank with safety, as they thought that it was poisonous. I gave them some information on the subject, and when I described the quantity and thickness of ice in the norther regions, and told them of immense ice-mountains and fields, floating in the ocean, I perceived, by their astonished looks, that, had they not thought one of their teachers incapable of falsehood or exaggeration, they would have suspected me of sporting with their credulity.[30]

Latrobe's account is an interesting form of climate comparisons: as a traveler he brought his knowledge of ice and the northern hemisphere to residents of a new place, employing it to describe an unusual weather condition of their own homes with which they were unfamiliar. This is still the same process of defining, of knowing a place by its climate, and Latrobe, being from England, was able to define an aspect of South Africa for its own residents. An account of ice in South Africa in August 1816, in the middle of the Year Without Summer, is also a fairly rare example of an English-language report of Cold Decade anomalies in the southern hemisphere.

Alexander Beatson's survey of the climate of St. Helena, in addition to employing methods of the weather watchers, also used climate comparison. As we have seen, he kept meticulous records of rainfall on the remote South Atlantic island, but he also compared St. Helena's rainy seasons to the rainiest place in the British Empire: India. Using rain gauge records of a British weather watcher in Madras from 1791 to 1803, Beatson noted that although St. Helena was known for having a "rainy season," unlike India, where rainfall outside of the monsoon months was "trifling," St. Helena still

[30] Rev. C.I. Latrobe, *Journal of Visit to South Africa in 1815 and 1816* (New York: James Eastburn & Co., 1818), 312.

received significant rain in the months outside of its rainiest periods.[31] Beatson traveled to St. Helena from England, but he did not claim to have experienced the climate of India firsthand. His climate comparison had both a scientific and an imperialistic dimension: meteorological records were a proxy for actually understanding India's climate in person, but the breadth of Britain's global presence meant such proxies were often at an Englishman's fingertips. Both St. Helena and India were intellectually constructed as colonial spaces.

Similarly, eyes and pens representing the British Navy invariably made climate comparisons within the context of Britain's world-spanning network of sea connections, both military and civilian, and some involved Cold Decade conditions. In January 1814, during the same great freeze that ultimately gave rise to the last Frost Fair on the Thames, the sea between Britain and Scotland—specifically the Solway Firth—was observed to be "a complete body of ice, impossible for a boat to pass." Employing a temporal as well as a geographical comparison, this observer, whose account appeared in the official magazine of the British Navy, noted, "The oldest seamen say they never saw such a field of ice...but in high northern latitudes, or on the banks of Newfoundland."[32] Here, as with Beatson's account, the global knowledge of Britain's maritime knowledge is employed in a climate comparison.

A final example is related to this one in the sense of Britain expanding its understanding of place, employing travelers whose accounts form, within the imperial whole, a sort of collective bank of climate knowledge. In 1818, as the climate disruptions

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[31] Beatson, 93-94.

[32] "Congelation of the British Sea," *The Naval Chronicle for 1814* XXI (January-June 1814), 191-92.

of the Cold Decade began to subside, British authorities noted that ice around Greenland appeared to be breaking up, and four vessels were sent, according to one Alexander Fisher, "for the purpose of exploring the polar seas."[33] This was the first of the Arctic expeditions under William Parry. Somewhere along the coast of Baffin Bay in the Canadian Arctic, Fisher and his companions observed what might have been direct physical evidence of Cold Decade conditions. In his travelogue he described finding "a red substance" in the snow, which, "whatever it may be, is very plentiful on this part of the coast." The stuff, collected in specimen jars, sank to the bottom of the vessels when the snow melted. Fisher stated that "a similar substance appears to have been observed on the snow, on the Alps and Pyrenees." Here the geographic comparison yielded not clarity, but mystery. Fisher was inclined to believe the red substance was the excrement of Arctic birds, but as no such birds were to be found in the Alps and Pyrenees in Europe, he discounted this possibility, leaving the red substance unidentified.[34] Colored snow, sometimes red, sometimes yellow, was indeed recorded in Europe during the Cold Decade,[35] and was a telltale sign of volcanic particulates in the atmosphere.[36] Fisher was on-site precisely to help develop Britain's strategic control of faraway places, and, if the

[33] Alexander Fisher, "Journal of a Voyage of Discovery, to the Arctic Regions," *New Voyages and Travels: Consisting of Originals and Translations* (London: Sir Richard Phillips and Co., 1818), I:iii. Searching for the Northwest Passage was also likely an objective of this expedition, as the existence (or non-existence) of such a feature was of both public and state interest in 1818. *See, e.g.,* "Polar Ice, and a North-Wes Passage."

[34] Fisher, 63.

[35] *Camden Gazette* (Camden, SC), June 6, 1816, 4.

[36] Clive Oppenheimer, "Climatic, Environmental and Human Consequences of the Largest Known Historic Eruption: Tambora Volcano (Indonesia) 1815," *Progress in Physical Geography* 27 (2003): 230-59.

red snow he found in Canada was indeed a remnant of volcanic eruptions, these official travels brought him into physical contact with the very stuff that caused the Cold Decade.

In a Better Place: Exchanging Climates

Closely related to the phenomenon of knowing a climate by comparing it to another place, the next logical step was for travelers to exchange one climate for another—usually experiencing or expecting some sort of change, whether temporary or permanent, in their fortunes as a result. Climate exchange was a powerful force in the Cold Decade, especially on the Western frontier in the United States, but it was certainly not limited to North America. Whether moving from an unfavorable climate to a more favorable one, or, if one was unlucky, the reverse, travelers in the 1810s marked their trajectories through the world in part through understanding and evaluation of the climates through which they traveled.

Some travelers did not have a choice about exchanging climates, or their choices were somehow limited by circumstance. Aaron Burr, whose weather-laden journals were discussed in the Diarists chapter, was a traveler who exiled himself to Europe at the beginning of the 1810s following the duel with Alexander Hamilton and his acquittal for treason in the United States. He clearly regarded his exchange of an American climate for a European one as unfavorable, at least in winter. In his journal, intended for the eyes of his daughter Theodosia, he wrote in December 1810:

> The day has been most detestable. Mist, fog, and chilly wind. *Le Ciceroni Parisien*, a book which I shall bring you, says that, taking the average of thirty years, they count from thirty-six to forty clear days a year in Paris. During the ten months I have been here we have not had that proportion.[37]

[37] Burr, II:69.

Burr, as noted earlier, frequently remarked upon the cold and unfavorable nature of the weather he found in Europe.[38] He ultimately reversed the climate exchange—though not because of environmental reasons—in 1812, returning to his home of New York City to rehabilitate his career and reputation. A weather-related disaster deprived him of his beloved daughter Theodosia. She vanished, presumed lost at sea, in a violent storm off the Carolina coast in early January 1813 while sailing to New York to meet her father.[39]

The odyssey of Charles Folsom, New England editor, librarian and diplomat, during the latter half of the Cold Decade is another example of a traveler with no choice about the climates he exchanged. In 1816 Folsom served as a chaplain aboard a naval vessel, the *USS Washington*, in which capacity he visited Annapolis, Maryland. In his diary he described an Annapolis college as "being like a N.E. [New England] academy. Flowers in bloom, snow-ball, honeysuckle, rose, lilac, locust &c." As he was visiting during the Year Without Summer anomalies, he noted too, "Season backward, they say."[40] A few weeks later he remarked upon the unusual season again, recording that "They say here...speaking of former years, 'Things were not so at *that time of day*. They

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38 *See* Chapter VI.

