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Knowing in America: The Enlightenment, Science, and the Early Republic

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DEDICATION

For my parents.

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ABSTRACT

This dissertation analyzes practices of science and technology in the early United States as windows onto the American Enlightenment. Although scholars have emphasized the important impact of Enlightenment thought on the American founding, the historiography tends to argue for the decreasing influence of the Enlightenment on American culture as the nineteenth century progressed. In addition, scholars tend to see a decline in American science after Benjamin Franklin as nineteenth-century Americans began to focus primarily on the practical problems of everyday life. I question these interpretations by connecting scientific practice in the Early Republic with transatlantic Enlightenment thought and analyzing American conversations about knowledge creation in practical pursuits such as agriculture. I place American science in the context of Enlightenment debates about how human beings could create knowledge, or epistemology. This part of the dissertation involves a review of American exposure to such Enlightenment thinkers as John Locke, David Hume, and Thomas Reid. Then, I conduct several case studies of different kinds of science in America, including agriculture and natural history, and I analyze how Enlightenment epistemology informed the practice of these sciences. Finally, I consider how Enlightenment epistemology and American scientific practice shaped American discourse about political economy and political philosophy. In books and pamphlets that discussed political topics, American writers attempted to support their arguments by applying what they saw as proper epistemological methods. Through discussion of these aspects of science, I show that the

Enlightenment continued to make its mark on American culture throughout the early nineteenth century.

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CHAPTER 1

INTRODUCTION

In the historical imagination of western civilization, few developments loom larger than the Enlightenment of the long eighteenth century. Few concepts, however, have inspired such diverse interpretations. For some scholars, the Enlightenment constituted a definitive break from the mysticism and religiosity of previous ages and led to the rise of religious toleration and objective science. For others, the Enlightenment enshrined a narrow rationalism that culminated in the development of racist and genocidal ideologies in the nineteenth and twentieth centuries. Still others have defined the Enlightenment as an explosion of print culture and commerce that created transnational networks of people through the exchange of goods and the written word. The diffusion of the Enlightenment presents another contentious issue. To what extent did the style, attitudes, and ideas of the Enlightenment extend beyond savants in the salons and learned societies of London and Paris? Did the common people experience the same Enlightenment as the philosophes, or any Enlightenment at all?

Historian Robert Darnton reflected on these differing interpretations by characterizing two approaches for studying the Enlightenment. The first, epitomized by the synthetic work of intellectual historian Peter Gay, took the philosophical writings of major thinkers as the main source for investigating the Enlightenment. In Gay's Enlightenment, Darnton argued, the disciples of reason ushered in modernity by

questioning the foundations of religious belief. The second approach, led by French historians of the Annales school, "[located] the Enlightenment by not looking for it," as Darnton put it.[1] These historians went to more mundane sources; they reviewed cheap pamphlets and almanacs rather than philosophical treatises. Considering the ideas contained in these less prominent sources, Darnton explained, resulted in a more complicated portrait of the eighteenth century that questioned its status as the "Age of Reason." Darnton thus called for a reconsideration of the Enlightenment that produced a new social history of ideas; no longer could historians understand the Enlightenment only by analyzing the great books of the long eighteenth century.

Around the same time as Darnton's challenge to produce this social history of ideas, historians of early America were writing new interpretations of the American Enlightenment. Henry F. May and Donald H. Meyer both produced monographs published in 1976 that attempted to define and describe the American Enlightenment. Reflecting Darnton's call for a more nuanced interpretation of the Enlightenment, both authors eschewed defining the Enlightenment as a unitary phenomenon. Both, however, made the tension between religion and Enlightenment a key element of their analysis. May defined Enlightenment thinkers as those who contended that, through the proper use of the human faculties, mankind could achieve progress in many pursuits. This definition thus excluded from the enlightened category those persons who turned to "revelation, tradition, or illumination" as the primary sources of truth. Very few people outside of the colonial and early national elite, May stated, could be considered enlightened under this definition because of the primacy of Protestantism in American culture.[2] May went on to

1. Robert Darnton, "In Search of the Enlightenment: Recent Attempts to Create a Social History of Ideas," *The Journal of Modern History* 43, no. 1 (March 1, 1971): 124.
2. Henry F. May, *The Enlightenment in America* (New York: Oxford University Press, 1976), xiv–xv.

develop a four-period chronology of the Enlightenment in America. Around the beginning of the nineteenth century, what May called the "Didactic Enlightenment," led by Scottish philosophers of the Common Sense school, succeeded in ensconcing itself in American culture. Institutionalized in American colleges, the Common Sense school reacted against the skepticism and radicalism of thinkers like David Hume and Jean-Jacques Rousseau by defending "the intelligible universe, clear and certain moral judgments, and progress."[3] Meyer argued that Americans produced a particular variant of the Enlightenment through their interaction with European ideas. In brief, the particular conditions of early America gave rise to an American Enlightenment that emphasized the practical applications of ideas over speculative theorizing. Like May, Meyer saw the American Enlightenment turning in a conservative direction around the start of the nineteenth century in response to the radicalism of the French Revolution.[4]

May and Meyer considered a variety of topics within their analysis of the American Enlightenment, including religion, morality, and politics. The two said very little, however, about science in early America, especially after 1800. For May and Meyer, the achievements of natural philosophers like Newton may have inspired Americans to adopt an experimental method in religious, political, and social inquiries, but with the exception of Benjamin Franklin's electrical experiments, Americans did not produce much scientific work. May, for example, saw the early nineteenth century as a period of decline in American science as the state and federal governments provided almost no support for scientific studies. The rise of egalitarian democracy in this period, May argued, made it difficult to justify government support for elite men of science.[5]

3. Ibid., xvi.
4. Donald H. Meyer, *The Democratic Enlightenment* (New York: G. P. Putnam's Sons, 1976).
5. May, *The Enlightenment in America*, 1976, 308–9.

Historians of the European Enlightenment also took up the call for a reconsideration of the long eighteenth century. Summarizing the results of this research, Dorinda Outram wrote that scholars could no longer define the Enlightenment as a coherent intellectual movement with clear goals. Instead, scholars should see the Enlightenment as "a series of problems or debates, of 'flash-points,' characteristic of the eighteenth century."[6] This framework conceptualized the Enlightenment as a process of working out various problems in society rather than a fixed ideology. Armed with this reworked concept of Enlightenment, historians pursued Darnton's agenda of interrogating the movement and exchange of ideas in arenas far from the philosopher's closet, such as coffeehouses, salons, the popular press, fraternal organizations, and the state. As part of this endeavor, historians looked to the practice of science in Europe. In an analysis of science in the Enlightenment, Thomas L. Hankins argued that "the Enlightenment was not a fixed set of beliefs but a way of thinking, a critical approach that was supposed to open the way for constructive thought and action." Hankins identified a key epistemological shift in theology in the late seventeenth century. Whereas in the Middle Ages theologians had relied on pure reason to deduce truths about God, the seventeenth century saw a turn to the study of external nature as a revelation of God. As a result, in the Enlightenment, "reason changed from the methods of formal logic to those of the natural sciences, and the laws of reason became identical with the laws of nature." Hankins, drawing from his earlier study of the French mathematician and natural philosopher Jean d'Alembert, argued that mathematical methods provided the essential structure of this new science of nature.[7] Outram agreed with Hankins that the natural

6. Dorinda Outram, *The Enlightenment* (Cambridge: Cambridge University Press, 1995), 3.
7. Thomas L. Hankins, *Science and the Enlightenment* (Cambridge: Cambridge University Press, 1985), 3, 16; Thomas L. Hankins, *Jean d'Alembert: Science and the Enlightenment* (New York: Gordon and Breach, 1970).

sciences constituted one of the important flash-points within the Enlightenment. She observed that because natural science lacked the high status that it would come to enjoy in the twentieth century, men and women of science in the eighteenth century had to face many thorny questions about how to pursue knowledge.[8] In introducing a volume of essays on European science during the long eighteenth century, William Clark, Jan Golinski, and Simon Schaffer commented that previous studies of European science during the Enlightenment had focused on highly localized subjects or on the development of specific scientific disciplines. These frameworks failed to connect the particular topics with the broader Enlightenment context. Still, the authors of these studies assumed that a future synthesis would reveal a singular Enlightenment "mind" that drove the various practices of science in this period. Revising this method, Clark, Golinski, and Schaffer argued that the Enlightenment was "now seen not as some mind or spirit, but rather as something projected, circulated, and negotiated day by day by agencies such as the 'Republic of Letters.'" The three thus advocated for case studies of science that revealed particular kinds of Enlightenment in different times and places. For example, a series of essays in the volume discussed the rise of quantitative measurement techniques to impose discipline on practices of science during the Enlightenment.[9]

From the beginning of the twenty-first century to the present, scholars of science in the European Enlightenment continued to give their subject more and more diverse shades of color and, for the most part, abandoned the attempt to discern a singular mind or ideology of Enlightenment. For example, Jessica Riskin revised the account of the rise of empirical science during the Enlightenment in her study of French "sentimental

8. Outram, *The Enlightenment*, 48.
9. William Clark, Jan Golinski, and Simon Schaffer, "Introduction," in *The Sciences in Enlightened Europe*, ed. William Clark, Jan Golinski, and Simon Schaffer (Chicago: University of Chicago Press, 1999), 16, 21, 26.

empiricists." In discourses about knowledge during the eighteenth century, many philosophers rejected the existence of innate ideas and instead grounded all knowledge on sensory experience. But contrary to interpretations of this empiricism that saw it as an emotionless consideration of facts, Riskin argued that French empiricists recognized that experience involved both sense impressions and the feelings engendered by those impressions. As Riskin concluded, "knowledge grew not from sensory experience alone, but from a combination of sensation and sentiment."[10] In a similar manner, Adelheid Voskuhl analyzed the construction of anthropomorphic automata in the late eighteenth century and interpreted these machines as representative not of a cold mechanistic philosophy but of a culture of sentimentality that placed great importance on feelings as well as sensory perception.[11]

The last decade of the twentieth century and the first decade of the twenty-first saw another reexamination of the American Enlightenment. Much of the work during this period continued to maintain a focus on the tensions between religion and the Enlightenment in early America, but some scholars questioned this framework that set up religion and Enlightenment as rival camps. Robert A. Ferguson, for example, analyzed the rhetoric of the American Revolution and found that the success of the uprising required both religious and enlightened discourses working together to achieve a consensus.[12] John Fea's study of Philip Vickers Fithian, a College of New Jersey (later Princeton) graduate who tutored children of Virginia planters in the middle of the eighteenth century, drew out the tensions between Fithian's traditionalism and his desire

10. Jessica Riskin, *Science in the Age of Sensibility: The Sentimental Empiricists of the French Enlightenment* (Chicago: University of Chicago Press, 2002), 4.
11. Adelheid Voskuhl, *Androids in the Enlightenment: Mechanics, Artisans, and Cultures of the Self* (Chicago: University of Chicago Press, 2013).
12. Robert A. Ferguson, *The American Enlightenment, 1750-1820* (London: Harvard University Press, 1997).

to become enlightened.[13] In a similar manner, J. Rixey Ruffin considered the case of William Bentley, a Massachusetts minister in the Early Republic who constructed a uniquely enlightened brand of Christianity that put him in conflict with evangelical sects.[14] Finally, Nina Reid-Maroney directly challenged the traditional interpretation of the Enlightenment's opposition to or tension with religion in her study of enlightened Philadelphians in the colonial and early national periods. She argued that, for Benjamin Rush and his fellows, Calvinist doctrines and Scottish Enlightenment epistemology reinforced one another in their doubts about the ability of finite human minds to know perfectly the truth about God or the natural world. In this case, then, Christianity and Enlightenment worked hand-in-hand; enlightened Philadelphians did not see the need to reconcile the two. Unlike other scholars who had given short shrift to science in America, Reid-Maroney made Philadelphia's interaction with natural philosophy and medicine a key aspect of the city's Enlightenment.[15]

Other historians unpacked American interaction with various strands of the Enlightenment and the influence of these ideas on multiple arenas beyond the tension between religion and reason. Sari Altschuler, reflecting the turn to the study of sentimentality with the Enlightenment, analyzed how Benjamin Rush conceptualized the Early Republic as a living, breathing body rather than a sterile machine. Altschuler argued that Rush understood that this body politic needed to be regulated by the action of sympathy, an important concept that grew out of the Scottish Enlightenment.[16] Eran

13. John Fea, *The Way of Improvement Leads Home: Philip Vickers Fithian and the Rural Enlightenment in Early America* (Philadelphia: University of Pennsylvania Press, 2008).
14. J. Rixey Ruffin, *A Paradise of Reason: William Bentley and Enlightenment Christianity in the Early Republic* (New York: Oxford University Press, 2008).
15. Nina Reid-Maroney, *Philadelphia's Enlightenment, 1740-1800: Kingdom of Christ, Empire of Reason* (Westport, Conn.: Greenwood Press, 2001).
16. Sari Altschuler, "From Blood Vessels to Global Networks of Exchange: The Physiology of Benjamin Rush's Early Republic," *Journal of the Early Republic* 32, no. 2 (Summer 2012): 207–31.

Shalev traced the influence of celestial metaphors, and particular the Newtonian model of the universe, in American political rhetoric up to the Civil War.[17] Similarly, Richard Striner analyzed the various uses of the Newtonian universe in the politics of Europe and America.[18] William Huntting Howell explored the image of Philadelphia astronomer David Rittenhouse as emblematic of the disinterested man of science and republican citizen.[19] Colleen A. Sheehan revealed the importance of French Enlightenment thought for James Madison's analysis of the role of public opinion in a republic.[20] Daniel D. Blinka considered the Scottish Common Sense roots of American lawyer Simon Greenleaf's analysis of the credibility of the writers of the Gospels.[21] Finally, Gail S. Murray's examination of children's literature in the Early Republic found that many of these books contained Lockean assumptions about the importance of beneficent experience in the instruction of children.[22] These studies revealed an early America that engaged deeply with the broader Enlightenment on a variety of fronts.

In addition to scholars that interrogated America's interaction with the Enlightenment, several historians demonstrated how America and its people shifted practices of knowledge creation in the colonial and early national periods. Susan Scott Parrish's study of natural history in the British Atlantic world showed how the empiricism of the Enlightenment provided space for white colonists, African slaves, and

17. Eran Shalev, "'A Republic Amidst the Stars': Political Astronomy and the Intellectual Origins of the Stars and Stripes," *Journal of the Early Republic* 31, no. 1 (Spring 2011): 39–73.
18. Richard Striner, "Political Newtonianism: The Cosmic Model of Politics in Europe and America," *William and Mary Quarterly* 52, no. 4 (October 1995): 583–608.
19. William Huntting Howell, "A More Perfect Copy: David Rittenhouse and the Reproduction of Republican Virtue," *William and Mary Quarterly* Third Series 64, no. 4 (October 2007): 757–90.
20. Colleen A. Sheehan, "Madison and the French Enlightenment: The Authority of Public Opinion," *William and Mary Quarterly* 59, no. 4 (October 2002): 925–56.
21. Daniel D. Blinka, "The Roots of the Modern Trial: Greenleaf's Testimony to the Harmony of Christianity, Science, and Law in Antebellum America," *Journal of the Early Republic* 27, no. 2 (Summer 2007): 293–334.
22. Gail S. Murray, "Rational Thought and Republican Virtues: Children's Literature, 1789-1820," *Journal of the Early Republic* 8, no. 2 (Summer 1988): 159–77.

Native Americans to contribute to the pursuit of knowledge about the natural world. In previous Enlightenment scholarship, these groups were seen as either outside the sphere of Enlightenment or as mere collectors of facts and specimens that European savants would analyze to produce scientific knowledge. Parrish inverted this center-periphery model of knowledge creation and placed people in America at the forefront of the analysis.[23] Kathleen Murphy followed Parrish with an examination of how white naturalists translated the "vulgar" knowledge of Indians and Africans in the New World into legitimate matters of fact.[24] She also analyzed the slave trade as a source of specimens and facts for natural history.[25] With a similar emphasis on how travel shaped natural knowledge, Frederik Albritton Jonsson took a look at Swedish naturalist Pehr Kalm's voyage to North America and his reliance on the testimony of local residents to understand the changes in climate that occurred in North America over time.[26] Margot Minardi's consideration of a smallpox epidemic in Boston in the early eighteenth century revealed how Cotton Mather relied on the testimony about smallpox inoculation from his slave Onesimus to argue for the propriety of inoculating Bostonians against the disease. Minardi's analysis of the role of African knowledge in this case provided another example of diffuse scientific authority in America; elite whites did not have sole access to creditable knowledge in this period.[27] Other historians shed light on the impact that Native American knowledge had on various areas of inquiry. Sarah Rivett contended that

23. Susan Scott Parrish, *American Curiosity: Cultures of Natural History in the Colonial British Atlantic World* (Chapel Hill: University of North Carolina Press, 2006), 8, 314–15.
24. Kathleen S. Murphy, "Translating the Vernacular: Indigenous and African Knowledge in the Eighteenth-Century British Atlantic," *Atlantic Studies* 8, no. 1 (March 2011): 32.
25. Kathleen S. Murphy, "Collecting Slave Traders: James Petiver, Natural History, and the British Slave Trade," *William and Mary Quarterly* 70, no. 4 (October 2013): 637–70.
26. Frederik Albritton Jonsson, "Climate Change and the Retreat of the Atlantic: The Cameralist Context of Pehr Kalm's Voyage to North America, 1748–51," *William and Mary Quarterly* 72, no. 1 (January 2015): 99–126.
27. Margot Minardi, "The Boston Inoculation Controversy of 1721-1722: An Incident in the History of Race," *William and Mary Quarterly* Third Series 61, no. 1 (January 2004): 47–76.

the study of Indian languages in the seventeenth century prompted several European thinkers to rework the philosophy of language. In European encounters with the strange tongues of Indians, philosophers came to argue that languages grew out of the social conventions of particular societies. No longer could words be seen as direct representations of ideas.[28] Amy Morris showed how colonial Americans employed Indian stories and myths to argue that fossilized bones and teeth found in New York belonged to an ancient giant.[29] Similarly, Cameron B. Strang, in a study of the Florida borderlands in the late eighteenth and early nineteenth centuries, argued that Indian storytelling formed an important part of the construction of natural knowledge in that region.[30] Finally, Christopher Steinke examined a map created by the Indian leader Too Né that provided an alternative geography of the land that Lewis and Clark explored in their famous expedition.[31] The work of these scholars demonstrates that the Enlightenment cannot be conceived as only the movement of ideas from Europe to peripheral areas; instead, the periphery actively participated in the creation of knowledge and even shaped the contours of that knowledge in significant ways.

James Delbourgo's study of electricity in early America made the most successful attempt to date to connect the practice of science in America to the Enlightenment context. In an analysis of the many ways in which Americans interacted with electricity, from experiments that passed electricity through human bodies to the construction of lightning rods to investigations of electric eels, Delbourgo concluded that the American

28. Sarah Rivett, "Learning to Write Algonquian Letters: The Indigenous Place of Language Philosophy in the Seventeenth-Century Atlantic World," *William and Mary Quarterly* 71, no. 4 (October 2014): 555.
29. Amy Morris, "Geomythology on the Colonial Frontier: Edward Taylor, Cotton Mather, and the Claverack Giant," *William and Mary Quarterly* 70, no. 4 (October 2013): 701–24.
30. Cameron B. Strang, "Indian Storytelling, Scientific Knowledge, and Power in the Florida Borderlands," *William and Mary Quarterly* 70, no. 4 (October 2013): 671–700.
31. Christopher Steinke, "'Here Is My Country': Too Né's Map of Lewis and Clark in the Great Plains," *William and Mary Quarterly* 71, no. 4 (October 2014): 589–610.

Enlightenment was "ecstatic and antinomian."[32] Far from seeking the "rational mastery" of nature, Americans celebrated the wonder and complexity of nature; they accepted that humans could never achieve a complete understanding of nature.[33] Along the same lines, this attitude toward science reflected an American distaste for the centralization of knowledge and power.[34] In a discussion of Edward Bancroft's observations of the electric eel, for example, Bancroft portrayed himself as a more trustworthy authority about the eel's electrical properties than European men of science who had never seen the beast.[35] Delbourgo thus continued the reassessment of the Enlightenment that had added more diverse shades to the portrait of the long eighteenth century.

Over the last few decades, then, scholars have fractured the once solid unity of the Enlightenment. As one result of this movement to reveal the heterogeneity of the Enlightenment, the practice of science has come to the forefront as one of the key flash-points of the long eighteenth century. But with the exception of Delbourgo's work, this more nuanced conception of the Enlightenment has not informed the study of science in the Early American Republic. The dismissal of science in the Early Republic stems from a longstanding interpretation of nineteenth-century Americans that portrayed them as concerned only with practical matters and distrustful towards the pronouncements of elite intellectuals.[36]

This dissertation seeks to add to the effort to expand our understanding of the Enlightenment in America by considering the interaction between Enlightenment ideas

32. James Delbourgo, *A Most Amazing Scene of Wonders: Electricity and Enlightenment in Early America* (Cambridge: Harvard University Press, 2006), 10–11.
33. Ibid., 282–83.
34. Ibid., 280–81.
35. Ibid., 180.
36. Perry Miller, *The Life of the Mind in America: From the Revolution to the Civil War* (New York: Harcourt, Brace, & World, 1965), 271–312; Perry Miller, *Nature's Nation* (Cambridge: Belknap Press of Harvard University Press, 1967), 4–9.

and scientific practice. Unlike previous studies of the American Enlightenment, however, it focuses primarily on the first half of the nineteenth century in order to demonstrate that the questions raised in the eighteenth century continued to have resonance in this period and that science in America did not die with Franklin. With the fracturing of the Enlightenment, John M. Dixon has warned that the concept of the Enlightenment in America has become so loose and vague so as to "render the Enlightenment incoherent." Dixon argues that the refusal to define the Enlightenment as a set of ideas has erroneously reinforced the notion that Americans cared little for philosophy or ideas in general. Too much focus on social practices and culture, he explains, has left historians blind to "the very question of what the Enlightenment is."[37] This dissertation attempts to address these concerns by grounding the analysis in an examination of the particular Enlightenment philosophers that Americans interacted with in libraries. Only after laying a foundation with an investigation of Enlightenment epistemology in America will the dissertation move on to specific practices of science through case studies of such topics as agriculture, astronomy, and natural history. I thus attempt to combine both the ideas of Enlightenment and the practices of Enlightenment. The variety of scientific practices considered in this dissertation will, I hope, avoid the pitfall that Clark and his co-authors identified of constructing a narrow topical or disciplinary history that does not address the wider Enlightenment themes that specific practices reveal.

Before commencing this examination, I must clarify the terms that I will use throughout the dissertation. As David Cahan has pointed out, the long nineteenth century saw the transition from a pursuit called "natural philosophy," which included practices of

37. John M. Dixon, "Henry F. May and the Revival of the American Enlightenment: Problems and Possibilities for Intellectual and Social History," *William and Mary Quarterly* 71, no. 2 (April 2014): 276, 275, 278.

natural history, to a variety of activities concerning the study of the natural world that were all subsumed under the term "science." In the nineteenth century, various sciences, such as biology, physics, and geology, began to define themselves as separate disciplines, and the notion that all of these investigations were conducting something called "natural philosophy" fell out of favor. Specialization marked the development of science in the nineteenth century. These natural sciences also grew farther and farther apart from the concerns of philosophy and theology, and so "science" lost its former association with knowledge generally and came to refer only to the study of the natural world.[38] The period examined in this dissertation fell right in the middle of these shifts in the conception of science, and so I will use the term "science" to denote various kinds of knowledge rather than a specific method of investigating the natural world or a particular discipline. Indeed, the figures analyzed in this dissertation spoke of such inquiries as the science of the human mind, the science of morals, and the science of government, concerns far from the specialized natural sciences of today.

Each chapter of this dissertation addresses an open question in the history of the American Enlightenment. Chapter Two conducts an analysis of the presence of Enlightenment philosophers of mind in a selection of American libraries in the late eighteenth and early nineteenth centuries. Starting with the particular epistemological treatises found in American library catalogs, the chapter characterizes the kind of Enlightenment that Americans imbibed. This chapter specifies the particular Enlightenment philosophers, primarily English and Scottish empiricists, that Americans read to understand how the mind worked and what human beings could actually know. In

38. David Cahan, "Looking at Nineteenth-Century Science: An Introduction," in *From Natural Philosophy to the Sciences: Writing the History of Nineteenth-Century Science*, ed. David Cahan (Chicago: University of Chicago Press, 2003).

this way, the chapter attempts to bring the ideas of the Enlightenment back to center stage.

Chapter Three explores the issue of empiricism through a discussion of attempts to found experimental farms in the early nineteenth century. I argue that the promoters of experimental farms employed a brand of empiricism that questioned the ability of ordinary farmers to achieve progress in the science of agriculture. The chapter thus demonstrates how Americans applied the empiricism of Enlightenment philosophers to the practical problems of agriculture.

Chapter Four uses the American career of mathematician and astronomer George Blackburn as a window onto the place of the mathematical sciences in the Early Republic. I argue that Blackburn's advocacy of mathematical methods in education and in surveying projects clashed head-on with Americans' preference for the practical and useful over the abstract and theoretical.

Chapter Five discusses the uses of empirical evidence in urgent moral and political questions. In the early nineteenth century, Americans received word of the discovery of two ant species that enslaved other ant species. The discussion of this peculiar fact from nature entered the American discourse about the South's peculiar institution. In particular, this fact raised the question about whether it was epistemologically valid to draw an analogy between the slavery of the insects and the slavery of man.

Chapter Six examines the career of Peter A. Browne, a Philadelphia man of science in the early nineteenth century, as a practitioner of the inductive method of science advocated by many of the Enlightenment philosophers of mind. Browne's

scientific work reflected the concerns of natural history, such as measurement, collection of facts, and classification of natural objects.

Chapter Seven argues that the epistemological concerns of the Enlightenment went beyond the practice of natural science and entered the realm of political philosophy. Through an analysis of the kinds of reasoning employed in the political treatises of the Early Republic, this chapter shows that the questions raised during the Enlightenment continued to have resonance throughout the early nineteenth century and outside of natural science. The chapter concludes with an analysis of Alexis de Tocqueville's observations of the democratic mind of Americans. Far from seeing Americans as uncritical and unconcerned with ideas, Tocqueville argued that the democratic mind moved in a dizzying manner from particular ideas to general ideas, with little in between. Tocqueville thus provides an account of Americans that does not deny their Enlightened status, but instead reveals the specifically American brand of Enlightenment formed in the New World.

CHAPTER 2

REPUBLICS OF KNOWING: THE ENLIGHTENMENT AND EPISTEMOLOGY IN THE EARLY UNITED STATES

Introduction

With the ratification of the Constitution in 1789, the United States began its life as a nation in the late Enlightenment. The long eighteenth century had seen a flurry of works that questioned how human beings could come to know the world around them. How could one determine the validity of different kinds of evidence? Under what conditions could the testimony of others be trusted, and why? These questions seemed particularly pressing because of the rise of new thinking in natural philosophy, especially Newton's work on gravitation and motion, and the emergence of deism and religious skepticism in some quarters. In short, who or what possessed authority in the creation of knowledge, and why did they have that authority?

To understand the intellectual context for American science in the early republic, we must explore the particular strands of Enlightenment thought to which Americans exposed themselves. The Enlightenment contained a great variety of ideologies and perspectives, so determining the particular kind of Enlightenment that Americans experienced will help to put American science in context. The catalogs of American libraries in the late eighteenth and early nineteenth century provide one window onto this interaction between Americans and the Enlightenment. For this analysis, I have reviewed

catalogs published in the late eighteenth and early nineteenth centuries from the Library Company of Philadelphia, the American Philosophical Society library (located in Philadelphia), the Boston Library, the Boston Athenaeum, and the Charleston Library Society.[39] With the exception of the American Philosophical Society, these libraries operated on a subscription basis, with members usually paying a yearly fee for access to the library's collections. The catalogs for these libraries thus reflect the interests of the polite reading public in three major cities of the Early Republic. Following a discussion of the works that appeared in these library catalogs, I analyze American responses to this literature to demonstrate that Americans did not passively accept the findings of Enlightenment authors but actively engaged in the discourse on knowledge.

For the most part, Enlightenment epistemology in America argued for an empirical and inductive method that followed the evidence towards general conclusions. Much of the literature, especially commentaries on the method of Isaac Newton, warned against the formation of hypotheses prior to the analysis of facts from nature. The ins and outs of this empiricism, however, found many Enlightenment authors at odds. In

39. Charleston Library Society, *A Catalogue of Books, Belonging to the Incorporated Charlestown Library Society, with the Dates of the Editions* (Charlestown, S. C.: Robert Wells, 1770); Library Company of Philadelphia, *A Catalogue of the Books, Belonging to the Library Company of Philadelphia; to Which Is Prefixed, a Short Account of the Institution, with the Charter, Laws and Regulations* (Philadelphia: Zachariah Poulson, Junior, 1789); Boston Library, *Catalogue of Books in the Boston Library. January 1, 1795* (Boston, 1795); Charleston Library Society, *A Catalogue of Books Belonging to the Charleston Library Society* (Charleston: W. P. Young, 1806); Charleston Library Society, *A Catalogue of Books Belonging to the Charleston Library Society* (Charleston: W. P. Young, 1811); American Philosophical Society, *Catalogue of the Library of the American Philosophical Society Held at Philadelphia for Promoting Useful Knowledge* (Philadelphia: Joseph R.A. Skerrett, 1824); Boston Atheneum, *Catalogue of Books in the Boston Atheneum: To Which Are Added the By-Laws of the Institution, and a List of Its Proprietors and Subscribers* (Boston: William L. Lewis, 1827); Boston Library, *Catalogue of Books in the Boston Library, June, 1830: Kept in the Room Over the Arch in Franklin-Place* (Boston: John H. Eastburn, 1830); Library Company of Philadelphia, *A Catalogue of the Books Belonging to the Library Company of Philadelphia; To Which Is Prefixed, a Short Account of the Institution, with the Charters, Laws, and Regulations*, vol. 1, 2 vols. (Philadelphia: C. Sherman & Co., 1835); Library Company of Philadelphia, *A Catalogue of the Books Belonging to the Library Company of Philadelphia; To Which Is Prefixed, a Short Account of the Institution, with the Charters, Laws, and Regulations*, vol. 2, 2 vols. (Philadelphia: C. Sherman & Co., 1835).

particular, the clash between David Hume's skepticism and Thomas Reid's Common Sense philosophy featured prominently in American intellectual discussions.

The Philosophy of Mind

The library catalogs contained many books that specifically addressed the natural sciences, such as Newton's *Principia Mathematica* and Buffon's *Histoire naturelle*. In addition to these "scientific" works, the catalogs listed a number of books that considered how human beings could gain knowledge of nature in the first place. These works on the philosophy of mind addressed the thorny problems of what constituted good evidence, the conditions for trusting that evidence, and who had the authority to produce good evidence.

The works on the philosophy of mind that appeared in early American libraries can be divided into four general categories. First, British empiricists made up a significant portion of these libraries' collections. Inaugurated by John Locke and revised by David Hume and James Hutton, this empiricist tradition held, broadly, that experience served as the foundational source for all human knowledge. Besides this general claim, however, these authors differed greatly on how exactly the mind operated on and used this experience. Second, George Berkeley developed an epistemology of immaterialism. Although Berkeley emphasized the importance of experience in securing knowledge of the world, he broke dramatically with the line of British empiricists by arguing that sensations did not derive from physical things made up of matter but directly from the will of God. Third, a number of authors, including Thomas Reid and James Beattie, constituted the Scottish Common Sense school. In response to the British empiricists, these philosophers argued that an instinctive faculty present in all human beings of sound

mind, Common Sense, was the source of human knowledge. Common Sense philosophers contended that experience, although important, could not provide support for many propositions that human beings knew were true. Finally, the Marquis de Condorcet provided an account of knowledge that emphasized the creation of mathematical theories to explain both natural and human phenomena. Although he subscribed to the basic outlines of Locke's empiricism, Condorcet's epistemology dispensed with the nagging doubts present in the British empiricists' writings and boldly argued for the unlimited progress of human knowledge (see table 2.1).

Previous scholarship on the presence of Enlightenment literature in American libraries supports the focus on these authors. David Lundberg and Henry F. May have constructed a statistical database of Enlightenment works in 291 American libraries from 1700 to 1813. These scholars included books that appeared in booksellers' sale catalogs, college libraries, circulating libraries, subscription libraries, and private libraries. Locke's *Essay Concerning Human Understanding* appeared in 45 percent of the libraries surveyed, while Locke's *Works* (which included the *Essay*) appeared in 17 percent. Hume's *Essays and Treatises on Several Subjects* (which included the epistemological treatise *An Enquiry Concerning Human Understanding*) appeared in 26 percent. Berkeley's *Treatise Concerning the Principles of Human Knowledge* appeared in four percent. Reid's *Enquiry into the Human Mind on the Principles of Common Sense* appeared in 14 percent, while his other epistemological work, *Essays on the Intellectual and Active Powers of Man*, appeared in 17 percent. Finally, Condorcet's *Outlines of an Historical View of the Progress of the Human Mind* appeared in 11 percent. Thus, many

of the authors analyzed in this chapter had at least some representation in libraries across colonial and early national America.[40]

Before commencing with an analysis of the intricacies of these philosophers' accounts of epistemology, we should place them in the context of the American Enlightenment generally. Henry F. May has argued that the Enlightenment came to America in four waves. In chronological order, May labels these four the "Moderate Enlightenment," the "Skeptical Enlightenment," the "Revolutionary Enlightenment," and the "Didactic Enlightenment." The Moderate Enlightenment of Locke and Newton stressed "balance, order, and religious compromise." Hume and Voltaire led the Skeptical Enlightenment, which questioned the authority of religion and the ability of humans to achieve certainty in natural and moral science. The Revolutionary Enlightenment of Jean-Jacques Rousseau, Thomas Paine, and William Godwin sought the radical reformation of society along more rational lines. Finally, the Didactic Enlightenment featured a primarily Scottish response to the Skeptical and Revolutionary Enlightenments that attempted to defend "the intelligible universe, clear and certain moral judgments, and progress." In May's reading, the Didactic Enlightenment took much greater precedence over the other strands of the Enlightenment as America moved into the nineteenth century.[41] In their analysis of Enlightenment works in American libraries, Lundberg and May find that the 1790s saw radicals like Condorcet and Common Sense writers like Thomas Reid make large gains in popularity. The Common Sense writers continued their ascent into the nineteenth century as Scottish Enlightenment thought became the template for many American college curricula.[42] Richard B. Sher expands on May and Lundberg's

40. David Lundberg and Henry F. May, "The Enlightened Reader in America," *American Quarterly* 28, no. 2 (Summer 1976): 262–93.
41. Henry F. May, *The Enlightenment in America* (New York: Oxford University Press, 1976), xvi.
42. Lundberg and May, "The Enlightened Reader in America," 270–71.

analysis in a consideration of Scottish authors and their publishers in eighteenth-century America. While May sees the Scottish Enlightenment beginning to dominate the American intellectual scene around the end of the eighteenth century, Sher argues for the Scottish Enlightenment wave reaching American shores around 1770.[43] For example, he finds that American publishers reprinted one in five books produced in the Scottish Enlightenment during the second half of the eighteenth century.[44] Following the end of the American Revolution, a contingent of Scottish and Irish booksellers and printers immigrated to Philadelphia seeking business opportunities. One of these bookmen, William Young, placed advertisements announcing the publication of some of Thomas Reid's works. Young and his fellows continued the spread of the Scottish Enlightenment that had begun around 1770.[45] The analysis of Enlightenment epistemology that follows finds significant representation for the Scottish Enlightenment, but it also considers spokesmen from the three other waves that May identifies. Locke, Newton, and Berkeley stand for the Moderate Enlightenment, Hume for the Skeptical, and Condorcet for the Revolutionary.