39 Ibid.

40 Charles Folsom, Diary, Vol. I, May 18, 1816, Charles Folsom Papers 1794-1872, Massachusetts Historical Society, Boston, MA.

set fire to rotten stumps in the vicinity of cornfields, for scarecrows."[41] This practice was evidently unusual in Maryland at this time of year.

Folsom's travels eventually took him quite far from American shores, through the Mediterranean, and ultimately (1818) to Tunis, where he served as the American chargé d'affaires. There, climate and weather, perceived (as we have seen in the Doctors section) as intimate components of disease, turned Folsom's environment and his mission into a tragic one. Rumors of plague began circulating in Tunis at the end of September. Folsom began to keep track of burials in the city. Jews in Tunis were attacked, as often happened during disease outbreaks. Yet the weather, though warm, remained fine; Folsom described December 10 as a "delightful spring day." He recorded a meeting with a government official from Sardinia. Comparing notes on diseases and climates, the Sardinian, according to Folsom, told him that "[t]here are several places in the island in which if one is during the heat of the day he is sure to be attacked with fever, generally fatal, though there are no marshes or other apparent causes of malaria."[42] In Tunis, at least, the plague began to taper off in late December, though people were continuing to die from it.[43]

Folsom's journeys have interesting environmental dimensions. In all of the places for which he exchanged his native New England climate—Annapolis, the Mediterranean, Tunis—Folsom exhibited a sense of trying to understand his new environments through

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41 Ibid., May 31, 1816.

42 Ibid., September 25, November 1, December 10, 13, 1818.

43 Ibid., December 29, 1818.

appreciation of its weather and climate: as the environmental characteristics of his local layers changed, they fit into a broader global context of aggregated climate experiences.

The notion of climate exchange in the early 19th century was fraught with assumptions, usually unspoken, about one's native or normal climate—an indigineity of climate, in a sense. Burr's "home" climate was New York, and Folsom's New England; under common thinking of the day, had these travelers stayed for long periods of time in alien climates, the conditions of their new environments could be expected to change them. This assumption had much in common with conceptions of race being closely linked to climate. A children's textbook from 1812 gave a rare explicit voice to these conceptions, informing its students that humanity could be divided into four races: white, "tawny" (presumably Asian), black and red. A supposition followed: "Perhaps this difference arises from the very long influence of climate on the same race."[44] This thinking was an outgrowth of traditional Enlightenment ideas of climate, such as the Abbé du Bos, who cautioned that prolonged exposure to tropical climates in colonial projects would ultimately change European colonizers biologically and racially, and even that they could be changed by consuming the produce of colonial possessions.[45] This assumption is relevant because it illustrates why climate mattered: it could change people, even drastically.

A less extreme and certainly less racialized assumption about the effect of climate on human beings lay at the heart of travelers' expectations that exchanging one climate for another would resound to their benefit or detriment. It was not so extreme as believing

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[44] Telescope, 95.

[45] Fleming, *Historical Perspectives*, 14-15.

that Aaron Burr would become a Parisian or Charles Folsom a Tunisian—assuming that some distinct human character of the residents of these places could be identified—if they remained too long there, but that idea is, like the idea of race-changing, another species of the assumption that a climate exchange *would* change the traveler. Beyond making him or her more or less comfortable in heat, cold or particular weather conditions, it could also change his or her economic circumstance, perhaps social standing, or even character. Once we understand this expectation, the importance of understanding one's place becomes clear. To know a new place by knowing its climate would also lead to understanding how one could be changed by moving to a new place.

An especially colorful traveler who deliberately sought a change of climate was one Estwick Evans, a resident of New Hampshire, who in 1818 roamed about New England, the Mid-Atlantic states and the West in a full-length body suit made of buffalo fur and who published an account of his adventure under the ostentatious title *A Pedestrious Tour of Four Thousand Miles Through the Western States and Territories*. He made this journey, he wrote, because "I wished to acquire the simplicity, native feelings, and virtues of savage life." As for why he undertook this arduous backwoods journey in winter Evans wrote, "The season of snows was preferred, that I might experience the pleasure of suffering, and the novelty of danger."[46] For Evans, a geographic and climate exchange was a means to enjoyment and self-improvement.

On February 2, 1818, Evans departed Hopkinton, New Hampshire, headed generally southwest. When describing his journey through the White Mountains of New Hampshire he ruminated:

[46] Evans, 6.

> The mountainous aspect of the country, the front of my cap...whitened by frost, and the creaking of the snow beneath my step, reminded me of [William] Wallace and [William] Tell; those champions of freedom, whose physical nature was as rugged as the rocks which they inhabited, and whose hearts, at the same time, could glow with generosity, or soften with compassion.[47]

As an American pioneer, which was clearly how he envisioned himself, Evans was explicitly equating climate and weather challenges—and the changes they wrought in an individual exposed to them—with the cause of becoming better Americans. Evans, whose favorite literary convention was the digression, wove an unabashedly patriotic narrative through his travelogue, frequently opining on the hardy physical and moral character of the inhabitants (including Native Americans) he encountered. From New England Evans trekked across New York to Albany, then across the Great Lakes to Detroit, then Pittsburgh and down the Ohio River, eventually making the most American of pilgrimages down the Mississippi to New Orleans. Throughout his journey climate was a constant subject of comment.

Possessing an opinion on nearly everything, Evans inevitably commented on climate change and perceptions of it. In various places in his narrative he recorded occurrences and anecdotes associated with Cold Decade anomalies; for instance, he remarked that the winter of 1817 was especially severe, the worst in living memory, on the Canadian side of the Great Lakes.[48] Even in New Orleans that year, according to residents he interviewed, "streets there were covered with ice sufficiently hard to bear

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[47] Ibid., 10.

[48] Ibid., 83.

loaded waggons."[49] Yet Evans conceived of the Cold Decade anomalies as something akin to a sort of cloud that was slowly, over a period of years, moving across the United States. Harsher winters that the people of New England had taken for granted in the past were now occurring in the West, but once the phenomenon of cold seasons "pass[ed] off to the west," the return of a warmer climate would mean unparalleled bounty for everyone in the country.

> Our unfavourable seasons have taught us our dependence on that Being, 'who prepareth rain for the earth, and maketh grass to grow upon the mountains.' I am of the opinion, that for some years to come, our seasons will be remarkably fruitful. The earth here has, for a considerable time, been acquiring strength, which has not been called forth; and having been accustomed to cool seasons, warm ones, operating upon this new acquisition of vegetative power, will cause an extraordinary impetus in the soil.[50]

Evans's opinions on climate change mirrored his views on the benefit of exchanging climates, warm for cold, and the benefits the exchange would bring to both travelers and nations. He traveled into colder climates, expecting the harsh and rugged conditions would steel his American constitution in the way Scotland's environment made hardy men of William Wallace and William Tell; similarly, the United States, passing through a period of climate cooling, would emerge a stronger and more bountiful land for the experience.[51] Evans conceived of the climate challenges of the Cold Decade

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[49] Ibid., 163.

[50] Ibid., 163.