The following sections provide an overview of these thinkers' epistemologies by analyzing three aspects of their philosophical systems. First, each philosopher defined the raw materials of human knowledge. In other words, where and how could the mind gain access to evidence? The nature of these raw materials depended on each thinker's view of the existence of an external world outside of the mind. Second, each thinker gave an account of how the mind reasoned with evidence. How did the mind work with the raw materials of evidence to discover new truths or improve knowledge? Finally, as a case

43. Richard B. Sher, *The Enlightenment & the Book: Scottish Authors & Their Publishers in Eighteenth-Century Britain, Ireland, & America* (Chicago: University of Chicago Press, 2006), 594.
44. Ibid., 508.
45. Ibid., 541, 563–66.

study of these philosophers' varying approaches to knowledge, I consider how they dealt with a certain variety of evidence: human testimony. Could oral or written testimony about things beyond one's direct experience be regarded as creditable? Here, I analyze how each philosopher judged the authority of human testimony in advancing knowledge.

The Raw Materials of Knowledge

John Locke made his most complete statement on epistemology in *An Essay Concerning Human Understanding* (1689), which appeared in the library catalogs within the anthology *The Works of John Locke* (1727). For Locke, the mind formed ideas and manipulated these ideas through reason. He stressed that all of these ideas derived from experience; each human mind came into existence as "White Paper, void of all Characters, without any *Ideas*." Experience provided the mind with ideas in two distinct ways. First, the five senses gave men ideas of external objects. Second, each man's reflection on the operations of his own mind served as another source of ideas.[46]

Sensations produced in the mind by the external world gave clear assurance of the existence of things outside the mind, Locke argued. He explained that sensation provided men with simple ideas. In feeling a piece of ice, for example, a man received the simple ideas of coldness and hardness. Even though he experienced these two ideas together in touching the external object, his mind easily separated the two distinct simple ideas from each other.[47] Locke called "the Power to produce any *Idea* in our Mind" a "quality," and he divided these qualities into two categories. Primary qualities consisted of those that one could not remove from some object by dividing it into smaller and smaller pieces. Objects outside the mind possessed primary qualities like solidity, extension, motion (or

46. John Locke, *The Works of John Locke Esq.*, vol. 1 (London: Arthur Bettesworth, 1727), 32.
47. Ibid., 1:39.

lack thereof), and figure. Secondary qualities, in contrast, "are nothing in the Objects themselves, but Powers to produce various Sensations in us by their *Primary Qualities, i.e.* by the Bulk, Figure, Texture and Motion of their insensible Parts." According to Locke, then, the primary qualities of objects "*are really in them*." The secondary qualities differed from the primary ones because they arose from the particular configuration of the primary qualities and existed only in the mind. For example, when viewing a fire, its primary qualities of figure and motion had an actual, real, external existence that the mind could perceive. In contrast, the fire's heat, a secondary quality, arose from the particular configuration of its primary qualities, and humans experienced this particular configuration as a sensation that he or she called "heat." The fire's heat and other secondary qualities, therefore, were not really in the object; they were only in the mind.[48] Despite his argument that secondary qualities existed only in the mind, Locke batted away any suggestion that his account cast doubt upon the actual existence of external objects. Surely, Locke offered, actually viewing the sun presented the mind with a completely different perception of it than when one thought on the image of the sun at night. "We as plainly find the Difference there is between any *Idea* reviv'd in our Minds by our own Memory, and actually coming into our Minds by our Senses," he stated, "as we do between any two distinct *Ideas*." In the same way, actually being burned by fire had a completely different effect on the mind than dreaming of being burned by fire.[49]

Reflection provided the second means of producing simple ideas in the mind. Through reflection on his own mind, a man received the simple ideas of thinking and willing. Locke argued that once experience had provided a mind with simple ideas, the

48. Ibid., 1:47–48.
49. Ibid., 1:249.

mind could combine and rearrange these ideas in infinite ways, but it could not make new simple ideas out of whole cloth.[50] All human knowledge thus derived from experience and not from innate ideas prior to experience. Once the mind had stored up these simple ideas, it could create innumerable complex ideas by combining simple ideas together.[51] Ideas such as "Beauty," "Gratitude," and "a Man" served as examples of complex ideas made by uniting many simple ideas derived originally from sensation or reflection.[52]

At least two additional authors in the library catalogs closely followed Locke's scheme of empiricism. George Gregory's *The Economy of Nature Explained and Illustrated on the Principles of Modern Philosophy* (1796) reviewed a variety of topics in the sciences, including matter, electricity, and botany. The final section of this three-volume tome consisted of a discussion of the operations of the human mind. In this section, Gregory, a preacher, largely followed Locke's system of simple and complex ideas.[53] Isaac Watts's *The Improvement of the Mind* also appeared in the catalogs as a book of advice that reworked Locke's epistemology into a practical manual for self-improvement.[54] Unlike the more systematic treatments of epistemology from Locke and Gregory, Watts's book offered "hints" for those looking to expand their minds and improve their judgment.[55] We will consider Watts in greater detail later when we discuss accounts of the reliability of testimony.

50. Ibid., 1:32, 44.
51. Ibid., 1:39.
52. Ibid., 1:62.
53. G. Gregory, *The Economy of Nature Explained and Illustrated on the Principles of Modern Philosophy*, vol. 3 (London: J. Johnson, 1796), 464, 470–73.
54. Isaac Watts, *The Improvement of the Mind: Or, a Supplement to the Art of Logic: Containing a Variety of Remarks and Rules for the Attainment and Communication of Useful Knowledge in Religion, in the Sciences, and in Common Life* (London: J. Buckland and T. Longman, 1787), iv.
55. Ibid., x.

Like Locke, David Hume promulgated an empiricist account of knowledge, but he pushed this empiricism in a more radical direction. Hume's *An Enquiry Concerning Human Understanding* appeared in the library catalogs within the collection *Essays and Treatises on Several Subjects* (1768). In *Enquiry*, Hume agreed with Locke that all ideas originated in experience. For Hume, sensations supplied the mind with impressions, and these impressions gave rise to ideas, which were fainter copies of the original impression. "If you tell me, that any person is in love," Hume explained, "I easily understand your meaning, and form a just conception of his situation; but never can mistake that conception for the real disorders and agitations of the passion." In the same way, looking at an object supplied one with the impression of its appearance, and afterwards he or she could recall the idea of its appearance. The only difference between the impression and the idea, Hume asserted, was that the former was much livelier than the latter. Hume concurred with Locke that although the mind could combine and rearrange its ideas in any number of ways, it could not create new ideas on its own; it could only operate on "the materials afforded us by the senses and experience." Thinking of a "golden mountain," for instance, merely required the combination of two ideas already lodged in most men's minds: the idea of gold and the idea of a mountain.[56] Although Hume's system shared elements with Locke's, Hume made an important distinction between impressions and ideas that Locke did not. This feature of Hume's epistemology had dramatic consequences for his account of inductive reasoning, which will be discussed below.

Hume also differed with Locke on the question of the actual external existence of objects. Nearly all of mankind, Hume admitted, assumed that the objects that impressed

56. David Hume, *Essays and Treatises on Several Subjects*, vol. 2 (London: A. Millar, 1768), 16–18.

themselves on the senses had an actual existence regardless of whether a person currently perceived them or not. Strict attention to the operation of the mind, however, demonstrated that this assumption of real existences could not hold, for "the mind has never any thing present to it but the perceptions, and cannot possibly reach any experience of their connexion with objects."[57] This view could, Hume acknowledged, drive thinkers into an abyss of skepticism that doubted the mind's ability to discover a real world underneath humans' perceptions of the world. Hume preferred, however, to retreat to experience as the sole guide for human knowledge. If men of science only inferred the existence of something from inquiring into its effects and avoided *a priori* theorizing, they could have some confidence in their ability to uncover knowledge about the world.[58] We will discuss Hume's particular view of cause and effect below.

James Hutton's *An Investigation of the Principles of Knowledge* (1794) contained a critique of Locke and Hume's theories of knowledge. Hutton, known primarily for his work on geology, composed this three-volume treatise late in his life as a grand statement about the "progressive" improvement of knowledge.[59] In his discussion of the origin of ideas, Hutton revised Locke's account. In explaining his disagreement with Locke, Hutton turned to the example of a snowball. As Hutton explained, "Mr Locke says, a snow-ball has the power to produce in us the ideas of white, cold, and round; whereas he should have said, it has the power to produce the knowledge or sensation of white and cold; and that then the mind has the power to produce the idea of that knowledge."[60] Thus, Hutton used the term "knowledge" to represent the original sensations excited by

57. Ibid., 2:178.
58. Ibid., 2:189–90.
59. James Hutton, *An Investigation of the Principles of Knowledge, and of the Progress of Reason, from Sense to Science and Philosophy*, vol. 1 (Edinburgh: A. Strahan, and T. Cadell, 1794), 3.
60. Ibid., 1:320.

some object. In turn, the mind stored "ideas" that proceeded from the original knowledge garnered from sensation. In Hutton's account, an external thing had the power to effect a "passion" in the mind. "But of this external thing," he continued, "the mind has no farther knowledge or understanding, than that it is the cause of that which in sensation is known to the mind." Following the production of this primary knowledge (sensation), the mind took these raw sensations and produced ideas of such things as "extension, direction, magnitude, [and] figure." If we take the example of the snowball, Hutton would argue that the visual sensations excited by it entered our mind. Then, because we have had experience in exercising our optic faculty, we can know that the snowball takes up some space (extension) and that it is spherical (figure). Hutton called this act of knowing such things as extension and figure "perception." Finally, the mind could take a third step in the operation of what Hutton called "judgment." In exercising judgment, the mind used both the primary knowledge gained by sensation and the secondary knowledge gained through perception to create new ideas of such qualities as "solidity and compressibility, hardness and softness in bodies, and motion and rest in space."[61] Hutton thus strongly disagreed with Locke and Hume's schemes which saw all ideas as generated almost directly from experience, with little action on the part of the mind itself. According to Hutton, ideas of extension, magnitude, and figure were produced *within* the mind *following* the excitement of sensations. As a result, Hutton argued that although external things did have an actual existence outside the mind, such qualities as the extension, magnitude, and figure of these things had no real external existence. They were creations of the mind itself.

61. Ibid., 1:328–30, 340.

George Berkeley's 1734 edition of *A Treatise Concerning the Principles of Knowledge* appeared in Philadelphia and Boston libraries. His discussion of epistemology started from similar premises as Locke but took a completely different turn from there as Berkeley argued for the nonexistence of matter. The "Objects of Human Knowledge," Berkeley asserted, consisted of ideas formed by the senses or the operations of the mind and ideas formed by the memory or the recombination of other ideas. In addition to ideas, Berkeley asserted that there must exist some entity that received ideas and exercised its will in thinking on these ideas. Berkeley called this thing "*Mind*, *Spirit*, *Soul* or *my Self*."[62] So far, Berkeley's account of ideas resembled Locke's. But whereas Locke insisted on the actual external existence of objects (even though the secondary qualities of objects only existed in the mind), Berkeley argued that objects did not exist apart from a mind that perceived them. In other words, objects existed only as ideas. Thus, Berkeley only allowed for two kinds of entities in the world: ideas and spirits. To those who argued that ideas were copies or representations of external objects actually existing apart from the mind, Berkeley answered that "an Idea can be like nothing but an Idea."[63] This account of ideas, Berkeley argued, dispensed with Locke's classification of primary and secondary qualities. If every sensation the mind received was an idea, then Berkeley did not need to assume that the primary qualities of extension and figure really existed outside the mind while a secondary quality like color only existed within the mind. For Berkeley, both extension and color existed only as ideas within the mind.[64] At first blush, Berkeley's doctrine of immaterialism seemed to deny the very reality of an external world apart from the individual human mind. Berkeley, however, resisted this

62. George Berkeley, *A Treatise Concerning the Principles of Human Knowledge* (London: Jacob Tonson, 1734), 35–37.
63. Ibid., 41.
64. Ibid., 41–42.

interpretation of his account. “I do not argue against the Existence of any one thing that we can apprehend, either by Sense or Reflexion,” Berkeley wrote. He merely denied the existence of some underlying “Matter or corporeal Substance” that philosophers took to be the root physical cause of human sensations.[65] He went on to explain that just because one human mind did not perceive some object at a particular time did not mean that *all* minds did not perceive the object. Thus, Berkeley’s doctrine did not imply the continual annihilation and creation of objects in the world.[66] Furthermore, humans had no control over the sensations they experienced. Upon opening his eyes, a man could not help but see particular colors and shapes. A man could not will a desk to appear a different color or shape. Where, then, did the ideas associated with the desk come from if Berkeley denied the actual existence of matter? He answered that since ideas could only exist in a mind or spirit, these ideas of sensation within a man’s mind must be caused by some other spirit, which was God. The regularity and constancy of nature, Berkeley argued, pointed to the existence of a powerful and wise God who willed that natural laws should not change.[67]

Berkeley had criticized Locke’s epistemology for his insistence on the real existence of matter. A group of Scottish philosophers, disturbed by the implications of Hume’s revision of Locke, crafted their own response to Hume’s system. The Scotsman Thomas Reid took the lead in this response, and this philosophical movement came to be known as the Common Sense school. Reid and his acolyte, fellow Scotsman James Beattie, made multiple appearances in the library catalogs. In *Inquiry into the Human Mind* (1769), Reid attacked Hume’s theory of ideas as a sure route to skepticism, “which

65. Ibid., 63.
66. Ibid., 75.
67. Ibid., 163–67.

leaves no ground to believe any one thing rather than its contrary."[68] Through a discussion of the five senses, Reid argued that Hume's scheme of impressions that led to ideas missed a crucial operation that every sound mind undertook. For Hume, sensation gave the mind impressions, and these impressions gave rise to ideas, which were fainter copies of the original impressions. For Reid, sensation did not only generate some passion in the mind. Sensation also led almost instantaneously to the *belief* that the object of sensation had a real existence. As Reid argued, when he saw a tree, he could be assured of the present existence of the tree. If, later, he thought on the image of the tree, he could be assured of its past existence, but *not* of its present existence. Thus, Reid contended that Hume's scheme which defined ideas as merely less vivid impressions was highly flawed. The mind operated completely differently when it thought on a memory (or idea) of a visible tree than when it originally perceived the tree.[69] How exactly could a person know that what he or she perceived actually existed? Reid here appealed to the notion of Common Sense. Take the example of a person touching a hard pillar, Reid suggested. A man touching the pillar could feel that it was hard. But, the property of hardness, or "the firm cohesion of the parts of a body," was completely *unlike* the sensation of hardness that the man felt. Nonetheless, touching the hard pillar immediately compelled the man to believe that the pillar was actually hard. Reid concluded that "by an original principle of our constitution, a certain sensation of touch both suggests to the mind the conception of hardness, and creates the belief of it: or, in other words, that this sensation is a natural sign of hardness." He called this original principle man's Common Sense.[70] A man could not use reason or point to experience to argue for his belief, but he

68. Thomas Reid, *Inquiry into the Human Mind, on the Principles of Common Sense* (London: T. Cadell, 1769), v.
69. Ibid., 290.
70. Ibid., 83–86, 91.

believed nonetheless. James Beattie gave a more polemical version of Reid's argument in *An Essay on the Nature and Immutability of Truth* (1773). Beattie asserted that the foundational pieces of evidence in the various sciences could only stand on man's common sense. For example, in mathematics, all proofs stood on self-evident axioms that the mind immediately assented to without rigorous demonstration. "Who will pretend to prove a mathematical axiom," Beattie asked, "That a whole is greater than a part, or, That things equal to one and same thing are equal to one another?"[71] In the same manner, no one could prove that man's senses gave him information about real things actually existing in the world, yet men naturally believed the evidence of their senses.[72] Reid and Beattie thus struck back against what they saw as the overly skeptical epistemologies of Locke and Hume.

The Marquis de Condorcet provided a Continental flavor to the mostly British epistemological tradition that appeared in the libraries. Philadelphia and Boston libraries held copies of Condorcet's *Outlines of an Historical View of the Progress of the Human Mind* (1795). Formally, Condorcet's epistemology differed little from Locke's, and he cited the Englishman several times in this treatise. He broke from Locke and other British thinkers, however, in his supreme confidence that mathematical frameworks could lead to unlimited progress in the sciences. In the introduction of *Outlines*, Condorcet gave a restatement of Locke's theory of ideas. Humans had the ability to experience sensations, and they could separate out these sensations into simple ones. These simple ideas could then be recalled by memory and combined in any number of ways within the mind. Condorcet made clear that "external objects" gave rise to "certain complex sensations,

71. James Beattie, *An Essay on the Nature and Immutability of Truth, in Opposition to Sophistry and Scepticism* (London: Edward and Charles Dilly, 1773), 59.
72. Ibid., 64–65.

the constancy of which, whether in their identical whole, or in the laws of their change, is independent of himself [man]." Thus, like Locke, Condorcet had no doubt of the actual physical existence of an external world apart from the mind.[73] The rest of *Outlines* consisted of Condorcet's history of human progress, which he divided into nine epochs, from the formation of hunter-gatherer hordes to the founding of the French Republic. Returning to Locke in the ninth epoch of his narrative, Condorcet declared him "the first who ventured to prescribe the limits of the human understanding, or rather to determine the nature of the truths it can ascertain and the objects it can embrace." Locke's method, Condorcet argued, led to improvements in many sciences, including those of politics and morality.[74] Condorcet also signaled his opposition to the Common Sense school. Scottish philosophers, according to Condorcet, "attributed to the human soul a new faculty, distinct from those of sensation and reason, though at the same time combining itself with them; of the existence of which could advance no other proof, than that is was impossible to form a consistent theory without it."[75] For Condorcet, this *a priori* assumption of the existence of the Common Sense faculty within each person did not meet the test of reason.