[51] That Evans's opinions are mostly bereft of any objective understanding of how weather and climate worked is entirely beside the point. He believed, for instance, that it was impossible for ocean water to freeze solid, which meant that the North Pole could not be frozen. Ibid., 63-64. Evans's somewhat naïve opinions extended beyond the realm of physical science; as an anti-slavery New Englander he asserted that "the evil [of slavery] can be easily removed" with a simple scheme of having Congress buy every

as a patriotic test of self-improvement, exemplified by his own unforgettable head-to-toe buffalo fur costume. In explaining why he chose this attire Evans related a classic piece of Cold Decade lore: the story of James Black, the stage driver who froze to death in his seat in February 1817. "In an unsuspecting moment," Evans warned, "the blood chills in the veins and ceases to move," a state of affairs that his buffalo fur suit would prevent, thus protecting him to enjoy fully the "pleasure of suffering" in winter climates.[52]

Facilitation of climate exchange was an explicit aim of the work of Daniel Drake, pioneering physician and *de facto* booster of Ohio and the West. Born in New Jersey and educated in Pennsylvania, Drake eventually migrated to Cincinnati, establishing a medical practice there and writing about the town, the region, its geography, climate and medical disposition. Drake's 1815 book *Natural and Statistical View, or Picture of Cincinnati and the Miami Country* was an expanded version of a smaller pamphlet he originally published in 1810 at the beginning of the Cold Decade. The pamphlet was circulated among Drake's "medical and scientific friends," but according to the 1815 preface "several applications were made to obtain copies for the use of travellers in quest of information concerning this country."[53] Drake then expanded his pamphlet to a book-length treatise that was essentially a traveller's geography of Ohio. To Drake, however—consistently with what we have seen regarding the climate interests of medical

slave in America, a plan he felt was so foolproof that even the most entrenched slaveholding Southerners would readily agree to it. Ibid., 224-25.

52 Ibid., 28.

53 Drake, A2.

professionals[54]—geography and climate were inextricably intertwined. “In attempting to obtain a correct knowledge of the climate of a country,” Drake wrote, “the study of its winds is of the first consequence. To be successful in this, requires a general acquaintance with its surface and aspect.”[55]

In painting a picture of the Cincinnati area and Ohio in general, Drake exhibited many of the ways of knowing climate and environment that we have seen in various contexts in Cold Decade discourse. He described the area’s terrain and its effect on winds, catalogued its trees and flora (especially plants useful in medicinal and pharmaceutical applications), set out a calendar of when particular plants bloomed and produce appeared in the markets, and catalogued the region’s winds, clouds, rain, snow, frost, humidity, storms and temperature. Drake presented his temperature data in a meteorological register, just like the weather watchers. He also made explicit comparisons of Cincinnati’s climate and geographical conditions to those of other parts of the United States, specifically Virginia, citing Jefferson’s *Notes on the State of Virginia* as the keystone catalogue of the climate of that place.[56] Beyond its physical characteristics, Drake also sought to convey a sense of Ohio’s political, legal, financial, cultural and religious character.[57] In doing so Drake went far beyond the climatic,

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[54] *See* Chapter VIII.

[55] Drake, 91.

[56] Ibid., 76-83 (trees); 84-88 (flora and medicine), 89-90 (blooming and produce calendar), 90-92 (winds), 103-04 (clouds), 104-07 (rain, snow and frost), 108-110 (humidity), 111-14 (storms), 115-28 (comparison to Virginia and other parts of the United States).

[57] Ibid., 129-78.

medical and environmental data favored by physicians and other medical practitioners. This exhaustive treatment was also beyond that which a casual or temporary traveler could have observed even with a fairly lengthy tour: one had to live there in order to absorb the level of detail that Drake sought to convey. Yet Drake's *Natural and Statistical View* is constructed exactly like a travelogue, and intended for the benefit of travelers. Its message was clearly one of potential exchange: it hoped to entice readers to exchange their environments for that of Cincinnati or elsewhere in Ohio, or at least sought to inform the potential exchanger what he or she would encounter if they did so. Masquerading as a geographer or naturalist as much as a doctor, Drake was, in fact, a booster.

His ambivalence on the question of climate change is interesting. Whether he intended to be noncommittal so as not to prejudice potential emigrants—or whether he was intellectually reluctant to endorse any particular conclusion—is unknown. "That our climate has undergone a change is the opinion of many people," Drake wrote. "The regular observations made here at an early period are too few and desultory to determine this point with accuracy; and many of them cannot now be had."[58] Drake thus resolved to rely upon what observations were available—and "numerous intelligent persons long resident on the Ohio"—to evaluate the area's climate without reaching any firm conclusion on whether it had changed.[59]

As noted in Chapter IV, Drake's treatise, when published, clearly granted him entry into the "pool" of Cold Decade environmental thinking and practice of American

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58 Ibid., 97.

59 Ibid.

elites, bridging the gaps between weather watchers, doctors and travelers. Drake's book caught the attention of weather watcher Josiah Meigs, who forwarded a copy of it to Thomas Jefferson; Meigs, and perhaps even Drake himself, undoubtedly saw the book as Ohio's answer to Jefferson's own *Notes on the State of Virginia*.[60] Drake's work was of particular importance because Ohio was the West, the chief stage on which America's bold experiment to achieve dominion over the physical and ideological environment—the "Empire of Liberty," in Jeffersonian terms—was expected to play out.[61] Taking this idea to its logical conclusion, an idealistic Jeffersonian might imagine, as the republic expanded across the continent, that some naturalist, geographer or doctor would compose a new *Notes on the State of Virginia* for each new state that joined the Union, uniting America in a web of descriptive treatises. The concept of climate would be one gossamer thread that would weave its way through the entirety of the web. But as new places were settled, the authors of these treatises, like Drake's, would chiefly be travelers, at least at first.

<u>Opening Frontiers and Defining Empires: What Travelers Accomplished</u>

It is in the understanding of this somewhat idyllic, and quintessentially Jeffersonian, view of travel and expansion—the knowing, largely environmental in nature, of new places through travelers' tales like Evans's and Drake's—that the importance of the travelers and their world-building becomes most clear. The travelers

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[60] *See* Chapter IV.

[61] *See generally* Gordon Wood, *Empire of Liberty: A History of the Early Republic, 1789-1815* (Oxford: Oxford University Press, 2010).

sought to understand the broader environmental layer through a spatial and experiential form of knowing. Their engagement with the broader layer was a kind of intellectual world-building that made conceivable and possible westward expansion in the new United States, and the project of global empire with respect to Britain and its possessions.

In the United States, migration west was, to a large degree, influenced by the experiences and accounts of travelers. Prior to the Cold Decade, regions like Kentucky were settled by Virginians (and others) who had heard of the supposed richness and opportunity of the land from pioneer travelers like Daniel Boone—both the paternal and maternal extended families of Abraham Lincoln, for instance, were drawn to Kentucky in the 1780s for these reasons, and young Lincoln and his family were drawn even farther west, to Indiana, during the Cold Decade itself.[62] The climate and weather anomalies of the Cold Decade may themselves have helped to drive migration to western regions.[63] The motivations of individuals and individual families certainly differed, but had travelers not gone first, promising implicitly or explicitly a change in circumstance resulting from an exchange of climate and geography, it is difficult to see how the lures that ultimately led to large-scale migrations could have caught on at all in popular consciousness.

In at least one highly significant case, the weather and climate anomalies of the Cold Decade, and specifically the Year Without Summer, had an outsized impact on religious history in the United States. The vicissitudes of that summer struck the hardscrabble farm of the Smith family in Norwich, Vermont, especially hard. Their

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[62] David Herbert Donald, *Lincoln* (New York: Simon & Schuster, 1995), 20-24.

[63] Skeen, 13.

previous two attempts at establishing a prosperous farm in New England had been thwarted by crop failures in 1814 and 1815. The strange cold summer and the crop failure it caused—their third in a row—nearly wiped them out. "This was enough," wrote Lucy Smith. "My husband was now altogether decided upon going to New York." That fall of 1816 the Smith family removed to Palmyra, New York, the epicenter of the famed "Burned-Over District" seared by religious revivals. The Smiths' eleven-year-old son, Joseph Jr., would fail there too, first at running his family's farm and then as a treasure hunter; but his claims of having discovered the Golden Plates ultimately triggered the most enduring legacy of the Second Great Awakening: the foundation of the Mormon religion.[64] We cannot know what travelers' accounts might have influenced the Smiths' decision to migrate to New York, but there was undoubtedly a traveler, and a story, somewhere behind this event.

These are deliberately stark examples. More subtly, people did not have to physically change climates or locales in order for travelers' engagement with the broader layer to have an effect. We can see, for example, no sudden waves of eager migration to distant places like Iceland or St. Helena after the publications of Alexander Beatson's or William Hooker's books. The effect of these travelogues, however, has as much to do with identity as it does with physical migration. Beatson was a British colonial official, sent to administer a windswept and inhospitable island to which few members of the British public actually wanted to travel. Yet in a sense his travelogue brought St. Helena to the British public, as Hooker's brought Iceland to his readers. One could know these

[64] Richard Lyman Bushman and Jed Woodworth, *Joseph Smith, Rough Stone Rolling* (New York: Alfred A. Knopf, 2006), 27-32.

places by reading the travelogues. At least in the case of St. Helena, a formal British possession, the act of knowing the place, even from afar, brought this distant place into the collective sense of what the British empire was. St. Helena was something “we” (Britons) possess, and that one of “ours” (Beatson) was sent to govern and report back. Similarly, when Englishmen like Hooker visited Iceland, or when Latrobe explained ice to bewildered residents of the Cape Colony who had never seen it before, Britain’s role in the world—a knower of distant places, an explainer of phenomena—was reinforced intellectually and ideologically in the minds of those back home who read their accounts. Traveling and travelogues were, in this sense, part of a larger colonial and imperial project.

Returning to the concept of the Cold Decade as the “last moment” before profound new ways of thinking and knowing the world—through science, technology and imperialism—began to change people’s environmental consciousness, this is, again, why the 1810s are worth studying. Nations and their citizens began to redefine themselves and their worlds in the decades after 1810 in terms of these new developments. After 1820 America would never again be a nascent country perched on the edge of a largely unsubdued frontier, just as Britain would never again be in the position of trying to administer a global empire without the tools and benefits of an industrialized economy. The Cold Decade is both the end of an era and the beginning of another.

And here we return to the *Savannah*—an oceangoing chariot whose travelers ultimately defined, without necessarily knowing it, their broader environmental layer as one that represented a significant break with the past and a bridge to the future. When the *Savannah* engaged its steam-powered engine on the Atlantic in the spring of 1819, Captain Moses Rogers was doing something that no oceangoing ship captain had done before, but which would be an utterly routine act even 20 years later when the first transatlantic steamship packet service was established. *Savannah*, through its travels, pulled America and Europe just slightly closer together. Not many years after the Cold Decade, travels to or communications with distant lands were no longer remarkable enough to whet the appetites of book readers and correspondents left at home who, for the most part, experienced the broader layers of their worlds through the proxies of others. Soon, more and more common people could go on the journey themselves. Traveling would become a personal experience.

# CHAPTER XIII

# FROSTIANA

In late December 1813, a few days after Christmas, an intense cold and freezing fog descended upon the city of London. This was followed shortly after the turn of the year by a heavy snowfall that lasted for two days.[1] Extreme cold conditions persisted unrelentingly for four weeks, and further snowfalls across the British Isles resulted in accumulations of snow that never had a chance to melt. The price of coal soared. By January 21 water pipes in London were largely frozen and plugs were opened. Streams from these open plugs flowed through the streets and eventually froze, turning thoroughfares into sheets of ice. Roads leading into and out of the city became impassable. As the Thames began to freeze the river's ferrymen and cargo-boaters saw the prospect of their livelihoods becoming temporarily interrupted. Commerce, which depended on the Thames, was beginning to freeze too.[2]

Finally, on February 1, 1814, the ice between Blackfriars and London Bridge became solid and thick enough to support many numbers of people coming and going, walking where most other times they had to catch a ferry boat. A few enterprising individuals set up tents and booths on the ice to sell spirits and small wares.[3] It was the

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1 *Frostiana*, 3.

2 Charles Mackay, *The Thames and its Tributaries; or, Rambles Among the Rivers* (London: Richard Bentley, 1840), II:406-08.

3 *London Times*, February 2, 1814, 3.

beginning of what would prove to be the last of the celebrated frost fairs in London's history.

Frost fairs had a long and illustrious tradition in England, reaching back to the early Middle Ages. There are references to the Thames freezing and merchants constructing booths on the ice as early as 695 CE. The tradition hit its stride and began its cultural resonance in the Elizabethan era, with a major fair occurring in the winter of 1564, reportedly visited by Queen Elizabeth herself. The longest and most famous frost fair happened in 1683 when the Thames was frozen for many weeks. In addition to food and spirits, sometimes set up by merchants in makeshift tents made from blankets and a frame of cargo-boat oars, the fairs were the occasion for sporting events, horse races, bear baiting, puppet shows and other entertainments for children and generally a circus atmosphere.[4] During the 1814 fair publishers hauled entire presses down onto the Thames and printed souvenir booklets, right on the ice, for sale. One of them bore the title *Frostiana*, and it captured the party mood of the festival:

> Gaming, in all its branches, threw out different allurements, while honesty was out of the question….Skittles was played by several parties, and the drinking tents filled by females and their companions, dancing reels to the sound of fiddles, while others sat round large fires, drinking rum, grog, and other spirits. Tea, coffee, and eatables, were provided in ample order, while the passengers were invited to eat by way of recording their visit. Several respectable tradesmen also attended with their wares, selling books, toys, and trinkets of every description.[5]

4 Jonathan Schneer, *The Thames* (New Haven, CT: Yale University Press), 70-79.

5 *Frostiana*, 17-22.

One enterprising Londoner got credit for one of the "more curious" enterprises of the frost fair. Over a coal fire built on the ice a large iron pan was placed, and a small sheep was toasted whole. The cook charged passers-by sixpence merely to watch the spectacle. When the sheep was cooked it was cut into slices that sold for a shilling apiece, and was called "Lapland mutton."[6]

On a broader level the concept of the frost fair and the temporary transformation it wrought upon London seemed to exist in a spontaneous, if rare, present. "Frostiana" was like a fairy kingdom unto itself, with its own rules, traditions, amusements and social conventions, hidden from view most of the time and which became miraculously visible, like the magical village in the musical *Brigadoon*, only once in a generation.

Sadly, memory and history are the only realms in which the London frost fairs may ever again be experienced. On Sunday, February 6, after the tide in the Thames rose and cracks appeared on the ice, the frozen mass between Blackfriars and London Bridge broke apart and the river again began to flow. The frost fair of 1814 was over, and it will never be repeated. In 1831 the old London Bridge was torn down and replaced by a new structure. The flow of the Thames, which had previously been restricted by London Bridge's nineteen stone arches and the timber casings protecting them, was significantly altered, with the effect that after 1831 the tide now reached farther upstream. It became physically impossible for the Thames to freeze again in this central location.[7] The 1814 frost fair, then, was the final chapter in London's ancient tradition, the last winter

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6 Ibid., 18.