Reasoning

Once the mind had gathered raw materials in the form of sensations, impressions, and ideas, how did the mind work with these materials to improve knowledge? Each thinker provided his own account of reasoning.

For Locke, humans could gain knowledge only by perceiving "*the Connection and Agreement, or Disagreement and Repugnancy of any of our Ideas*." Locke identified

73. M. de Condorcet, *Outlines of an Historical View of the Progress of the Human Mind* (London: J. Johnson, 1795), 1–2.
74. Ibid., 242–43.
75. Ibid., 245.

four kinds of agreement or disagreement. First, the mind naturally perceived that a single idea agreed with itself and that other ideas were *not* this idea. Locke provided the proposition "*Blue is not Yellow*" as an example of this kind of (dis)agreement. Second, the mind noted various connections between its many ideas, even if the ideas themselves were distinct. For example, "*Two Triangles upon equal Bases between two Parallels are equal*." Third, the mind took notice of ideas that co-existed with each other. For example, the complex idea "gold" arose from the nearly constant conjunction of "Yellowness, Weight, Fusibility, [and] Malleableness" in the substance that humans called "gold." Fourth, the mind could perceive whether or not an idea referred to something that had a real existence outside of the mind. Locke offered "*GOD is*" as an example of this kind of proposition.[76]

Locke divided this knowledge of the agreement or disagreement of ideas into three categories. The first and most basic kind of knowledge was called "intuitive." The mind grasped this intuitive knowledge immediately, without the assistance of intermediate ideas. In geometry, the proposition that a triangle is not a circle served as an example of intuitive knowledge. In contrast, "demonstrative knowledge" required "reasoning," or the construction of a chain of intermediate ideas to arrive at this knowledge. Thus, the proposition that the three angles of a triangle are equal to two right angles needed several intermediate geometrical ideas to prove its truthfulness. Locke made sure to emphasize, however, that "every step in Reasoning that produces Knowledge, has intuitive Certainty." In this way, although the proposition about the angles of a triangle required several steps of agreement in various ideas to prove it, humans could have just as much certainty about its truthfulness as the intuitive

76. Locke, *Works*, 1:243–44.

proposition that a triangle is not a circle. Third and finally, Locke identified "sensitive knowledge" as that which gave humans assurance that an external object actually existed. Because sensitive knowledge could only tell humans that something had a real existence (the fourth kind of agreement or disagreement of ideas), it reached to a lesser extent than intuitive or demonstrative knowledge.[77]

Elaborating on the nature of this sensitive knowledge, Locke raised considerable doubt about the ability of humans to discover certain knowledge about the physical world. Although the senses provided humans with knowledge that things existed outside of the mind, the senses could not form a chain of ideas that led to certainty about the nature of the physical realm. Take for example the substance humans called "gold." As previously stated, humans gave the name "gold" to a substance that excited in observers several simple ideas together (yellowness, malleableness, fusibility, etc.). Crucially, however, "No one, I think, by the Colour that is in any Body, can certainly know what Smell, Taste, Sound, or tangible Qualities it has, nor what Alterations it is capable to make or receive, on or from other Bodies."[78] Or, in other words, for each simple idea excited by a substance, there existed "no visible necessary Connection or Inconsistency with any other simple *Ideas*, whose *Co-existence* with them we would inform our selves about."[79] Unlike the inescapable truth that the three angles of a triangle are equal to two right angles, ideas about the physical world, such as the laws of motion, had no necessary connection between each other.[80] In fact, humans could imagine any number of consistent laws that governed the operations of the physical world, but these imaginary laws could nevertheless have no resemblance to the real world as revealed by sensation. Locke

77. Ibid., 1:246–50.
78. Ibid., 1:273.
79. Ibid., 1:253.
80. Ibid., 1:260.

therefore argued that "all our complex ideas of them [substances] must be such, and such only, as are made up of such simple ones, as have been discover'd to co-exist in Nature."[81] Summing up his doubt about the ability of humans to achieve certain knowledge of the physical realm, Locke stated that "This way of getting, and *improving our Knowledge in Substances only by Experience* and History...makes me suspect, that natural Philosophy is not capable of being made a Science. We are able, I imagine, to reach very little general Knowledge concerning the Species of Bodies, and their several Properties."[82] For the most part, this method of improving natural philosophy by experiment and history could lead only to less-than-certain "probability," not knowledge.[83] In contrast, however, Locke expressed great confidence that moral science could yield definite truths. If only everyone agreed on what specific complex ideas words like "justice" and "property" referred to, reasoning could result in unquestionable truths. "*Where there is no Property, there is no Injustice*, is a Proposition as certain as any demonstration in *Euclid*," Locke argued.[84]

Locke thus revealed an important difference in his account of the use of reason in moral philosophy and natural philosophy. Although Locke did not employ the word "induction" to refer to the use of reason in natural philosophy, he clearly held that humans could only achieve an understanding of the physical world through experiments and observations that took note of things and qualities that appeared together. For Locke, because no necessary connection existed between the qualities of some substance or the particular features of the laws of motion, natural philosophers had to make do with an experimental and historical account of the behavior of physical bodies, which could only

81. Ibid., 1:264–65.
82. Ibid., 1:303.
83. Ibid., 1:253–54.
84. Ibid., 1:255–56, 304.

aspire to probability, not knowledge. In moral philosophy and mathematics, in contrast, the use of deductive reasoning to chain ideas together could lead to certainty, or knowledge.

George Gregory largely followed Locke's account of reasoning. "Reasoning may be defined as a chain of judgments, following and depending upon one another, by which some general conclusion is attempted," he wrote.[85] Taking issue with the Common Sense philosophers, Gregory agreed with Locke that all ideas and knowledge derived ultimately from experience and not from instinct or Common Sense. The propositions that Common Sense philosophers argued were based in Common Sense were actually just very closely related to common experience. "Thus, 'that things equal to the same thing are equal to one another;' 'that nothing material exists without a cause;' 'that, therefore, this world has a first cause,' and such like, are propositions immediately connected with experience, and therefore admitted without hesitation," Gregory asserted. In contrast, the proposition that the three angles of a triangle are equal to two right angles required a chain of reasoning to prove its truthfulness.[86] Gregory warned of the danger in using "analogical reasoning," in which humans put forth propositions based on "the resembling parts of complex ideas." As an example, Gregory turned to David Hartley's consideration of the operations of the stomach in different animals. A claim about the stomach in an animal based on the known actions of the stomach in some other animal could only be trusted to the extent that the animals resembled each other. Any sort of difference between the animals diminished the strength of this analogical reasoning. But, as Hartley argued, "If, on examination, the stomach, way of feeding, &c. of the second animal should be found, to sense, the same as

85. Gregory, *Economy of Nature*, 3:532.
86. Ibid., 3:534–35.

the first, the analogy might be considered as an induction, properly so called, at least as approaching to it."[87]

In his account of the operation of reason, Hume put forth a great skepticism regarding the ability of human beings to achieve certainty in any part of knowledge. Recall that Hume allowed for only two sorts of materials within the mind; sensation provided the mind with impressions, and ideas were simply less vivid copies of the original impressions. Similar to Locke, he defined three ways in which humans associated ideas with other ideas. First, the principle of "resemblance" referred to the similarity of some idea with another. For example, "a picture naturally leads our thoughts to the original." Second, the mind took note of "*Contiguity* in time or place." Recalling a single apartment in some building, for example, led the mind to think on the other apartments in that building. Third and finally, humans associated ideas through the principle of "*Cause* or *Effect*." Hume provided the example that "if we think of a wound, we can scarce forbear reflecting on the pain which follows it."[88]

Hume spent much of *Enquiry* examining the principle of cause and effect because of its relationship with "matters of fact." A matter of fact, Hume argued, referred to a proposition that asserted the actual existence of some object. Matters of fact stood in contrast to "relations of ideas" in that the opposite of some matter of fact was not false on its face. The propositions of geometry, therefore, constituted relations of ideas that were true because their opposite would be absurd. In contrast, one could assert the matter of fact "*that the sun will not rise tomorrow*" without logically contradicting him- or herself. "All reasonings concerning matter of fact seem to be founded in the relation of *Cause* and

87. Ibid., 3:536–37.
88. Hume, *Essays and Treatises on Several Subjects*, 2:24.

Effect," Hume stated. Thus, for example, a man could be reasonably certain that his friend was in Paris (a matter of fact) because he received a letter from the friend (the friend was the cause of the letter).[89]

But how, Hume asked, did the mind arrive at this knowledge of cause and effect which allowed for proposing matters of fact? After all, there existed no necessary connection between some apparent cause and some apparent effect. Take, for example, a human's willingness to eat an object that resembled bread and his or her expectation that eating the object would provide sustenance. No one could point to any necessary connection between the "sensible qualities" of bread and the "secret powers" which led to nourishment. Nevertheless, most humans would not hesitate to eat the bread-like substance, and they would anticipate that eating it would be attended with the nourishment that they had experienced in the past from a similar object. As Hume summarized, no necessary connection existed between these two general propositions: "*I have found that such an object has always been attended with such an effect*, and *I foresee, that other objects, which are, in appearance, similar, will be attended with similar effects*." Indeed, why could humans assume that the future would resemble the past? The underlying nature of the world could conceivably change without their taking notice.[90]

Hume proposed to solve these discomfiting doubts by appealing to "Custom or Habit." Many observed instances of the conjunction of a supposed cause and a supposed effect resulted in a more firm belief that the two objects were connected. Matters of fact thus differed essentially from what humans called "fiction" in that "whenever any object

89. Ibid., 2:34–35.
90. Ibid., 2:43–44, 48–49.

is presented to the memory or senses, it immediately, by force of custom, carries the imagination to conceive that object, which is usually conjoined to it; and this conception is attended with a feeling or sentiment, different from the loose reveries of the fancy." Or, to put the point even more strongly, "belief is nothing but a more vivid, lively, firm, steady conception of an object, than what the imagination alone is ever able to attain."[91] This explanation of the origin of the knowledge of cause and effect, Hume argued, demonstrated why humans believed something more strongly when they had experienced many instances of it. "The concurrence of these several views or glimpses imprints its idea more strongly on the imagination; gives it superior force and vigour; renders its influence on the passions and affections more sensible; and in a word, begets that reliance and security, which constitutes the nature of belief and opinion," he concluded.[92] Returning to Hume's scheme of impressions and ideas, these repeated observations imprinted the objects more strongly on the human mind. As an example of this habit of mind, Hume provided the following:

> When a sword is levelled at my breast, does not the idea of wound and pain strike me more strongly, than when a glass of wine is presented to me, even though by accident this idea should occur after the appearance of the latter object? But what is there in this whole matter to cause such a strong conception, except only a present object and a customary transition to the idea of another object, which we have been accustomed to conjoin with the former?[93]

Hume's epistemology thus provided a defense of induction in the sciences. All human knowledge about the external world, including both studies of human nature and of matter, derived from repeated observations of conjoined objects. Philosophers, therefore,

91. Ibid., 2:54–61.
92. Ibid., 2:70.
93. Ibid., 2:66–67.

could never discover some root metaphysical cause for some phenomenon in nature. At most, they could say that some object was almost always attended with some other object. Little wonder, then, that Hume's critics bemoaned the "scepticism" at the heart of his philosophy.[94]

Whereas Locke and Hume expressed varying degrees of skepticism regarding man's ability to achieve certain knowledge of the external world, Hutton gave a more optimistic account of the power of human reason. As the title (*An Investigation of the Principles of Knowledge, and of the Progress of Reason, from Sense to Science and Philosophy*) of Hutton's treatise proposed, he viewed the human race as proceeding from simple sensation to science and finally to philosophy. Before reviewing the particulars of Hutton's account of this progress through reason, we should note the fundamental distinction that Hutton made between the knowledge of animals and that of man. Animals, Hutton argued, had the capacity to reason, reflect, and know.[95] The operations of an animal's mind, however, were purely instinctive. An animal burned once by fire would avoid it for the rest of its life simply because it associated the fire with the pain it experienced.[96] Man also reasoned instinctively, but he could rise above the simple operations of the mind that animals performed. Hutton argued that "man...is only superior in relation to the animal, or is properly man, in knowing himself; and this is the knowledge which, it is here, advanced, is only to be acquired in reflecting upon the operations of his own mind."[97] Only in knowing the general principles by which he reasoned, Hutton argued, could man progress in knowledge.

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94. Beattie, *An Essay on the Nature and Immutability of Truth*, 14.
95. Hutton, *Investigation of the Principles of Knowledge*, 1794, 1:4.
96. James Hutton, *An Investigation of the Principles of Knowledge, and of the Progress of Reason, from Sense to Science and Philosophy*, vol. 2 (Edinburgh: A. Strahan, and T. Cadell, 1794), 195.
97. Hutton, *Investigation of the Principles of Knowledge*, 1794, 1:10.

We have already reviewed Hutton's response to Locke's theory of ideas, in which Hutton argued that reason took the raw materials provided by sensation and formed ideas like figure and extension. Figure and extension, therefore, were not inherent qualities of an external thing but ideas formed within the mind *after* sensation. For Hutton, human knowledge proceeded progressively from the simple knowledge of sensation to the general knowledge of "science." Hutton defined science as the generalization of one's *ideas* as opposed to one's simple sensations.[98] For example, by comparing three quantities, A, B, and C, one could form a judgment about their relation to each other. So one could determine that A was equal to B and that B was equal to C, but "no number or repetition of those opinions are here considered as producing science." One only advanced to science when one considered the two relationships together (A=B and B=C) and thus came to the realization that A=C.[99] Hutton offered an additional example of this process in a discussion of humans' ideas of color. Through observing the apparent color in objects around them, humans could obtain a general abstract idea of the color green, for instance. The idea of *green* was general in that anything we see might have the color green in it, and the idea was abstract in that it was not, strictly speaking, a "*thing*," but "only an *idea* in our mind." From this understanding of the idea of green, the mind could take a further step of generalization and produce the universal idea of *color* itself. "Thus we say," Hutton explained, "*What colour has such a body?* And this is the voice of science; or we say, *That every body which is perceived by means of sight, must have a colour*; and this is a general physical principle, or an abstract scientific proposition." As a result, Hutton argued that humans attained science only if they reasoned about the ideas

98. Ibid., 1:19–20.
99. Ibid., 1:22.

in their minds, not about actual physical things in the world. As he put it, "science, therefore, is the judging of pure relations, distinct from actual things, or independent of that knowledge which is considered as constituting the reality of things."[100] Finally, following the attainment of science, humans could proceed on to "philosophy." Hutton argued that "philosophy is the application of science, in the exercise of wisdom. Wisdom is the conception of an action which is leading to an end." In order to achieve philosophy, humans needed to combine several sciences, for achieving some end required more than just an understanding of the relation between things. Thus, "the philosophy of moving things...requires the science of space, time, and number, in order to ascertain the directions and velocities of moving bodies."[101] Hutton saw human reason as proceeding progressively from the particular (sensations of things) to science (generalizations about the relations between things) and finally to philosophy (the application of the sciences in order to achieve some end).

Hutton also took issue with Hume's account of how humans come to have knowledge of cause and effect. Hume had argued that knowledge of the relation between cause and effect arose purely through experience by the mechanism of custom or habit. Hutton, in contrast, contended that reason played a vital role in producing the knowledge of cause and effect. Take the example of one object striking another object, Hutton proposed. The first object strikes the second object, and following the collision the first object stops its motion while the second object moves. Hutton argued that the perception of the first object's causing the motion of the second object could *not* be a result of simple sensation. In order to obtain the idea that some power in the first object caused the

100. Ibid., 1:496–97.
101. Ibid., 1:23–24.

motion of the second, a person needed to hold the memory of the first object's changing its position in his or her mind while he or she observed the second object's changing position. Indeed, the very idea of motion itself could only arise through the use of reason, as the mind pieced together several images of the object to perceive that the object had changed position. Thus, the determination that the first object caused the second object to move could only result from the use of reason on the original materials garnered from sensation. In sum, then, Hume's argument that the knowledge of cause and effect arose purely from experience could not hold.[102]

Out of all the authors reviewed so far, Berkeley perhaps gave the most strident defense of the method of inductive reasoning which formed conclusions based on the consideration of many particulars. Berkeley revealed his doubts about the reliability of deductive reasoning in his denial of the existence of abstract ideas. Whereas Locke had insisted on the ability of the human mind to abstract simple ideas from other ideas, Berkeley found he was incapable of doing so. For example, Berkeley found it impossible to think of pure motion in the abstract; he insisted that when he thought about motion, he always imagined a particular body with some color, extension, and figure changing its position.[103] Along the same lines, Berkeley expressed doubts about the ability of mathematics to provide an accurate portrayal of ideas. Arithmetic, Berkeley argued, was merely a system of signs used to represent things, akin to a written language. Any kind of mathematical inquiry in which philosophers used numbers in the abstract without having them represent actual ideas was analogous to mere wordplay that failed to discourse about the ideas that words were supposed to represent.[104] In the same way that Berkeley

102. Hutton, *Investigation of the Principles of Knowledge*, 1794, 2:180–95.
103. Berkeley, *A Treatise Concerning the Principles of Human Knowledge*, 11–15.
104. Ibid., 140–43.

attacked the existence of a corporeal substance that purportedly supported the sensations that humans experienced, he objected to abstract mathematics because, he argued, such investigations went beyond the ideas received from sensation or reflection and posited the real existence of something that was not observable by the mind.