7 Schneer, 70-72; Phil Jones, "Historical Climatology—A State of the Art Review," *Weather* 63, no. 7 (July 2008), 182. Many people today believe erroneously that modern anthropogenic global warming is the reason why the Thames will never freeze again.

bacchanalia of a now-vanished age. Its magic images and frosty celebratory lore—the Brigadoon that will never again emerge, but frozen in amber in London's collective environmental memory—is one of the ways in which the Cold Decade lives on, even though the conditions that gave rise to it now belong irrevocably and irretrievably to the past.

# CHAPTER XIV

# TEN YEARS OF WINTER

The Cold Decade between 1810 and 1820 was not literally "ten years of winter," in the sense that the winter was monolithic and unending, however long and harsh some of the individual winters within it may have seemed to those who lived through them. But the phrase and title *ten years of winter* is deliberately provocative. It puts our minds in a place where the seasons seem wrong somehow, unusually harsh, sometimes threatening, though we may not always be able to explain or know in the moment the cause or the implications. This was the situation for millions of people in the early 19$^{th}$ century, and they dealt with this situation, as I have shown, in a number of ways.

But does any of it make a difference? Does the Cold Decade *matter?* Yes, it does.

There are three significant reasons why the second decade of the 19$^{th}$ century—and the environmental consciousness constructed and lived during that time by Americans, Europeans and others—is relevant to understanding the history of the 19$^{th}$ century and indeed our modern world.

First, the Cold Decade represents the "last moment," and the most highly developed iteration, of environmental thinking before large-scale industrialization, especially in the United States and Europe, began to change people's understanding and conceptualization of their environment. The construction of factories, the development of a modern market economy, and even the shattering of time as it had been experienced before work shifts and railroad schedules made instant time a priority could not have helped but to change profoundly how Americans and Europeans related to their surroundings, including the weather and climate they experienced. I have expressed this "last moment" idea before, principally in terms of the development of science,[1] in the medical milieu,[2] and in terms of travel and the narrowing of world distances by technology and communication.[3]

Secondly, the Cold Decade was the last episode of global climate change that occurred before the noticeable beginning of our modern episode of anthropogenic global warming. As an episode of climate change, the Cold Decade is unique in its advantages for study: it was severe enough to be noticed at the time, its anomalies are indisputably documented in modern scientific analysis, and its short duration and relatively distinct beginning and end mark it as different than less well-defined episodes, such as the "Little Ice Age" whose temporal and geographic parameters are legitimately disputed.[4] Consequently, the Cold Decade offers us insights into how people conceived of climate and climate change in a context divorced from human responsibility and its troubling political and moral implications.

Finally, as I have mentioned several times before, environmental consciousness in the Cold Decade was generally more holistic and comprehensive than it is today. By that I mean that people believed weather and climate were connected to each other the world over and to broader forces, such as seismic activity and volcanism, that they often

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1 *See* Chapter IV.

2 *See* Chapter VIII.

3 *See* Chapter XII.

4 *See, e.g.,* Kelly & Ó Gráda; Sam White, "The Real Little Ice Age," *Journal of Interdisciplinary History* 44, no. 3 (Winter 2014): 327-352.

presumed were merely different facets of the same phenomena. The development of institutional science since the 1810s has rendered our society's scientific thinking, and the popular conception of it, hyper-specialized and captained principally by credentialed experts rather than arising from a deep pool of commonly accessible knowledge. As a result, we in the 21st century are less able to "see the forest for the trees" than were people who lived two centuries ago. Appreciating this difference in world-view could potentially have vast importance for how we, as a global modern society, choose to deal with the problem of global warming that we have brought upon ourselves.

I will discuss these reasons in more depth, in turn.

## The "Last Moment": Environmental Consciousness Before Industrialization

In *Walden*, published in 1854, Henry David Thoreau observed and praised the heroism of men who were employed manning a railroad snowplow to keep Boston-bound trains running on time. He wrote:

> On this morning of the Great Snow, perchance, which is still raging and chilling men's blood, I bear the muffled tone of their engine bell from out the fog bank of their chilled breath, which announces that the cars *are coming*, without long delay, notwithstanding the veto of a New England northeast snow-storm, and I behold the plowmen covered with snow and rime, their heads peering, above the mould-board which is turning down other than daisies and the nests of field mice, like bowlders of the Sierra Nevada, that occupy an outside place in the universe.[5]

In his novel *Hard Times*, published the same year, 1854, Charles Dickens described a fictional industrial town in the English countryside, Coketown—believed to have been modeled after Manchester or perhaps Preston—in the following manner:

[5] Henry David Thoreau, *Walden*, ed. Stephen Fender (Oxford: Oxford University Press, 1997), 109.

> It was a town of red brick, or of brick that would have been red if the smoke and ashes had allowed it; but as matters stood, it was a town of unnatural red and black like the painted face of a savage. It was a town of machinery and tall chimneys, out of which interminable serpents of smoke trailed themselves for ever and ever, and never got uncoiled. It had a black canal in it, and a river that ran purple with ill-smelling dye, and vast piles of building full of windows where there was a rattling and a trembling all day long, and where the piston of the steam-engine worked monotonously up and down, like the head of an elephant in a state of melancholy madness.[6]

Both of these visions, one from England, one from America, represent a world—and an environmental world-view—irrevocably changed by the Industrial Revolution.[7] The ugly colors, toxic air and choking vapors of Dickens's industrial Coketown are a blunt and unmistakable mirror of what industrialism had done to Britain only a few short decades after the end of the Cold Decade. Thoreau, who elsewhere in *Walden* decried deforestation and other manifestations of industrial capitalism, here presents men whose job is literally to conquer the weather: to plow and clear the train tracks and thus cancel the "veto" of a New England winter storm which, in years past, would have made travel impossible or at least much more difficult.

These are images of the environment from a time when industrialization had taken hold and which was rapidly changing how people thought of their physical surroundings, including weather and climate. Historian of science Katherine Anderson argues that the invention of the telegraph was a game-changer in the perception of weather and meteorology, because it enabled (and created demand for) weather forecasting—thus

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6 Charles Dickens, *Hard Times* (New York: Signet Classics, 2008), 28-29.

7 Another stark example from roughly the same time is Herman Melville's 1855 short story "The Tartarus of Maids," which, similar to Thoreau, depicts a New England winter landscape ravaged and changed by industrialization.

adding the crucial future dimension to people's understanding of the weather with which we today are intimiately familiar.[8] Carolyn Merchant, in her gendered cultural history of New England farming, argues that New England's physical environment and its cultural consciousness was profoundly changed by the advent of industry and the importation of goods and produce that previously had been home-grown.[9] As many of the examples of environmental consciousness in the Cold Decade come from the New England countryside, in Merchant's argument in particular we see New England, formerly a place of natural and agricultural rhythms, beginning to function more and more like an industrial machine, pulsing more to the beating heart of capitalist market economy and less to the natural and environmental world that preceded it. In the Cold Decade, New England was a place whose environment was measured by weather watchers, catalogued in farmer's almanacs and personalized in people's diaries. In the industrial decades that followed, it was a place of factories, pollution, deforestation, bustle and transportation.

For many people in the United States and Europe, industrial society changed the composition of the layers of their worlds. Their local layers could not help becoming broader and more multivaried, as railroads, steamships and instant communications brought individuals and communities within much easier reach of one another. In mirror image, the broader layers of their worlds grew smaller as science, transportation, invention and imagination began to conquer the worlds outside the local in tangible and startlingly different ways. The evolutionary discoveries of Darwin, who made his first

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[8] Anderson, *passim*.

[9] Carolyn Merchant, *Ecological Revolutions: Nature, Gender, and Science in New England* (Chapel Hill, NC: University of North Carolina Press, 1989), 198-260.

voyage in the *Beagle* eleven years after the end of the Cold Decade, made deep time—even the spans of millions of years—knowable and tangible in a way it had never been before, by looking at something as simple (and local) as a leaf, a flower or a shellfish. Later in the 19th century, works of imagination by writers like Jules Verne and H.G. Wells made distant planets, the heavens and the depths of the ocean imaginable to popular audiences. These imaginations would become reality in the next century through the development of submarines, airplanes and spacecraft. Today I can view a high-resolution photograph of the Andromeda Galaxy at the click of a button on my laptop. There is such little distance between my local layer and the broader one that the layers themselves can scarcely be said to exist anymore.

The Cold Decade, therefore, represents the "last moment" of environmental consciousness in a pre-industrial world, before the changes of machines and industrialized economies began to wreak the profound changes that Dickens and Thoreau observed in the 1850s. As we have seen, this environmental consciousness was not uninformed by science, but science existed on an essentially coequal basis, in the popular mind, with very un-scientific beliefs and practices. Exploring the almost endless ways in which industrialism and the technological world changed environmental thinking is (fortunately) beyond the scope of this dissertation. Yet anyone interested in that subject must first tackle a preliminary question: what *was* environmental consciousness like just *before* these profound changes truly took hold? This is why the study of the Cold Decade is relevant and necessary.

Climate Change: The Heavy Burden of Culpability

It was my contention, in discussing the arguers who debated the climate trajectory of Earth, that no camp into which they were divided—global warming theorists, global cooling advocates, or the difference-splitters—ever actually obtained the winning card they desperately sought, and in any event the game itself was about to end with the advent of weather forecasting and modern meteorology.[10] Though the arguers themselves long ago left the table, modern science can at last provide the winning hand: in the Cold Decade, and only in the Cold Decade, the global cooling theorists were correct. The planet's climate *did* change significantly between 1810 and 1819, and temperature data and statistical analysis prove it.[11] The change was not permanent, as many of the 1810s cooling theorists expected, but it clearly did happen.

Modern scientific understanding enables us to finish the work of, and in some cases validate the aspirations of, some Cold Decade observers. Using much the same anecdotal and observational evidence that Thomas Jefferson hoped, in the summation of his weather book, might one day be relevant to resolving broader questions of climate and climate change,[12] climate historians can today put together the occurrences and anomalies of the Cold Decade into a relatively accurate picture of how the anomalies developed and how they played our across the world.[13] We can also, with modern

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[10] *See* Chapter X.

[11] Cole-Dai et al., 1.

[12] Jefferson, Weather Book, 83.

[13] *See, e.g.,* Chenoweth; Klingaman & Klingaman.

scientific tools, to some degree validate the suspicions and beliefs of people in the Cold Decade who held that various earth phenomena were interconnected. Some of them believed—erroneously, in our understanding—that earthquakes were directly related to weather phenomena,[14] but we can today prove through scientific evidence that volcanoes in Indonesia ultimately caused corn-killing frosts in New England, which is not so far off from 1810s notions of interconnectedness.[15]

The Cold Decade represents a unique laboratory in climate studies. It is a place and an episode in history where we can observe how people dealt with, responded to and attempted to understand a period of global climate change, *without* having to grapple with the difficult political and moral implications of climate change caused principally by human activity. While the world in 1810 was quite different from the world of today and the transferability of the example is far from seamless, the absence of culpability in the Cold Decade situation is at least something akin to a "control group" in a scientific experiment: it allows the implications and effects of human-caused climate change to be observed in a different light, by presenting an example that lacks this crucial element.

To recap, in this dissertation I have identified people who engaged in scientific (and pseudo-scientific) responses to climate change events: attempts, not always successful, to analyse the anomalies and divine from them explanatory patterns, they hoped with predictive value. George Mackenzie and his "System of the Winds" is an example.[16] Though I have not dealt with them at length, there are examples of cultural

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14 "On the Cold of the Late Summer," *New York Weekly Museum*, December 14, 1816, 2.

15 Oppenheimer, *passim*.

16 MacKenzie, *System*.

responses, literary and artistic, to the climate change events and weather anomalies of the 1810s: English Romanticist painter J.M.W. Turner, for example, painted a number of pictures after 1815 that are believed to have been influenced by the red volcanic sunsets following the Tambora eruption,[17] and Mary Wollstonecraft Shelley was inspired to write *Frankenstein* while she and her European literati friends (including Lord Byron) were sequestered indoors at the Villa Diodati by Year Without Summer weather events.[18] We have seen medical responses: attempts to understand, manage and leverage environmental and weather conditions into techniques and strategies for healing human bodies or preventing outbreaks of disease, such as Charleston physician Joseph Johnston's analysis of the summer weather of 1820 and its role in the happy absence of a yellow fever outbreak in that year.[19] We have seen religious and deeply personal responses to the events of the Cold Decade: people integrating the anomalies, and what they meant, into their own reflections and personal lives, such as the introspective diary of Mehitable Sullivan Cutler Amory.[20] We have seen responses to climate and weather conditions in the form of travel and migration, the ultimate "voting with your feet," such as the emigration of the Joseph Smith family to upstate New York in 1816[21] or the Irish

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[17] Stanley Williams and Fen Montaigne, *Surviving Galeras* (Boston: Houghton Mifflin, 2001), 198.

[18] Shelley, *Frankenstein,* 439.

[19] Aldredge, 199, 240-41.

[20] Amory, Vol. VIII, July, October, December 1816.

[21] Bushman & Woodworth, 27-32.

farmer who set out for Missouri in 1819 hoping to find "some healthy place where the land is good."[22]

Examples of all of these sorts of responses are abundantly evident in our own modern situation of anthropogenic climate change. Yet the culpability factor—our recognition that we ourselves, through our behavior, have caused this particular environmental disaster—makes the character of our responses to climate change markedly different than those of the 1810s. There are numerous scientific responses, such as massive decades-long attempts to project the course and effects of global warming.[23] There are cultural responses, such as a growing body of literature dealing with climate change, known as "cli-fi" or "climfic",[24] and artistic responses, like the 2012 painting called "Somewhere Over the Rainbow" by Australian artist John Forrest, depicting Dorothy (from the 1939 *The Wizard of Oz* film) turning away from a smog-choked, overheated urban landscape toward a potentially brighter future.[25] There are medical responses, such as the growing awareness among physicians and medical organizations that doctors are destined to be on the front lines of climate change adaptation, such as

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22 Valençius, *Health*, 4-5 (quoting "Meet Me in St. Louis—1819," *Missouri Historical Society Bulletin* 7 (1951): 182.

23 *See, e.g.,* Hansen et al..

24 Amy Brady, "The Man Who Coined 'Cli-Fi' Has Some Reading Suggestions For You," *Chicago Review of Books*, February 8, 2017 <https://chireviewofbooks.com/2017/02/08/the-man-who-coined-cli-fi-has-some-reading-suggestions-for-you/> (visited February 25, 2017).