Berkeley thus offered a defense of strict induction in the sciences. Returning to his argument that the mind of God willed certain ideas to arise in humans' minds, Berkeley explained that "the set Rules or established Methods, wherein the Mind we depend on excites in us the Ideas of Sense, are called the *Laws of Nature:* And these we learn by Experience, which teaches us that such and such ideas are attended with such and such other Ideas, in the ordinary course of Things."[105] Speaking specifically about natural philosophy, Berkeley contended that this enterprise consisted merely of "an Induction of Particulars" that resulted in a more complete and accurate description of how bodies behaved.[106] Natural philosophers flattered themselves, Berkeley asserted, when they pretended to have uncovered some natural cause of phenomena. In truth, he claimed, "there is no other Agent or efficient Cause than *Spirit*," and in the case of the study of nature, this efficient cause was God, not some hypothetical entity like matter. Take for example the theory of universal attraction promulgated by Newton. Berkeley argued that attraction merely described the behavior of some kinds of bodies; it could not be a root cause of this behavior. Truly, he continued, claiming that the principle of attraction was inherent in every body took the theory entirely too far, for "in some Instances a quite contrary Principle seems to shew it self: as in the perpendicular Growth of Plants, and the Elasticity of the Air." Berkeley concluded that "it seems beneath the

105. Ibid., 59.
106. Ibid., 76.

Dignity of the Mind to affect an Exactness in reducing each particular *Phaenomenon* to general Rules."[107] Thus, Berkeley made his case for a strict induction that took nothing for granted but the existence of ideas and minds. Even the assumption of underlying corporeal substance could not be admitted in philosophy. Furthermore, philosophers had to take care not to extend their descriptions of phenomena too far so as to think that they had discovered a universal causal principle for all observable things, for the only cause for phenomena in nature was God.

Reid and Beattie gave an account of reasoning that made it subservient to Common Sense. As Reid argued, reasoning acted from the "first principles" that humans received from their Common Sense.[108] To return once again to the example of mathematics, Reid argued that the "axioms" of that science could not be proved with reason. A man believed that things equal to the same thing are equal to each other because his Common Sense could not allow him to think otherwise. Reason operated on these axioms to produce "propositions," such as the theorems about triangles that we have discussed above. In a similar manner, reason operated on the raw materials of perception to deduce truths about physical objects. For example, Reid perceived the moon to be different shapes at different times. "But from these various appearances of her [the moon's] enlightened part," Reid insisted, "I infer that she is really of a spherical figure." He came to this conclusion by using his reason to combine the several observations of the moon at different times. This conclusion, however, did not demonstrate that the senses were untrustworthy, just imperfect. Reid utilized evidence gained through several instances of perception, after all, to reason about the moon's real

107. Ibid., 122–28.
108. Reid, *Inquiry into the Human Mind*, 111.

shape.[109] Thus, for Reid, all reasoning ultimately proceeded from the foundation of Common Sense. In this way, he differed significantly from Locke and especially Hume, who declared that experience formed the foundation for all reasoning.

Reid made his break with Hume most dramatically in his discussion of how human beings came to the knowledge of cause and effect. Like Hume, Reid also considered the question of why humans assumed that similar causes would produce similar effects in the present *and* in the future. This understanding, Reid argued, could not result from comparing ideas (Locke) or from experience (Hume). Instead, Reid located the origin of this understanding in human instinct, or Common Sense. Consider the example of knowing that "a certain degree of cold" would freeze water. A person could surely not compare his ideas of cold and hardened water to obtain this knowledge because these two objects had no necessary connection between them. Experience might show that cold froze water *today*, but why must this cause operate in the same way in the future? Only the existence of some instinct in every person could explain why human beings felt justified in the belief that the future would resemble the past, and that therefore experience could indeed provide a guide for future conduct. No argument from reason could support this assumption; only Common Sense could provide a solid foundation for this belief. Reid labeled this belief in the "constancy of nature's laws" the "inductive principle." As Reid explained, obtaining knowledge of nature was like learning a language; as a person gained more experience in studying nature, he or she paid less attention to the sensations (the sound of words) he or she experienced and went immediately to the things signified (the meaning of the words) by sensations. "For *effects* and *causes*, in the operations of nature, mean nothing but signs, and the things signified

109. Ibid., 297.

by them," Reid argued. "We perceive no proper causality or efficiency in any natural cause; but only a connection established by the course of nature between it and what is called its effect."[110] Thus, although Reid disagreed strongly with Hume as to the justification for humans' knowledge of cause and effect, both of them defended a highly inductive method of natural philosophy, in which philosophers developed an experimental and historical account of the physical world.

Condorcet's account of human reasoning emphasized the creation of mathematical theories that explained natural and human phenomena. Throughout *Outlines*, he continually attacked those philosophers who used the authority of authors (particularly ancient Greek authors) rather than the authority of reason to support their claims. In his narration of the rise of printing in the West, for example, Condorcet noted that although printing made knowledge more transferable and accessible than before, "a proposition was not adopted because it was true, but because it was written in this or that book, and had been embraced in such a country and such an age." Thinkers failed to study nature itself and instead relied on the authority of books.[111] Indeed, Condorcet held that many ancient authors held up as authorities had practiced a primitive "empirical" science that failed to achieve "a true theory founded upon general principles, drawn from nature, and acknowledged by reason."[112] Newton, Condorcet argued, dispensed with this slipshod empiricism by enunciating the true method of the sciences. "He taught men to admit in natural philosophy no other theories but such as are precise, and susceptible of calculation," Condorcet explained, "which give an account not only of the existence of a phenomenon, but its quantity and extent."[113] The efforts of Newton and mechanical

110. Ibid., 342–47.
111. Condorcet, *Outlines*, 175.
112. Ibid., 89, 101, 102–3.
113. Ibid., 274.

philosophers like Alembert transformed natural philosophy into "nothing more than the art of interrogating nature by experiment, for the purpose of afterwards deducing more general facts by computation."[114] Although some men railed against the usefulness of mathematical theories in practical fields of application, Condorcet assured his readers that "it is not to the profundity of these theories, but, on the contrary, to their imperfection, that we ought to attribute the inutility or unhappy effects of so many useless applications." "In all the arts," he continued, "the results of theory are necessarily modified in practice," but this was no reason to dispense with theories that retarded the progress of the arts.[115] Finally, Condorcet advocated the creation of a "universal language" that could communicate "the theory of a science or the rules of an art" and "an account of a new experiment or a new observation."[116] The gradual improvement of this universal language would result in unlimited scientific progress. "Then would the march of every science," Condorcet proclaimed, "be as infallible as that of the mathematics, and the propositions of every system acquire, as far as nature will admit, geometrical demonstration and certainty."[117] Thus, to a far greater extent than the British empiricists, Condorcet advocated the construction of mathematical theories in all departments of science. He denigrated an empirical method that stressed the collection of facts over the creation of theories. Such fact collection was necessary, he admitted, but it was of little use without the further step of rationalizing these facts by expressing them in a generalized mathematical framework.

114. Ibid., 277.
115. Ibid., 290–91.
116. Ibid., 363–64.
117. Ibid., 366.

The Authority of Testimony

Until now, we have considered the basic elements of each philosopher's epistemology. In this section, we will examine the application of these theories of knowledge to a particular type of evidence: human testimony. Could oral or written reports be a creditable source of knowledge?

Locke, in his discussion of humans' knowledge of the physical realm, argued that in most cases a natural philosopher had to make do with less-than-certain probability, not knowledge, because a person could not produce a chain of ideas about physical things that were necessarily connected with each other. He analyzed the authority of human testimony in a similar manner. Locke defined two "grounds" for probability. First, a person could declare a proposition probable if it lined up with his or her own "Knowledge, Observation, and Experience." Second, a person could make a judgment about the probability of a proposition based on "the Testimony of others, vouching their Observation and Experience." In determining the credibility of testimony, a person needed to consider several factors: "1. The Number [of testimonies]. 2. The Integrity [of the testifiers]. 3. The Skill of the Witness. 4. The Design of the Author, where it is a Testimony out of a Book cited. 5. The Consistency of the Parts, and Circumstances of the Relation. 6. Contrary Testimonies." As an example, Locke asserted that if he saw a man walk on ice, "it is past *Probability*, 'tis Knowledge." If another person told Locke that he saw a man walking on frozen water in England during the winter, "this has so great Conformity with what is usually observ'd to happen, that I am dispos'd by the Nature of the thing it self to assent to it." But now, Locke continued, consider the reaction to this report of a man who has lived his whole life in a tropical region. In this case, the tropical

man could not combine his own experience with the report to conclude that the report was very likely true. To determine the probability of the report's truthfulness, the tropical man could only rely on the six criteria of credibility for testimony. In sum, then, human testimony could only provide grounds for judging a proposition to be more or less probable; testimony, combined with one's own observations, might make some proposition extremely probable, but it could not result in certain knowledge.[118]

Isaac Watts presented a similar analysis of the authority of human testimony in leading to knowledge. He emphasized the reliability of certain information gained second-hand, without direct observation or a conformity with nature. Testimony, whether written or oral, could be relied upon as a source of truth if it came from "wise and honest men" or "the concurring witnesses of multitudes who have seen and known what they relate." Thus, Watts could say with "moral certainty" that "the tea plant grows in China" and "the Emperor of the Turks lives at Constantinople."[119]

Hume also considered the issue of whether the testimony of others could be a reliable source of knowledge. Holding fast to the idea that all ideas and knowledge originated in experience, Hume argued that one trusted the testimony of others if that testimony accorded with his previous experience. For example, if a man knew through experience that the person testifying was trustworthy, he was more likely to believe him. Alternatively, if the content of the testimony seemed likely to be true based on previous experience, then again the hearer was more likely to believe it. Thus, for Hume, testimony presented the same problem as evidence based on a person's own senses; there existed no necessary connection between what "really" happened and a person's report of

118. Locke, *Works*, 1:308–9.
119. Watts, *Improvement of the Mind*, 393–94.

what happened. A person could only justify his belief in the truthfulness of some testimony by appealing to his "observation of the veracity of human testimony, and of the usual conformity of facts to the reports of witnesses."[120]

Hutton also expressed skepticism about the authority of human testimony. A "perfect judgment" about some subject could only result from "data that are complete." Anything short of complete data could only lead to "probability, where conjecture in some degree takes place." He concluded that testimony "should be examined in reason with regard to its credibility." But one could only form a certain judgment of the credibility of testimony from complete data. Lacking this, one could only speak of a probability, not a perfect judgment, that the testimony was trustworthy or not.[121]

Although Locke, Watts, Hume, and Hutton put forward slightly contrasting versions of empiricist epistemology, when they turned to the issue of the authority of human testimony, they generally argued that testimony could only result in something less than absolute truth. The Common Sense philosophers, however, presented a much more optimistic account of the trustworthiness of human testimony which centered on the natural instinct of a person to trust other people. In the same manner as his discussion of mathematical axioms and sensory perception, Reid argued that an original instinct in all persons gave them a propensity to speak truth and a willingness to believe what others said. Just as making any conclusion about the operation of cause and effect would be impossible if the underlying nature of the world constantly changed, human society could simply not endure if this instinct did not exist. To bolster this point, Reid pointed to the general credulousness of children. Only as they grew older and gained experience did

120. Hume, *Essays and Treatises on Several Subjects*, 2:130; Nicholas Wolterstorff, *Thomas Reid and the Story of Epistemology* (Cambridge: Cambridge University Press, 2001), 179.
121. Hutton, *Investigation of the Principles of Knowledge*, 1794, 2:275–78; Wolterstorff, *Thomas Reid*, 173–84.

they start to become more suspicious of the truth of testimony. If Hume was correct that people trust testimony because they have experience that it was trustworthy, then "children...would be absolutely incredulous; and therefore absolutely incapable of instruction" because they would have very little experience in judging the trustworthiness of testimony. Yes, Reid admitted, human beings could lie and obfuscate, but these were learned behaviors that employed the operations of reason. As people grew older, they also learned to use their reason to judge the credibility of particular testimonies. Experience thus provided people with beliefs that guided their judgment of the truth of testimony, but the original instinct to trust the testimony of others originated in Common Sense, not experience. Indeed, how could everyday life proceed at all if people in their normal dealings did not trust the word of others? They certainly could not rigorously investigate every last statement for demonstrable veracity.[122] Beattie recounted many of these same arguments in his defense of testimony as a source of truth. Additionally, he pointed out that if testimony was doubted as a creditable source of evidence, then the entire edifice of natural philosophy, "a science not inferior to pure mathematics in the certainty of its conclusions," came crumbling down because, in that science, "testimony is admitted as a sufficient proof of many facts."[123] For their part, Locke and Hume would almost certainly argue that natural philosophy's reliance on testimony meant that its conclusions could *not* aspire to the certainty of pure mathematics.

In this brief overview of the Enlightenment works on epistemology in early American libraries, we can divide the British works into two general categories. First, Locke inaugurated what might be labeled the classical British empiricist tradition. This

122. Reid, *Inquiry into the Human Mind*, 336–41.
123. Beattie, *An Essay on the Nature and Immutability of Truth*, 131.

group of authors, which included Hume and Hutton, sought to develop a system of epistemology that explained how the human mind operated on the ideas gained through sensation or reflection. Although Locke, Hume, and Hutton differed on such issues as the origin of ideas and the role of reason in shaping ideas, they all trained their focus on the creation and manipulation of *ideas within the mind*. As all three pointed out repeatedly, the connection between external objects and humans' ideas about those external objects was extremely problematic; Locke went so far as to doubt the potential of natural philosophy to become a science that could produce definite truths. Certainty could only be found in reasoning about one's *ideas*, not in attempting to tailor one's ideas to fit the external physical world.

Reid and Beattie represented the second group of authors, the Common Sense philosophers. In contrast with the classical empiricists, the Common Sense philosophers expressed much greater confidence in the ability of the human mind to discover certainty about the external world. By arguing that all knowledge ultimately rested on principles of Common Sense that could not be defended by an appeal to reason, these philosophers avoided the skeptical musings of Hume, who could abide no direct and necessary connection between external objects and passions of the mind.

Despite these differences between the two groups, operationally their two rival epistemologies worked in an extremely similar manner. Take Reid and Hume, for instance. Reid argued that Common Sense provided persons with an original understanding that nature would remain constant. Therefore, inductive reasoning about the operations of the natural world was a perfectly legitimate means of investigation. Hume, in contrast, grounded the belief in the constancy of nature's laws purely in

experience, not in instinct. However, Hume also contended that inductive reasoning was the only means of pursuing knowledge of nature, for the only way to achieve something resembling certainty was to observe which objects were constantly conjoined with one another. Thus, despite the contrasting foundations of each theory, they remained operationally very similar in their prescriptions for producing knowledge.

Which Newton?

As the towering symbol of modern natural philosophy, Isaac Newton made his mark throughout the library catalogs. His *Principia Mathematica* and *Opticks* appeared in several of the libraries, and these works were accompanied by separate commentaries on Newton's philosophy by Colin Maclaurin, professor of mathematics at the University of Edinburgh, and Henry Pemberton, an English physician (see table 2.2). In addition, the philosophers of mind invoked Newton's illustrious name to support their accounts of human knowledge. A review of Newton's presence in early American library catalogs provides another window onto the particular discourse about epistemology that Americans imbibed in the late Enlightenment. Through commentaries on Newton and Newton's presence in the philosophy of mind literature, Americans received a summary of his work that emphasized two aspects of his philosophy. First, Newton rejected hypotheses in favor of practicing a strict induction from observations to general principles. Second, Newton's mastery of geometry allowed him to penetrate the secrets of nature in a more precise manner than a philosopher who relied only on simple observation.

In explaining Newton's achievement to their audiences, authors argued that he had exceeded the natural philosophy of the ancients by proceeding from observations to

general principles, not the other way around. Pemberton claimed that the ancient authorities on natural philosophy "[framed] conjectures; and if upon comparing them with things, there appeared some kind of agreement, though very imperfect, it was held sufficient."[124] Newton took the exactly opposite track. He determined to proceed upward from the phenomenon to "the most immediate cause" of it instead of going downward and deducing the phenomenon from some general cause or principle.[125] Maclaurin explained Newton's method by dividing it into two parts: analysis and synthesis. Analysis took observations and proceeded upward to discover general causes, while synthesis involved taking these general causes and deducing effects from them. Newton conducted his analysis before his synthesis, Maclaurin argued, which prevented him from indulging in the conjectures of other philosophers.[126] Many of the philosophers of mind agreed with this interpretation of Newton's method. Locke utilized the example of Newton in an argument against the use of maxims in philosophy. Contrary to what some believed, Locke stated, Newton did not begin with first principles and proceed to conclusions. Instead, Newton advanced natural philosophy "by finding out intermediate *Ideas*, that shew'd the Agreement or Disagreement of the *Ideas*, as express'd in the Propositions he demonstrated."[127] Watts identified Newton's law of universal gravitation as one of the "general and fundamental truths" that all men seeking to improve their minds should know and understand. But Watts reminded his readers that "we should be very curious in examining all propositions that pretend to this honour of being general principles: and we should not without just evidence admit into this rank mere matters of common fame, or

124. Henry Pemberton, *A View of Sir Isaac Newton's Philosophy* (London: S. Palmer, 1728), 4.
125. Ibid., 14.
126. Colin Maclaurin, *An Account of Sir Isaac Newton's Philosophical Discoveries, in Four Books* (London: A. Millar, 1748), 8–9.
127. Locke, *Works*, 1:280.

commonly received opinions." Newton's discoveries only ascended to the status of general principles because he based them in sound inductions, not *a priori* theorizing.[128] Reid perhaps made the strongest use of Newton in arguing for an inductive method of philosophy. He asserted that the method of "observation and experiment" and the establishment of "general rules" from these "is the only one by which any real discovery in philosophy can be made." Both the *Principia* and the *Opticks*, Reid argued, had employed this method, a procedure that other men used every day to understand the world around them. "Conjectures and theories are the creatures of men," Reid continued, "and will always be found very unlike the creatures of God."[129] Reid so strongly opposed the construction of hypotheses prior to observation and experiment that he even criticized Newton himself for indulging in unjustified theorizing on occasion. Despite Newton's brilliant explication of attractive and repulsive forces, the great man sometimes attempted "to conjecture" that "all the phaenomena of the material world depended upon attracting and repelling forces in the particles of matter." In this case, Newton's "love of simplicity" led him into error, for many examples from nature (such as the crystalline forms of certain minerals and the organized bodies of living things) demonstrated that this single principle did not govern the whole of creation.[130]

For many authors, however, Newton did more than apply an inductive method in his investigations of nature. Crucially, his mastery of geometry allowed him to present his findings with a precision that a mere description of the celestial motions could never achieve. As Pemberton explained, Newton had proved by "indisputable geometrical

128. Watts, *Improvement of the Mind*, 254–55.
129. Reid, *Inquiry into the Human Mind*, 2–3.
130. Ibid., 370–71; L. L. Laudan, "Thomas Reid and the Newtonian Turn of British Methodological Thought," in *The Methodological Heritage of Newton*, ed. Robert E. Butts and John W. Davis (Toronto: University of Toronto Press, 1970), 103–31.

principles" that all the celestial bodies gravitated towards one another. In this manner, he had "laid open those intricacies of the moon's motions, which no astronomer, from observations only, could ever find out."[131] While emphasizing that Newton had proceeded from observations to general principles, Maclaurin nonetheless admitted that "experiments and observations, 'tis true, could not alone have carried him far in tracing the causes from their effects." Newton relied on "a sublime geometry" to lead him towards the truth.[132] Of the philosophers of mind, Condorcet in particular praised Newton for his geometrical mastery. He argued that Newton had greatly advanced philosophy by demonstrating that all theories in natural philosophy must be "precise, and susceptible of calculation; which give an account not only of the existence of a phenomenon, but its quantity and extent."[133]

The invocation of Newton, then, took on two faces. Authors praised Newton for maintaining a strict inductive method throughout his work. Unlike the flawed philosophizing of old, Newton started with no hypotheses and allowed nature to lead him towards general principles. At the same time, Newton structured his analysis of natural effects with a geometrical framework that provided his philosophy with far greater mathematical precision than those that settled for a merely descriptive account of nature. Thus, Newton rationalized empirical observations by fitting them into a geometrical account of the universe.