25 Sean Munger, "42 Historical Objects, No. 42: 'Somewhere Over the Rainbow,' A Painting About Climate Change," *SeanMunger.com*, July 13, 2014 <https://seanmunger.com/2014/07/13/42-historical-objects-no-42-somewhere-over-the-rainbow-a-painting-about-climate-change/> (visited February 25, 2017).

battling tropical diseases unleashed or inflamed by warmer temperatures.[26] There are religious and deeply personal responses at all levels of society, like Pope Francis's historic encylical *Laudato Si,*[27] or my own attempts to come to terms, personally and religiously, with the implications of climate change.[28] As for travel responses, many people have already become climate refugees, fleeing various climate change-related disasters, with millions more predicted in this century.[29]

As with the question of how industrialization changes environmental thinking, the issue of how our own culpability in changing the Earth's climate affects our modern psyches, directs our responses and shapes our environmental world-view is beyond the scope of this dissertation. However, for scholars of any discipline who wish to explore that question, analysis of environmental world-views in the Cold Decade is a strategic place to begin taking stock of how our thinking has changed, and perhaps how it has not.

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26 *See, e.g.*, Barbara Sibbald, "Physicians' Roles on the Front Line of Climate Change," *Canadian Medical Association Journal* 185, no. 3 (2013): 195; Jonathan A. Patz, Howard Frumkin et al., "Climate Change: Challenges and Opportunities for Global Health," *Journal of the American Medical Association* 312, no. 15 (2014).

27 Pope Francis I, "Encyclical Letter: Laudato Si, Of the Holy Father Francis, On Care For Our Common Home," *w2.vatican.va*, May 24, 2015 <http://w2.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html> (visited February 25, 2017).

28 Sean Munger, "Gloomy Skies: Trying to Remain Optimistic in the Era of Catastrophic Climate Change," *SeanMunger.com*, March 22, 2016 <https://seanmunger.com/2016/03/22/gloomy-skies-trying-to-remain-optimistic-in-the-era-of-catastrophic-climate-change/> (visited February 25, 2017).

29 Paul Jeffrey, "From the Global Lens: Climate Refugees," *PNW News Blog*, February 2, 2017 <http://www.pnwumc.org/news/from-the-global-lens-climate-refugees/> (visited February 25, 2017).

Interconnectedness: Seeing the Forest for the Trees

There have been in this dissertation many instances of how people in the 1810s perceived interconnections between various Earth phenomena: weather events, climate, earthquakes, volcanic eruptions or even celestial occurrences. Observers' interest in weather conditions preceding earthquakes, such as Luke Howard's ruminations on rain and water in conjunction with seismic and volcanic events, is an example.[30] Lord Dreghorn's suggestion that the 1755 Lisbon earthquake somehow, through a process not immediately understood, triggered a period of climate change is another clear indication of how this holistic view of the planetary environment worked.[31] Whether people's particular conceptions of how the connections worked can be proven with any modern scientific understanding is quite beside the point. The point is that they saw the Earth and its processes, including weather and climate, all as parts of a vast system that worked together, with each piece and cog in the wheel affecting something else.

To a large extent this is no longer how we see the environmental world. Scientific institutions and the detail and profusion with which they have developed since the early 19th century have hyper-specialized our understanding of the Earth. A climatologist who studies monsoon patterns in India is unlikely to have much professional contact with a geologist who studies volcanic eruptions in Indonesia. Yet we know, from episodes like the Cold Decade, that Indonesian volcanoes can and *do* affect the atmosphere, including monsoon conditions in south Asia. Yet, in a time when scientific understanding is

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[30] Howard, *Climate*, II:169.

[31] John McLaurin, *Works of the Late John MacLaurin, Esq., of Dreghorn: One of the Senators of the College of Justice* (Edinburgh: J. Ruthven and Sons, 1798), 303.

atomized and highly specialized, these connections are harder to see than they might otherwise be. This is especially true for people without scientific training, who tend to defer to the poorly-defined concept of *expert opinion*.[32] That people tend to lack a holistic world view in an era of globalized economics and instant worldwide communication is profoundly ironic.

Despite the great wealth of detailed knowledge that specialized scientific institutions have given us, they also run the risk of obscuring—or even erasing—both historical and environmental truth. Conevery Valençius argues this powerfully with respect to the 1811-12 New Madrid earthquakes, one of the most dramatic seismic events of the Cold Decade. Directly experienced and recorded by countless observers at the time, later in the 19th century, over a long period of social, political, environmental and scientific change, the historical facts of the New Madrid quakes were strangely forgotten both in scientific and public consciousness. As early as 1872, easily within the lifetimes of many people who experienced the quakes, historians of the Missouri region expressly cast doubt on whether the earthquakes had occurred at all, and suggested that, if they had, their accounts were greatly exaggerated. Valencius contends that the development of seismology as a professional science, and the consolidation of expert opinion, tended to make direct observation and historical memory of environmental events superfluous. By the 1920s seismologists working in laboratories, many funded by fossil fuel interests in search of new mineral reserves, had taken on the mantle of deciding what the seismic history of Missouri truly was, and that history, for a long time, mostly or completely

[32] Furthermore, in an era when experts in some subjects (like anthropogenic climate change) are regularly targeted and demonized in the press and public sphere for political and economic purposes, there is a coordinated assault on the public perception of the value of expert opinion to begin with. *See, e.g.,* Michael Mann, *The Hockey Stick and the Climate Wars* (New York: Columbia University Press, 2012).

excluded the 1811 and 1812 tremors.[33] This is not an argument against, or a condemnation of, scientific institutionalization or specialization. It is, however, a cautionary example of how our societal construction, use and interpretation of science runs the risk of minimizing, obscuring or denying certain environmental or historical facts.[34]

To be sure, the idea of holistic environmental connectedness is far from absent in modern scientific understanding—but it may be fair to characterize that it was knowledge lost sometime after the Cold Decade which had to be generally rediscovered in the 20th century. The science of ecology, which is now a cornerstone of modern environmental science, stresses the interconnectedness of ecosystems and biota, existing within a broader context of weather, climate and Earth phenomena. But on a highly conceptual level the chain of discoveries and intellectual advances in the field of ecology, from Ellen Swallow Richards in the 1890s to Lindeman and Rachel Carson in the mid-20th century and beyond, seems to contain at least an element of rediscovery of knowledge that was previously assumed to be true, even if it could not, in an earlier era, be empirically demonstrated. The way we, as a society, understand and react to expert scientific opinion reflects an unspoken assumption that scientific and environmental phenomenon don't really deserve to be taken seriously unless multiple experts in multiple fields agree upon it. With regard to anthropogenic climate change, the fact that the issue of scientific consensus on the matter—how many scientists, and which ones, agree that human

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33 Valençius, *Lost History*, 216-63.

34 It goes almost without saying that such denial or minimalization can be, and today is, actively encouraged by industry-funded media outlets seeking to obscure or dilute public understanding of issues like global warming.

activity is warming the Earth—remains a constant topic of public discussion reflects how we have normalized and internalized the fractured and specialized nature of scientific discourse.

Understanding of the holistic nature of how people in the early 19th century saw and conceptualized the atmosphere and the Earth—in other words, seeing the forest for the trees—better equips us to understand and appreciate how the various systems of the global environment are interconnected and interdependent. The gentlemen naturalists of the early 19th century, like Thomas Forster, were generalists, dabbling sporadically and not very deeply in a host of subjects. Without indulging a historical counter-factual that presupposes modern science could have developed from this generalist model rather than fracturing into a multitude of specializations, it is at least worth appreciating the advantages of a generalist approach of that time rather than dwelling upon the many, many important understandings that it had not yet reached. In this way, the environmental consciousness of the Cold Decade is worth thinking about.

## Summation: A Winter Never Ended

I have posed, as an analytical tool to understand and examine environmental thinking in the early 19th century, the concept of layered understanding—that people in the United States and Europe saw their environment as existing in two layers: a local layer, encompassing their homes, fields, surroundings, occupations and communities; and a broader layer, consisting of everything outside the local, stretching even to the limits of the Earth and the farthest reaches of the heavens. This was an exercise in world-building, in the inellectual construction of environments in which people lived, and which, especially during the Cold Decade, sometimes behaved strangely or in a threatening manner.

I have examined how these layers functioned by focusing on five groups of people, each of whom sought a different way to reach out and pull in—to define, explain or even conquer—the broader environmental layers that they perceived beyond them. I examined how the weather watchers accomplished this reaching-out process through observation, recording and pattern-seeking. I examined how ordinary people from various walks of life accomplished the reaching-out process on a personal level, integrating weather and climate into their daily lives, their religious beliefs and the intimacy of their own thoughts and characters. I investigated how medical professionals accomplished the reaching-out process, leveraging climate and weather knowledge and experience into practical advantages to improve the health of their patients and their communities. I examined how educated elites, the arguers, accomplished the reaching-out process, by playing an intellectual card game centered upon what they conceived to be the climatological future of the planet. Finally, I examined how travellers accomplished the reaching-out process, by comparing and sometimes exchanging one climate environment for another.

All of these attempts to define, explain, leverage or conquer that broader environmental layer had consequences. They had consequences for the development of meteorology and climatology as scientific disciplines. They affected public appetites for, and interest in, meteorological and climate data in the press and in daily discourse. They affected religious moods, personal histories, and artistic expression; it is worth recalling again that *Frankenstein* likely would not exist in our literary culture without the Cold

Decade anomalies. The attempts to engage the broader environmental layer sometimes made a life-or-death difference in medical situations. And they helped explore and conquer new frontiers, and define potential empires—even in the minds of those who did not accompany the travelers themselves on their journeys.

The decade of the 1810s, the changes it brought to the world, and how people conceived of and dealt with those changes is important to understanding our own environmental consciousness. It is especially important now, in the moment of human history where another and much more serious disaster of climate change threatens to change profoundly, and in many cases detrimentally, the lives and fortunes of everyone on Earth. With the stakes seen in that light, we can afford to spare no conceptual tool—we can afford to bypass no potential avenue—that might lead us to greater understanding of this problem and how we, as citizens of the world in the 21st century, choose to deal with it. This, in its most simple and direct iteration, is why the Cold Decade matters.

We could, for example, pay more attention to the idea of holistic environments in which nothing on Earth is entirely unconnected from anything else. Such a world-view might help us appreciate the long-range and long-term consequences of our own environmental actions, economic and political choices, and our attitudes toward each other and ourselves. We could, like the diarists of the Cold Decade, seek greater personal understanding of what the climate and our environment mean to us personally; such a world-view might give us a greater personal stake in the fortunes of our world. We could also, like people in the Cold Decade, broaden our appreciation of the sources of scientific and environmental knowledge, beyond *expert opinion* or scientific consensus, to include the perhaps not-quite-quantifiable evidence of our local experiences, the way people in the 1810s did with vernacular and experiential knowledge of the world derived from almanacs, from traditions, and from their own experiences working their fields. The people of the Cold Decade were more connected to their environment than we are. We should seek to restore that connection, but it begins with how we see and conceptualize the environmental world—which is why it's worth studying how the people of the 1810s did that.

In a strict chronological and scientific sense, the Cold Decade unquestionably ended. Modern scientific analysis indicates that temperatures and climate patterns returned more or less to normal after 1819.[35] There were still harsh winters, unexpectedly cold days, weather disasters, crops ruined by frost, or spates of unseasonable temperatures in subsequent years; meteorologists, both amateur and professional, judged 1837 in New England to be especially cold.[36] As the 19th century wore on, an increasing number of the "oldest persons living" of any given community remembered events of the Cold Decade as the most severe or most memorable or most remarkable weather events of their lives, and then these people, all of them whose stories I have presented here, died. Ultimately a new period of climate change, global warming, began, and no one on planet Earth today was born before it began.

But the Cold Decade lived on, and continues to live on. The subtle ways in which it does so are often more moving than the explicit ones. Reverend Francis Parkman, a Massachusetts pastor and the father of noted historian Francis Parkman, Jr., kept

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35 Cole-Dai et al., 1.

36 Hill, 187-92; Willis I. Milham, "The Year 1816—The Causes of Abnormalities," *Monthly Weather Review* 52, no. 12 (December 1924), 564.

throughout many years of his life a “textbook” of sermons that he preached to his congregations, interspersed with more traditional day-to-day fare. Of the great cold snap of February 1817, Parkman recorded, “Weather. Excessive cold for three days from Friday [February 14] to Monday [February 17]. The thermometers in different situations varied...at Cambridge, lower than it had been known for 25 years.” On the Sunday of that terribly cold weekend, February 16, 1817, Parkman wrote and delivered a sermon he called “No. 199,” based on Galatians 5:22: “The fruit of the Spirit is love, joy, peace, long-suffering gentleness, goodness, faith, meekness, temperance. Against such there is no law.”[37]

Parkman evidently numbered all of his sermons, and returned to the pages in his diary where they were first noted, marking down when in subsequent years he gave the same sermon again. According to his textbook, he preached Sermon No. 199 again on July 22, 1821, six years later on February 4, 1827, and once more on June 30, 1839.[38] My mind settles upon this last date. When Parkman was preaching that sermon again, for the fourth time, this time on a summer morning 20 years after the Cold Decade ended, did he perhaps think of the circumstances under which he originally wrote it, perhaps suppressing a shiver with the memory of that bitterly cold weekend? It is unknowable, but this is an example of how the Cold Decade and its legacy might have lived on in a subtle and personal way.

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37 Francis Parkman, Diary (Textbook #2, 1817-1829), Francis Parkman diaries and textbooks 1810-1843, February 16, 1817, Massachusetts Historical Society, Boston, MA.

38 Ibid., February 16, 1817 (subsequent notations, same page).

When I began the research for this dissertation, a book I handled that was published during the Cold Decade, the marble-dyed edges of its pages flaking off into dust, remained long in my memory. *The Religious Intelligencer*, a compilation of religious newspapers from 1816 and 1817,[39] it said nothing substantive about weather or climate or the environment, but the ink on many of its pages were blotted and warped with the water-marks of dried raindrops. When I encountered the book it looked as if it had not been opened in a very long time. Could the raindrops that marred those pages have fallen during the Cold Decade, from a sky hazed with sulfur dioxide from Tambora or Mountain X? Perhaps, perhaps not; but it was an enticing thought.

Similarly, in an archive in California, handling an 1812 scientific textbook expounding the presumed scientific foundations of the environment—the "invisible fluid existing in all the bodies of the earth"—I found a small dried oak leaf pressed between two of the book's pages. Someone may have been reading it under an oak tree, some day long ago, perhaps during the 1810s; the leaf might have been a physical artifact of the Cold Decade.[40]

In these ways, and in our minds and our own environmental consciousness, the Cold Decade lives on. It was not literally ten years of unending winter, but the ten winters, springs, summers and autumns within that unusual time have much to tell us about the many layers of the world in which it occurred.

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[39] *The Religious Intelligencer* (New Haven, CT: N. Whiting, 1816).

[40] Telescope, 59 (quote); the leaf was between pages 62 and 63. I did not remove it; hopefully it remains there.

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