John Adams Against Condorcet

Americans did not passively absorb the Enlightenment thought contained in libraries. In the spirit of the age of criticism, Americans engaged in conversation with

131. Pemberton, *A View*, 17.
132. Maclaurin, *An Account*, 8.
133. Condorcet, *Outlines*, 274–75.

Enlightenment philosophers. John Adams provides an example of this transatlantic discourse with his hand-written annotations to Condorcet's *Outlines*. Adams read the treatise at least twice, in 1798 and 1811. His comments around these two years reflect his reactions to Condorcet's progressive optimism both during the French Revolution and during the Napoleonic Wars.[134] Adams, who above all else argued for the necessity of balanced political systems that pitted the society's various interests against one another, tore into the philosophe for his role in promoting a unitary legislature in France during the revolution. Commenting on Condorcet's death at the hands of Robespierre's Terror, Adams blamed Condorcet for his own demise. His death, Adams argued "was Suicide by voluntary Passion. It was an Effect of his own System of a Government in one Assembly. It was the Fruit of the Tyranny of his own pretended...simple Majority, without a Ballance, or Check, which he abhorred."[135]

But most crucially for our purposes, Adams attacked what he saw as Condorcet's overly abstract and theoretical method that ignored the lessons of human history. In his review of the advancement of science in ancient Greece, Condorcet argued that Aristotle and Plato had inaugurated the science of political economy by providing observations on the operations of various kinds of governments. He criticized these philosophers, however, by asserting that this early political economy was "a science rather of facts, and, if I may so speak, empirical, than a true theory founded upon general principles, drawn from nature, and acknowledged by reason." Adams could hardly contain his bewilderment. "Is there any Science, not of facts?" he asked. "Newton's Science is empirical. Principles drawn from Nature, are drawn from Facts. Wt [What] is Nature but

134. Zoltan Haraszti, "John Adams Flays a Philosophe: Annotations on Condorcet's Progress of the Human Mind," *William and Mary Quarterly* Third Series 7, no. 2 (April 1950): 230–31.
135. Jean-Antoine-Nicolas de Caritat Condorcet and John Adams, *Outlines of an Historical View of the Progress of the Human Mind* (London: Printed for J. Johnson, 1795), iii.

Fact? How can reason acknowledge any Thing but facts and Inferences from facts? Beckman and Swedenbourg were not more mystical and unintelligible than this philosophical and mathematical Charlatan."[136] Here Adams referred to Emanuel Swedenborg, an eighteenth-century Swedish intellectual who had experienced a religious revelation in the middle of his life and had published accounts of his prophetic visions.[137] In a similar manner, Adams reacted to Condorcet's analysis of how the ruling class established its dominance over the rest of society. Condorcet argued that the rulers always attempted to create "between the masters and slaves a real difference, which shall in a manner render nature herself an accomplice in the guilt of political inequality." Inequality, Condorcet held, only arose because of human machinations, and thus societies could dispense with it by instituting governments that protected the rights of all. Adams cast doubt on this hope. "Is there any Nation of Indians, Negroes, Tartans or Hottentots, in which the Mass is not guided by one of its portions?" he asked.[138] For Adams, the dazzling promise of rationality to usher in a new age of equality had blinded Condorcet; he had ignored the lessons of history, which demonstrated that a part of society must rule while the other part must obey.

In a similar vein, Adams repeatedly blasted Condorcet's celebration of the rare geniuses that had advanced science and society. Adams accused Condorcet of attempting to set up the so-called geniuses as a new aristocracy that would rule. In Condorcet's narration of the decline of the sciences in Arab countries during the Middle Ages, the philosophe told of "genius abandoning nations whom it had enlightened." Adams shot back, "Wt [What] a Pity! that this Man of Genius, cannot be King and Priest for the

136. Ibid., 89.
137. Inge Jonsson, *Emanuel Swedenborg*, trans. Catherine Djurklou (New York: Twayne Publishers, 1971).
138. Condorcet and Adams, *Outlines*, 147.

whole human race! Has not Genius been employed to introduce Tyranny and Superstition, as well as to extroduce them?"[139] When Condorcet complained of the construction of a ruling class that held a monopoly on religious doctrine and scientific knowledge, Adams asked, "Are not the Pretensions of Genius, sett up by this Visionary as dangerous and indeed in the End a worse System?"[140] Adams thus questioned whether putting enlightened intellectuals like Condorcet in charge would actually result in a more just society.

Common Sense and the Question of Authority

Besides this quite direct response to Condorcet that Adams crafted in the margins of *Outlines*, A number of Americans engaged in a proxy battle between Hume and Reid. The several examples of Americans engaging in this dispute demonstrate that the divide between the two Scotsmen constituted a key issue in the intellectual life of the Early Republic.

Benjamin Rush, the prominent Philadelphia physician, took direct aim at Reid's account of Common Sense in a 1791 article that appeared in *The Universal Asylum*. Rush first laid out Reid's definition of Common Sense in a quotation from the Scotsman. Common Sense, Reid said, denoted that faculty of the mind that allowed human beings to assent immediately to some idea as true, without the use of logic or other intermediate ideas. This faculty, then, was not opposed to reason but in fact the first operation of reason, the foundation on which the other uses of reason depended. The Philadelphia doctor could not accept this account of Common Sense. For Rush, Common Sense simply meant "the perception of things as they appear to the *greatest* part of mankind. It

139. Ibid., 156.
140. Ibid., 27; See also ibid., 71, 88.

has no relation to their being *true* or *false*." He went on to give several examples of Common Sense, including the observation that "it is agreeable to the common sense of a great part of mankind, to revenge public and private injuries by wars and duels, and yet no wise or just reason has ever been given to justify the practice of either of them." Rush thus insisted that Common Sense varied from place to place and from age to age depending on the particular prejudices of societies. If by Common Sense, Reid had meant that the "five external senses" provided all healthy persons the same information, Rush could abide this definition. But by making Common Sense the foundation of reason, Reid had erred. In truth, Rush continued, "the principal business of reason is to correct the evidence of our *senses*. Indeed, the perception of truth, in philosophy, seems to consist in little else than in the refutation of the ideas acquired from the testimony of our senses." Rush's objections to Reid's notion of Common Sense might seem like mere quibbling with words, but this criticism reflected Rush's interest in establishing himself and his fellow intellectuals as authorities over the common people. As he stated in one of his examples of how Common Sense could run against the truth, "The common sense of mankind has generally been in favour of established modes and habits of practice, in medicine. Opium, bark, and mercury, have all forced their way into general use, contrary to this common sense. Their utility is a proof how little common sense accords with the decisions of reason, and how improperly it is supposed to be a part of that noble power of the mind."[141] As the dean of the emerging medical profession in America, Rush made sure to head off any suggestion that the Common Sense of common people might serve as a route to the truth.

141. Benjamin Rush, "Thoughts on Common Sense," *The Universal Asylum and Columbian Magazine* 3 (April 1791): 211–14.

Another example of an anti-Common Sense treatise comes from James Ogilvie, a native of Scotland who tutored children of Virginia planters. Ogilvie had a rather odd career in America; following his stint as a teacher, he undertook a multi-city tour across the young United States to demonstrate and promote the art of oratory.[142] In 1816, he published *Philosophical Essays*, a strange mishmash of a book that included papers on various subjects and a narrative of Ogilvie's experiences in America. One of the essays, "On the Nature, Extent, and Limits of Human Knowledge," put forth a Humean epistemology and answered the objections that Reid had raised against Hume. Ogilvie agreed with Hume that all human knowledge consisted of the recognition that some object followed another object (the relationship of cause and effect). Reid's attempt to base human understanding of cause and effect in instinct, or Common Sense, could not succeed for several reasons. First, Ogilvie accused Reid of "a recurrence to extraordinary causes" in his reliance on Common Sense when "ordinary causes are adequate to explain...the phenomena we are considering." Second, "if instinct means any thing, it must mean the anticipated sequence of one event, on the appearance or occurrence of another, before the actual order of succession has been perceived." But "the most superficial observation" demonstrated that this anticipation of one object following the perception of another object only occurred after a person had experienced the conjunction of these two objects and not before. For example, young children could not distinguish between "those successions of events that are casual and separable, and those that are indissoluble." Even in older age, thinkers often found it difficult to determine the causes of some event, especially when several events preceded the event in question. Finally,

142. See the "Supplementary Narrative" in James Ogilvie, *Philosophical Essays; to Which Are Subjoined, Copious Notes, Critical and Explanatory, and a Supplementary Narrative; with an Appendix* (Philadelphia: John Conrad, 1816), i–xci; "Review: Philosophical Essays by James Ogilvie," *The North-American Review and Miscellaneous Journal* 4, no. 12 (March 1817): 378–86.

Ogilvie questioned how far Reid's idea that Common Sense provided persons with confidence that the future would resemble the past extended. Did Reid mean "that the future will *generally* resemble the past, or is this assurance confined to *particular* instances?" Ogilvie asked. "A general belief, can mean only, an instinctive assurance of this sort, in a multitude of particular instances." Thus, a general belief only differed from a particular belief "by the number of instances." Reid's lack of precision on this point did not recommend his conclusions, Ogilvie argued.[143] Although Ogilvie defended a Humean approach to knowledge, he did not adopt his entire program. A section near the end of Ogilvie's essay included an argument against Hume's rejection of the possibility of miracles. In brief, Hume had maintained that because a miracle was by definition a violation of the laws of nature and because all human knowledge rested on the assumption that the laws of nature were constant, miracles simply could not occur. Ogilvie responded that because God had constructed the laws of nature, He could surely suspend or control these laws for the purpose of giving a divine revelation to human beings with limited senses. Thus, miracles could certainly happen.[144]

Ogilvie's exposition of epistemology prompted a response from the high brow Boston periodical *The North American Review.* The reviewer of Ogilvie's book pointed out that Reid had agreed with Hume that human beings could not discover the "*necessary connexions* in the phenomena we witness." In other words, Reid also held that humans could not uncover the efficient cause of some object. Reid and his followers "opposed only the *sceptical conclusions*, which Hume drew from a principle they admitted." However, Reid "holds it to be a first principle, that there must be an efficient cause for

143. Ogilvie, *Philosophical Essays*, 48–49.
144. Ibid., 145–47.

every phenomenon we witness. He is merely saving men from dreary scepticism." The reviewer admonished Ogilvie that he "should have understood his countryman [Reid] better, and remembered that Hume himself may possibly better deserve the charge of 'sophistical artifice' than such a straight-forward observer as Dr. Reid."[145] This review provides an example of a defense of Reid's Common Sense philosophy and shows that disputes over the two Scotsmen's accounts of truth continued into the nineteenth century.

Defenses of Reid went beyond the pages of journals. As historians have noted, the Scottish Enlightenment, and particularly its Common Sense variant, found fertile soil in American colleges.[146] Samuel Stanhope Smith, president of the College of New Jersey (later Princeton), provides an example in the published lectures he delivered on moral and political philosophy, which appeared in 1812. His introductory lecture took issue with Locke, Berkeley, and Hume's theory of ideas. Contrary to the opinion of these thinkers, Smith argued, persons did not perceive *ideas* of objects, but the *objects themselves*. Recalling the Enlightenment interpretation of Newton's philosophy, Smith contended that the insistence that humans perceived only ideas and not real things was nothing more than a "hypothesis" that Hume and others assumed without justification. If taken seriously, this theory implied that objects outside the mind did not actually exist.[147] Smith went on to praise Reid for striking back against the skepticism of Hume and Berkeley and for reviving "the calm and rational dictates of the common feelings of mankind."[148] Epitomizing the attraction of Common Sense philosophy for Americans who sought a middle ground between cold skepticism and rigid ideology, Smith concluded that "we

145. "Review: Philosophical Essays," 401–2.
146. May, *The Enlightenment in America*, 1976, xvi.
147. Samuel Stanhope Smith, *The Lectures, Corrected and Improved, Which Have Been Delivered for a Series of Years, in the College of New Jersey; on the Subjects of Moral and Political Philosophy*, vol. 1 (Trenton: Daniel Fenton, 1812), 20–21.
148. Ibid., 1:138–39.

have as much reason to avoid the dangers of a weak and suspicious scepticism, as of a bold and positive dogmatism."[149]

One final example will demonstrate the American interaction with the Enlightenment philosophy of mind literature. In 1819, *The Academician*, a New York journal dedicated to educational reform, published a piece "On the Baconian Method of Induction." This article argued that induction, the discovery of general principles through the analysis of particular facts, was the only "natural" method of reasoning. "No man ever taught an other his first Induction," according to the author. "It is a mode of inference which the *human being is prompted to make, by the very constitution of his mind*." Unfortunately, this method, adequate for both everyday life and philosophical speculations, had fallen out of favor until Bacon revived it in his writings. The application of this method almost immediately led to great strides in natural philosophy, most notably in Newton's discoveries. Locke had then applied Bacon's inductive method to the science of the human mind, and Reid, "the follower of Mr. Locke," had continued to progress this branch of inquiry. The author notably omitted Hume from this pantheon.[150] Hume's absence from the piece combined with the author's insistence that the constitution of a person's mind prompted him or her to apply the inductive method indicated that the author was defending the Common Sense account of epistemology.

149. Ibid., 1:27.
150. "On the Baconian Method of Induction," *The Academician* 1, no. 22 (September 25, 1819): 338–39.

Table 2.1 Appearance of epistemological works in library catalogs.

	Library Catalogs								
Author and Title	Charleston Library Society, 1770	Library Company of Philadelphia, 1789	Boston Library, 1795	Charleston Library Society, 1806	Charleston Library Society, 1811	American Philosophical Society, 1824	Boston Atheneum, 1827	Boston Library, 1830	Library Company of Philadelphia, 1835
Locke, *Works*	●						●	●	●
Gregory, *Economy of Nature*					●		●	●	●
Watts, *Improvement of the Mind*	●	●	●		●		●	●	●
Hume, various works	●			●	●		●	●	●
Hutton, *Principles of Knowledge*				●	●				●
Berkeley, *Principles of Knowledge*		●	●				●	●	●
Reid, various works	●	●	●	●	●		●	●	●
Beattie, *Essay on the Nature and Immutability of Truth*					●	●	●	●	●
Condorcet, *Outlines*						●			●

Table 2.2 Appearance of commentaries on Newton in library catalogs.

	Library Catalogs								
Author and Title	Charleston Library Society, 1770	Library Company of Philadelphia, 1789	Boston Library, 1795	Charleston Library Society, 1806	Charleston Library Society, 1811	American Philosophical Society, 1824	Boston Atheneum, 1827	Boston Library, 1830	Library Company of Philadelphia, 1835
Pemberton, *View of Sir Isaac Newton's Philosophy*	●	●							●
Maclaurin, *Account of Sir Isaac Newton's Philosophical Discoveries*	●	●		●	●				●

CHAPTER 3

A Pattern for Improvement: Pattern Farms and Scientific Authority

Introduction: Enlightened Agriculture

Americans in the Early Republic spilled a staggering amount of ink in discussions about agriculture. The early nineteenth century in particular saw the proliferation of numerous rural journals and local agricultural societies all dedicated to the improvement of cultivation. Within these sites, Americans engaged in lively debates on every conceivable aspect of agriculture, from plowing to animal husbandry to manure. Agricultural writings provide an ideal subject for examining the American Enlightenment because they contain a record of Americans engaging in critique of farming practices and attempting to determine the best ways to achieve progress in the art. How, in other words, could one gain the knowledge to improve agricultural practice? Agriculture thus constituted an an arena of clashing epistemological values.

Two seemingly contradictory themes flowed through discourses about American agriculture in the Early Republic. First, writers and orators rarely hesitated to praise the benefits of agriculture to the country and the virtue of farmers as a class. Agriculture formed the very foundation of civilization, according to a representative item in a Kentucky newspaper. “If the earth produced not, where were the materials for manufactures—where were the objects of commerce; where the wealth of nations?” the

paper asked.[151] The cultivators of the soil, furthermore, constituted the virtuous core of the American republic. As Thomas Jefferson argued, farmers depended on "their own soil and industry" for their livelihoods, in contrast to merchants and manufacturers who relied on "the caprice of customers."[152] Alexander Coventry, in an 1818 address to the Agricultural Society of the County of Oneida, New York, praised the life of the farmer as both physically healthier and psychically happier than the physician or mechanic. While the mechanic needed to perform his work in a cramped position detrimental to health, the farmer exercised all parts of his body to cultivate a good crop. The physician, in order to gain the confidence of his anxious patients, deceived them by pretending to know cures for fictional diseases. Farmers, in contrast, did not compete for customers, and therefore they did not need to engage in the pretensions common in other professions. Finally, the independent husbandman formed an essential bulwark of virtue against the ever-present threats to republican government. "When the factious or ambitious demagogue would raise his parricidal arm, he does not follow the farmer to his plough; but finds fitter instruments in the crowded marts of the city, where vice erects her throne," he concluded.[153]

Despite these paeans the virtues of agriculture and of farmers, commentators lamented the sorry state of the agricultural art as practiced in America. Physician George Logan bemoaned the lack of progress in agriculture. "It is remarkable," he told the Philadelphia Society for Promoting Agriculture (PSPA) in 1818, "that whilst agriculture has been declared by virtuous and learned men, and by the most enlightened statesmen, in all ages of the world, as an honourable occupation, as well as the most useful in civil

151. "Agriculture," *The Medley*, no. 2 (February 1803): 37.
152. Thomas Jefferson, *Notes on the State of Virginia* (Richmond, Va.: J.W. Randolph, 1853), 176.
153. Alexander Coventry, *Address to the Agricultural Society of the County of Oneida: Delivered at Whitestown, on the 27th Day of Sept., 1818* (Utica, N.Y.: William Williams, 1819), 26–27.

society, yet it is too generally in the hands of poverty and ignorance."[154] Logan and his fellows in the PSPA chastised farmers who, instead of seeking new and better methods of cultivation, followed the imperfect ways of their fathers. These traditional practices not only prevented farmers from achieving the greatest crop possible but also destroyed the fertility of the soil. Worn-out lands required farmers to seek fresh fields in the West, thus draining resources from the eastern states. The preservation of a strong and independent agricultural class, advocates of improvement argued, required intelligent experimentation and the assistance of sciences like chemistry and geology. Only then could the art of agriculture progress.

To effect this progress, Logan and his fellows advocated for the construction of what they called "pattern farms."[155] Many other agricultural societies and concerned citizens took up the call, with the proposed institutions labeled as "model farms" or "experimental farms" in addition to pattern farms. These institutions would serve as experimental spaces for testing crops, manures, and machinery. Pattern farms would also provide models of enlightened agriculture that farmers could emulate to improve their lands. Many pattern farm advocates anticipated that these spaces could form the core of agricultural schools that would systematically instruct young men in the intricacies of scientific agriculture. Pattern farms thus constituted an early version of the American agricultural experiment station, but only federal support from the post-1860 Morrill Acts and the Hatch Act would establish these stations on a permanent basis.[156] This chapter,

154. George Logan, *An Address on the Errors of Husbandry, in the United States: Delivered Before the Philadelphia Society for Promoting Agriculture, at Their Annual Meeting, January 14, 1818* (Philadelphia: Lydia R. Bailey, 1818), 3.
155. Stevenson Whitcomb Fletcher, *The Philadelphia Society for Promoting Agriculture, 1785-1955* (Philadelphia: Philadelphia Society for Promoting Agriculture, 1976), 84–90.
156. Alan I. Marcus, "The Wisdom of the Body Politic: The Changing Nature of Publicly Sponsored American Agricultural Research Since the 1830s," *Agricultural History* 62, no. 2 (Spring 1988): 12–16.

however, does not seek to develop a pre-history of the modern experiment station. Despite the many calls to found pattern farms in the antebellum period, the pattern farm remained for the most part a dream rather than a reality. Instead, by considering the attempts to found pattern farms as an example of the effort to reform American agriculture, this chapter uses the pattern farm as a window onto the values and anxieties of agricultural reformers. Those who argued for pattern farms sought to tame what they saw as a disorderly and ineffective discourse about agricultural knowledge in two ways. First, they tried to use purportedly legitimate science to uncover general laws of agriculture. No longer, the critics argued, would a haphazard empiricism, in which every farmer who scraped in the dirt could advise his fellows, rule the field. The pattern farm would introduce a rational system of agriculture that could standardize farming practices by submitting all theories to the test of experiment. Thus, the pattern farm movement attempted to shift scientific authority from the scattered farming population to a central institution that could pronounce on proper agricultural practice. Second, by providing a space to train young farmers in the correct methods of agriculture, the pattern farm would aid in transforming the ordinary farmer into a gentleman farmer who could become a virtuous citizen in the early republic. This new class of gentleman farmers would elevate the respectability of agriculture by raising their eyes from petty concerns about making money to the more profound questions about the nature of creation. Enlightenment would come to the sowers of seed. Although the promoters of pattern farms never invoked the names of Locke, Hume, or Reid, they believed that pattern farms would succeed in instituting an effective form of the empiricism enunciated in the British epistemological tradition. Their efforts did not go without criticism, however. The editor of the

Massachusetts Ploughman took issue with the proposals to found pattern farms and articulated a rival form of empiricism. This conflict arose over disagreement about *who* could creditably produce facts about farming: leisured men of science or practical working farmers.

Republicanism, Democracy, and the Improvement of Agriculture

The attempts to institute pattern farms occurred during a period of immense upheaval in the structure of American society. These changes provided the backdrop for the struggle over authority revealed in the discourse on pattern farms. The elites who had led the American Revolution and established the Constitution had intended to create a society based on republican principles. Though they rejected monarchy and denounced hereditary nobility, American elites did not intend to equalize the status of all citizens. Men of merit, the elites thought, would naturally rise to the top of society, and these gentlemen would form the ruling class of the young nation. Distinguished from ordinary men by their superior learning and civility, gentlemen believed that they had the necessary disinterestedness to pursue the public good, the chief goal of a republic. Even though they engaged in moneymaking through their landholdings or in professions like the law and medicine, gentlemen downplayed their pursuit of wealth, for they desired to become men of leisure who did not dirty their hands with labor. Thus, many urban professionals dreamed of retiring to estates in the country and becoming leisured overseers of their farmlands. Some men really were better than others, the American elites believed, and although everyone should have the opportunity to become a

gentleman, it would be ridiculous to suppose that the distinction between gentleman and commoner would disappear.[157]

As the nineteenth century progressed, this distinction became increasingly difficult to maintain. Egalitarian democracy gradually encroached upon the republicanism of the founding generation. Instead of pursuing the public good, as good republicans should have, the masses focused on getting ahead. They migrated westward to take advantage of cheap land and demanded the printing of paper money to facilitate commerce between distant parts of the union. Americans celebrated labor, which became a means to achieve prosperity rather than a necessary evil to avoid destitution. Gentlemanly leisure became contemptible idleness in the eyes of ordinary Americans. Despite the variety in occupations, everyone had to work for a living, which reinforced a sense of the basic equality of all men. In government, the people refused to be ruled by their gentlemanly betters, and the expansion of the franchise led to the election of "the lower sorts" to political offices. In short, a variety of forces conspired to make America an egalitarian society. Although great disparities of wealth and the enslavement of millions of blacks endured, Gordon Wood observes that white Americans "came to believe that no one in a basic down-to-earth and day-in-and-day-out manner was really better than anyone else."[158] Thus, for ordinary Americans, it became increasingly ridiculous that a supposed gentleman would claim superiority over his fellow men by virtue of his education or his particular tastes.

The elitist tendencies of revolutionary-era republicanism did not disappear with the onset of nineteenth-century egalitarian democracy, and scientific discourse in the

157. Gordon S. Wood, *The Radicalism of the American Revolution* (New York: Alfred A. Knopf, 1992), 194–98, 211–12.
158. Ibid., 234.

Early Republic reflected the deep tensions between the two. In his analysis of natural history in the Early Republic, Andrew J. Lewis discusses the conflict between the "democracy of facts" and the "empire of reason." For the most part, the practice of natural history took on the character of the democracy of facts, in which every literate male citizen, with or without special training in natural history, could contribute his observations to the pursuit of knowledge about nature. Some citizens, however, lamented this sometimes rowdy democracy, which could lend creditability to absurd claims, such as the idea that swallows dove into rivers and ponds to hibernate for the winter. A few professors, physicians, and others, therefore, formed an empire of reason, which fought to centralize authority in well-trained experts. In contrast to the democracy, which prioritized the collection of facts over systematic theorizing, this empire argued that human reasoning and experiment could provide a productive means to pursue scientific truth.[159] This divide between the democracy and the empire thus paralleled the broader social divide between would-be gentlemen who claimed a special ability to discover truth and the masses who resented any pretensions to superiority. The gentlemen who tried to establish pattern farms followed a similar program in an attempt to reform the practice of agriculture in America.

Although opinions about the specific fertilizers farmers should use or the kind of plowing methods they should pursue varied greatly, agricultural journals and agricultural societies almost unanimously agreed on one proposition: American agriculture was backward, wasteful, and far behind European standards. Nicholas Biddle's 1822 address to the PSPA enumerated several advantages that Americans enjoyed over Europe. Rents

159. Andrew J. Lewis, *A Democracy of Facts: Natural History in the Early Republic* (Philadelphia: University of Pennsylvania Press, 2011), 5–8, 40, 107–9.

and taxes for farms around Philadelphia were much lower than those for farms around London. Farmers outside Philadelphia could also manure their fields with lime more cheaply than their British counterparts. Despite the advantages that Americans had, English farmers produced more and better crops, as revealed in the quantity and quality of English crops that reached American markets. This shameful result, Biddle argued, only occurred because Americans "will not bestow on our lands the same well directed labour, or the fiftieth part of the capital which they [Englishmen] intrust to theirs."[160] "Poverty and ignorance" characterized the practice of American agriculture, according to George Logan's speech to the PSPA in 1818. Thus, gentlemen in agricultural societies felt a pressing need to improve agriculture by conducting experiments and bringing sciences like chemistry to the aid of agriculture.[161]

A major irony, however, attended the calls for agricultural improvement in the early nineteenth century: for the most part, the gentlemen bemoaning the state of American agriculture and suggesting steps to improvement did not actually work the land for a living. Out of the many agricultural societies across the country, the PSPA was probably the most active group in promoting the establishment of pattern farms. Its membership during the early nineteenth century consisted entirely of wealthy gentlemen who did not farm for a living. For example, James Mease delivered *An Address on the Subject of Establishing a Pattern Farm in the Vicinity of Philadelphia* to the PSPA in 1818.[162] Mease was a physician by training, but he rarely practiced medicine because he

160. Nicholas Biddle, *Address Delivered Before the Philadelphia Society for Promoting Agriculture, at Its Annual Meeting, on the Fifteenth of January, 1822* (Philadelphia: Clark & Raser, Printers, 1822), 28–32.

161. William Tilghman, *An Address Delivered Before the Philadelphia Society for Promoting Agriculture at Its Anniversary Meeting, January 18, 1820* (Philadelphia: William Fry, 1820), 24.

162. James Mease, *Address on the Subject of Establishing a Pattern Farm in the Vicinity of Philadelphia: Delivered at the Annual Meeting of the "Philadelphia Society for Promoting Agriculture"* (Philadelphia: Printed by order of the Society, 1818).

had inherited a significant fortune. Instead, he devoted his time to the PSPA and to geology.[163] As a member of the New York Assembly, newspaper editor Jesse Buel called for the establishment of a state agricultural school.[164] Buel only began farming in earnest after he had achieved a fortune as a printer, thus giving him the resources to experiment on his own land.[165] The backgrounds of many agricultural improvers, therefore, left them open to charges that they lacked the practical experience of the typical farmer.[166] In short, the gentlemen of agricultural societies and journals often had little firsthand knowledge of farming, but they knew that American agriculture could and must be improved, both to maintain prosperity over the long haul and to establish a class of gentlemanly farmers who took an interest in that long-term prosperity.[167]

The gentlemen's lack of practical farming experience resulted in a curious mixture of scorn, modesty, and advice in public statements that urged the improvement of agriculture. For example, General R. G. Harper's 1824 address to the Maryland Agricultural Society began with a tribute to the importance of agriculture in ensuring an orderly and prosperous community but quickly turned towards a lament for the sorry state of American agriculture. Farmers "have generally been left to grope their way in the dark; to overcome obstacles by their individual efforts; to find out errors by the experience of their injurious effects; and to rely for their correction, as well as for the discovery and introduction of improvements, on single divided and unassisted exertions," Harper stated.

163. Fletcher, *The Philadelphia Society for Promoting Agriculture, 1785-1955*, 38–39, 41.
164. Jesse Buel, "Report of the Committee of Agriculture in the House of Assembly, Jan. 17, 1823," *The Plough Boy, and Journal of the Board of Agriculture* 4, no. 34 (February 4, 1823): 292–93.
165. Caryn Hannan and Jennifer L. Herman, *Connecticut Biographical Dictionary*, vol. 1 (Hamburg, MI: State History Publications, 2008), 182–84.
166. Benjamin R. Cohen, *Notes from the Ground: Science, Soil, and Society in the American Countryside* (New Haven: Yale University Press, 2009), 41.
167. Steven Stoll, *Larding the Lean Earth: Soil and Society in Nineteenth-Century America* (New York: Hill and Wang, 2002), 20–21, 84–86.

The Maryland Agricultural Society was determined to address these problems. Harper then adopted a tone of humility while reflecting on the society's choice to delegate to him the duty of making the annual address to its members:

> In assigning this honourable task to me, they have, I fear, formed much too favourable an estimate of my attainments, in this department of knowledge. If fondness for agricultural pursuits, and a deep conviction of their importance to the prosperity and happiness of our country, were alone sufficient, I might claim to be in some degree qualified...But I am sensible how much more is necessary, and how far I am from possessing that practical and minute knowledge on agricultural subjects, which alone would enable me to give useful lessons to farmers. Some hints I may be able to suggest, which perhaps would lead to future enquiries, and point the way to useful improvements. To this I shall confine my endeavours, leaving to skilful and experienced agriculturists the more important and difficult task, of guiding the practical farmer in the details of his profession.

Despite this initial modesty, Harper went on to deliver a lengthy speech full of advice for farmers, including admonishing them to read up on all aspects of agriculture, not just the topics that applied to their own lands. He also called for the establishment of "a pattern farm, where the best animals of every breed, and for every purpose, might be brought together, for constant inspection as well as propagation; and every new improvement in tillage, husbandry and agricultural instruments, might be subjected to the test of experience."[168] Gentlemen adopted a similar modesty in letters requesting membership in the PSPA. In an 1817 letter requesting membership in the society, Condy Raguet, a prominent Philadelphia banker, wrote that he had "no pretension to the character of an agriculturist, further than what is derived from the ownership of distant lands, and from

168. R. G. Harper, "General R. G. Harper's Address, Prepared at the Instance of the Board of Trustees, and Delivered Before the Maryland Agricultural Society," *The American Farmer* 6, no. 38 (December 10, 1824): 297–301.

the cultivation of a fine crop of oats upon a lot of ground at the upper end of Chesnut street." Despite his limited experience, he wished "to cultivate a taste for that... [on] which so much of the prosperity of this nation is dependent."[169] Thus, the statements of gentlemen in the agricultural societies paradoxically downplayed the individual's practical knowledge of agriculture while insisting that they knew the steps to improve it.

A critic of the gentlemen of the PSPA pointed out their distance from the needs and experiences of typical farmers. In an 1846 article, "I. U." complained of the gentlemen's obsessive focus on introducing the foreign Durham breed of cattle to America. Practical dairy farmers in the Philadelphia area, I. U. claimed, found the Durhams no better than domestic breeds for milk and butter production despite the promises of promoters. Yet the PSPA continued to focus exclusively on the Durhams in premiums offered for fine cattle. I. U. blamed the impracticality of the PSPA's members for their ill-advised focus on Durhams:

> Look at a list of their members—active members—and see how few among them are practical farmers: by that term is meant men who really till their grounds in the sweat of their own brow;—but they are mostly gentlemen, and very liberal gentlemen too, who have acquired fortunes at mercantile and other lucrative pursuits; and who, wearied with the dull round of money-getting, have determined to improve agriculture by money-spending; but who have failed to perceive that their experiments in stock-raising and otherwise, do not influence, because they are not applicable to the condition of the great body of farmers, who have not the means to follow their example, even if they were convinced of their utility—which, however, is far from being the case.[170]

169. Condy Raguet, "Condy Raguet to Roberts Vaux" July 8, 1817, Box 4, Folder 168, Philadelphia Society for Promoting Agriculture Records, University of Pennsylvania.

170. I. U., "Cattle--Philadelphia Agricultural Society," *The Farmers Cabinet and American Herd Book* 10, no. 8 (March 16, 1846): 252; Fletcher, *The Philadelphia Society for Promoting Agriculture, 1785-1955*, 67.

I. U. thus advanced a potentially devastating argument against the ambitions of the gentlemen-improvers. He labeled the gentlemen of the PSPA rich dabblers who did not understand the practical limitations and challenges of actual, working farmers.

How, then, could elite gentlemen, who admittedly did not have much practical experience in farming, claim the authority to repair the broken state of agriculture in the young nation? In several ways, the pattern farm supplied a partial solution to this quandary. In the promoters' view, the pattern farm would shift authority in agricultural matters from a loose and scattered network of farmers, journals, and local societies to a central institution that could give order to the practice of husbandry. Pattern farm advocates believed that this new institution could uncover general laws or principles of agriculture through well-documented experiments. In this way, the urban gentlemen who did not have experience in farming would not hold *themselves* out as an authority in agricultural matters. Instead, the *institution* of the pattern farm would take over as the authority. Just as important, by providing places to train young farmers in scientific agriculture, the pattern farm would transform narrow-minded and materialistic farmers into well-rounded, high-minded, and discerning citizens. Agricultural reformers thus sought to improve people as much as agriculture. In this way, the gentlemen clothed their elitist critique of American agriculture in egalitarian garments. By vesting scientific authority in an institution rather than their individual persons, the gentlemen avoided the charge that they lacked the necessary experience to instruct farmers in a pursuit about which the gentlemen knew little. In addition, by envisioning the pattern farm as a training ground to create a new class of enlightened farmers, the gentlemen indicated that through

education most citizens could rise to a higher station in society. Thus would pattern farms bring order to the agricultural democracy of facts.

Discovering the Laws of Agriculture

In their arguments for the establishment of pattern farms, promoters put forward an account of agricultural science that stressed the discovery of the natural laws that governed the growth of vegetables and animals. Farmers should not follow an overly empirical method in which they exchanged time-honored rules of thumb amongst themselves, the pattern farm promoters argued. In Newtonian fashion, the advocates of pattern farms saw nature as a vast, complex machine that operated according to universal laws. All agricultural practice, they argued, should proceed from an understanding of these laws. The complexity of nature, however, made these laws difficult to uncover. Only through precise and well-documented experiments would nature reveal herself to man. The pattern farm provided the space to accomplish this reduction of agriculture to fixed laws.

The pattern farm advocates expressed striking confidence that farming, a practice beset by varying weather, mysterious crop failures, shifting soil conditions, ravaging insects, and numerous other intricacies, could be reduced to general laws. In an address to the PSPA in 1818, George Logan asserted that "like all other arts, agriculture is reducible to fixed, unalterable principles." Just as experiments had made chemistry into "a regular system," agriculture could also arrive at foundational principles through "accurate, well-digested experiments."[171] In the same year, James Mease urged the PSPA to establish a pattern farm because, through the activities of the institution, "there would not be a single principle in Agriculture, that might not be ascertained in the space of a few years, and

171. Logan, *An Address on the Errors of Husbandry, in the United States*, 3–4.

farmers in the future, and especially the gentleman farmer, would have an invariable standard to go by, which they might rely on with certainty."[172] *The Cincinnatus*, a journal published by Farmers' College near Cincinnati, argued in 1856 that the nation needed agricultural schools with "a sufficient quantity of ground to test experimentally the principles and doctrines taught." Such institutions would enable agriculturists to "investigate understandingly the laws, numerous and complicated as they are, involved in agricultural science."[173] In order to improve their art, agriculturists needed to work from sound principles established through experimentation, and pattern farms and agricultural schools formed a crucial part of this endeavor.

In addition to establishing generally valid laws of agriculture, promoters of pattern farms insisted that the institutions would apply specific sciences like chemistry and geology to agriculture. Jesse Buel distinguished between three different kinds of knowledge employed in agriculture, proceeding from the least to the most rigorous:

> It has been said, that agriculture is a *trade*, an *art*, or a *science*. That as a trade, it requires only the exercise of bodily power.--That as an art, it employs the understanding and the judgment; and that as a science, it comprehends a knowledge of natural history, of chemistry, &c. so far as these are subservient to the improvement of husbandry. We have many who follow the trade, less who practise the art, and but few who understand much of the science.

As such, Buel recommended establishing an agricultural school that instructed students in mathematics, chemistry, geology, and veterinary medicine.[174] An education in these sciences combined with practical experience working on the experimental farm attached to the school would produce graduates prepared to farm in a truly scientific manner.

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172. Mease, *Address on the Subject of Establishing a Pattern Farm in the Vicinity of Philadelphia*, 8.
173. "Our Present System of Agriculture—Its Defects and Remedies," *The Cincinnatus* 1, no. 1 (January 1856): 11–12.
174. Buel, "Report of the Committee," 292.

Former American President James Madison, the president of the Agricultural Society of Albemarle, Virginia, circulated a letter in 1822 to agricultural societies across the Old Dominion asking for contributions to help establish a professorship of agriculture at the University of Virginia. This professor would supervise a pattern and experimental farm that would provide a model of judicious management and test out new methods. Commenting that the improvement of agriculture required a combination of "theory and practice," Madison argued that the current professor of chemistry at the university could aid the future professor of agriculture in "unveiling the processes of nature to which the principles of agriculture are related."[175] *The Cincinnatus*, writing more than three decades after Madison's appeal, also argued strongly for combining theory and practice through the mechanism of agricultural schools. Progress would only result, the journal claimed, "from applied science." Thus, the nation needed "institutions that shall not be satisfied with mere theory, but shall unite theory and practice, after a most rigid analysis of facts and phenomena, carried forward through numerous experiments, under a great variety of circumstances." Pattern farms and the agricultural schools attached to them could accomplish this application of the sciences to agriculture, resulting in "a more rational system" of cultivation.[176]

In stating their reasons for establishing pattern farms, promoters held out "science" as the key to improving American culture. The promoters mobilized the idea of "science" in two distinct but related ways. First, as Jesse Buel argued, the sciences of natural history and chemistry could provide insights that could lead to more effective techniques of cultivation. Second, the science of chemistry, for example, provided a

175. James Madison, "Agricultural Education," *The American Farmer* 4, no. 35 (November 22, 1822): 273.
176. "Our Present System of Agriculture—Its Defects and Remedies," 11, 9.

model by which Americans could improve agriculture. Just as chemists had made their science into a rigorous system through repeated experiments, agriculturists could improve their art if only they had pattern farms that could conduct experiments, derive general principles from these experiments, and disseminate these principles to the farming community.

The Pattern Farm in Practice: The Wheat Experiments at Farmers' College

The pattern farm advocates distinguished their proposed method of improving agricultural knowledge from what they saw as the disorganized and shabby method practiced in agricultural treatises and journals. Descriptions of experiments at the farm at Farmers' College provide perhaps the best example of this critique of the empiricism of the agricultural press. Founded in 1846 near Cincinnati, Farmers' College sought to combine classical studies of Greek and Latin with a separate scientific course of study for young men interested in pursuing a career in agriculture.[177] As part of this course, the college established an experimental farm and botanic garden in 1856.[178] Freeman G. Cary, the former president of the college, served as the principal of the farm department. Cary had taught at schools near Cincinnati since 1833, and he had been an active experimenter in agriculture and horticulture. He also edited the college's journal, *The Cincinnatus*, which covered agriculture extensively.[179] On the experimental farm, Cary attempted to determine once and for all the true and correct method of growing wheat, the great staple of the West.

177. Liberty Hyde Bailey, ed., *Cyclopedia of American Agriculture*, vol. 4 (New York: Macmillan, 1910), 371–73; "Our College, Errors in Respect to Its Object and Aim," *The Cincinnatus* 2, no. 6 (June 1857): 241–48.
178. "Our Farm Department," *The Cincinnatus* 1, no. 9 (September 1856): 415.
179. A. B. Huston, *Historical Sketch of Farmers' College*, n.d., 19, 55; *A History and Biographical Cyclopaedia of Butler County, Ohio* (Cincinnati: Western Biographical Publishing Co., 1882), 479–80.

Cary justified the college's investigations of wheat culture by pointing to the great divergence in opinions about how to grow wheat. In an 1856 article in *The Cincinnatus*, Cary reported that the faculty had conducted experiments on 48 varieties of wheat. They had done so in part, he stated, because of the wide variety of opinions in the agricultural literature about how the farmer should go about raising the crop. The article reproduced several passages on wheat culture from the authoritative sources *Loudon's Encyclopaedia of Agriculture* and the *American Agriculturist*, a prominent rural journal. Each example differed widely as to the number of bushels of seed per acre to sow, the best time to plant the seeds, and the proper way to plow and harrow the ground prior to planting. "Every man has his own way, and is as tenacious of it as he is of the articles of his religious creed," Cary summarized. From this diversity of opinion, how could one decide which practices would result in the greatest yield for the least expense? In these differing examples of wheat culture, "every law of vegetable physiology is set at defiance, with a practice strangely diverse and opposite. *This is not science*. There are laws in the vegetable, as well as in the animal world. These laws are uniform, and will, if known, by our faithfully conforming to them, be attended with no uncertain results."[180] Cary thus took direct aim at the empirical method that prevailed throughout the agricultural literature. Agricultural works simply recounted the practices of the past that seemed to have worked. The college's experimental farm, in contrast, would determine the *single* best way to cultivate wheat, for the uniform laws of nature could only allow for *one* optimum solution.

180. "More about Terra Culture," *The Cincinnatus* 1, no. 12 (December 1856): 576–80 (emphasis in original).

This critique of empiricism sharpened in an 1857 article. Cary criticized a program run by the United States Patent Office that distributed foreign seeds to farmers around the country to test whether they would grow on American soil. Most of these seeds went entirely to waste, Cary argued, because no one had established an organized system to make experiments, draw conclusions, and disseminate results. The most common method of exchanging agricultural knowledge—the rural press—only perpetuated confusion and discord:

> According to the present order of things, a farmer who cultivates one kind of land, writes to a paper that he has adopted a certain mode of culture for a particular kind of crop, and has met with success, and hence recommends it to all, as the result of his 'experience.' Another, with soil totally different, is highly incensed at this, for he has tried the same mode, and utterly failed. He therefore sits down, and with a caustic pen, contradicts him. Now the strife must go on forever, unless science stepped in and settled the question, just as she has done in former astronomical and other speculations...[Science] takes into view all attending circumstances, and estimates their bearing. Two farms can not, under ordinary circumstances, be cultivated exactly alike. The only way is to establish general principles by the aid of science, and not trust to individual experience.

Much greater progress would result if the Patent Office distributed seeds only to established and respected "agricultural institutions" in the several states. "Scientific men" in these institutions could then test these seeds and make regular reports of their results, leading to enlightenment instead of confusion.[181] Thus, Cary and his fellows at Farmers' College sought to shift authority from the experience of the solitary cultivator to institutions that could make definitive pronouncements about proper practices.[182] Individual farmers could perhaps do the necessary experiments to advance agricultural

181. "The Agricultural Department of Our Government—Distribution of Seeds, Etc.," *The Cincinnatus* 2, no. 1 (January 1857): 1–4.
182. Cohen, *Notes from the Ground*, 162.

knowledge, but most of them had "neither the time, means, nor qualifications to conduct" these trials, according to Cary. Only "under the supervision and by the direction of men of profound scientific attainments" could agricultural experiments prove useful to improvement. Thus, the advancement of agricultural knowledge could only occur if the *right* kind of men conducted experiments, drew conclusions, and published the results. The typical farmer, in Cary's view, simply did not have the requisite "extensive knowledge of the physical sciences" to accomplish this feat.[183]

The college's experiments in wheat culture attempted to sort through the conflicting methods of growing the grain in the literature and to establish definitive guidelines that farmers could follow in the future. After trials with over 40 varieties of wheat, Cary felt confident in stating a few generally applicable rules in a report that appeared in *The Cincinnatus*. First, a variety of wheat with "a thin transparent bran" would always command a higher price than a variety with "a thick dark one." The variety called "White Pirk" met the standard for thinness of bran, and the college recommended it "for all kinds of soils." Second, Cary considered the question of when farmers should plant wheat seeds. According to the table that recounted the results of the wheat experiments, the college planted 41 of the 47 varieties tested between September 23 and 25. Two varieties were planted in early November, and both of these did not ripen. The remaining four varieties "did not vegetate.--Sowed too late." The college, therefore, did not test a wide range of planting dates. "Experience is uniformly in favor, all other things being equal," the report stated, "of sowing wheat in this latitude during the month of September." Planting any later than September did not give the wheat enough time to

183. "Difficulties and Discouragements in the Establishment of Institutions for the Promotion of Scientific Agriculture—Plan to Be Pursued," *The Cincinnatus* 1, no. 4 (April 1856): 169.

"tiller and root well before winter." For the question of the time of planting, the college drew on both its own experiments (all the varieties sown after September failed) and, apparently, the experience of local farmers.[184]

Cary then turned to the highly controversial question of how deep farmers should plant wheat seeds. Claiming to break with typical practice, Cary came out strongly in favor of shallow planting (no more than half an inch deep): "science can develop no more obvious truth than this, and we are assured by the most obvious tests in our experience that practice will confirm the same as most correct and proper." Many farmers argued for deep planting so that the seeds might be protected from the frost, which could eject the nascent plant from the soil. Cary claimed that these farmers were attempting to solve the wrong problem. In the winter, the water in the soil froze, which caused the water to expand, which resulted in the frozen water ejecting the wheat plants from the soil. The solution, then, was not to bury the seed below the reach of frost. "How deep would it be secure against such casualty do you suppose, Mr. Farmer?" the report mockingly asked. Answering the question, the report estimated that the seeds would need to be planted at least a foot below the surface, an absurd depth that would prevent the plant from ever emerging. Instead, farmers needed to drain their lands in order to move the water away from their fragile wheat plants. To illustrate, Cary provided cross-sectional diagrams that depicted wheat growing in undrained land, wheat growing in drained land, and the development of wheat when planted at different depths. This last diagram showed that wheat planted at greater depths than half an inch did not reach near the same level of development as wheat planted near the surface. Furthermore, the college had found that

184. "Wheat and Wheat Culture," *The Cincinnatus* 2, no. 9 (September 1857): 398, 402.

six weeks after planting, the product of wheat planted at the surface outweighed by a factor of eight the product of the wheat planted two inches below the surface.[185]

Cary's report on the wheat experiments thus provided farmers with generally applicable rules to follow when cultivating the grain. The report stated its conclusions in rather stark terms. Perhaps some of their views were mistaken, the report admitted, "but before retraction we must have demonstration and that united with practice." The report then summarized its findings in a single blunt paragraph, providing rules for choosing the seed, preparing the soil, and planting the seed. Cary made little allowance for the diversity of situations that farmers faced. As long as the farm's soil was of "proper composition" for wheat, following the rules would result in a "rich harvest."[186] In this way, Farmers' College attempted to tame the democracy of facts by stating clear and generally applicable rules derived from well-documented experiments. The college tried to rationalize agricultural knowledge by providing its own (hopefully) definitive judgment that dispensed with the innumerable claims and counterclaims of farmers that wrote to the agricultural press.

Cultivating Land, Cultivating Men

The experimental farm at Farmers' College sought to improve agriculture through the application of the sciences and rigorous experiments. Promoters of pattern farms, however, had more in mind than just an increase in soil fertility and crop production. Along with this desire for a more rational science of agriculture, pattern farm advocates wanted to cultivate a new kind of farmer, one who contemplated the profound secrets of creation instead of focusing exclusively on the year's profit. As an 1856 article in the

185. Ibid., 398–402.
186. Ibid., 403.

college's *Cincinnatus* put it, educating farmers in agricultural schools would lead to both "the improvement of our Agriculture" and "the mental and moral elevation of those engaged in it."[187] Learning the art and science of agriculture at a school attached to the pattern farm, promoters thought, would transform the young farmer into a gentleman.

Pattern farms and agricultural schools would, their proponents insisted, create a new class of enlightened farmers. Elkanah Watson, famous advocate and chronicler of the Erie Canal, included a call for pattern farms in his 1820 history of canals and agricultural societies in New York. Agricultural schools established in different districts across the state could teach students the theory and practice of agriculture along with the useful aspects of chemistry, botany, and mineralogy. Watson envisioned that men could receive an agricultural education at a flagship institution, and then these agriculturists could teach more students at branch schools in different locations around the state. "In the process of time, under the operation of this benign system...the great mass of our citizens will become scientific farmers," he argued.[188] Anthony Morris lauded the combination of scientific studies and agricultural labor that would be required of students at a pattern farm. The union of learning and labor in the student, he argued, would "form a character as different from that of the uninstructed, undisciplined, and often intemperate clown, as the free, industrious, and intelligent farmer, mechanic and laborer of a republic ought to be, from the dependent, degraded, and ignorant slave."[189] Farmers' College argued in the same vein. An agricultural course that combined the teaching of scientific theory with

187. "Institutions for the Promotion of Scientific Agriculture—Proposed Advantages," *The Cincinnatus* 1, no. 6 (June 1856): 279.
188. Elkanah Watson, *History of the Rise, Progress, and Existing Condition of the Western Canals in the State of New-York* (Albany: D. Steele, 1820), 208.
189. Anthony Morris, "Fellenberg School," *New Harmony Gazette* 3, no. 23 (April 2, 1828): 181.

experimental tests of that theory would improve the students' minds in addition to improving agriculture:

> Through the instrumentality of the frequent and rigid analysis made, and the various experimental tests applied, on the farm, and in the garden, the mind would be inured to close investigation, patient thought, and constant reasonings; and they would induce a habit of scanning profoundly every subject entered upon, so that, instead of sciolists, the tendency would be to make sound thinkers, and active and efficient men in every department of life.[190]

The pattern farm promoters thus sought to make a new kind of farmer that combined the manly qualities of intelligence, reflection, industriousness, and forthrightness in the same person. Farmers would become gentlemen.

Agriculture provided a particularly fertile subject for expanding men's minds, the pattern farm advocates argued. Only a proper education, however, could lead to this happy result. In an 1825 address to the PSPA, Roberts Vaux criticized flowery pastoral literature that gave the impression that mere residence and labor in the country inevitably resulted in a virtuous life for the farmer. "By ascribing to mere locality all that ennobles our nature and constitutes our best estate," these uncritical praises of country life "arrest the development of those principles, and the exercise of those habits, which are every where necessary to the attainment of moral excellence." Achieving such virtue required an active and disciplined intellect. "To the mind opened by liberal studies, and rectified by christian discipline," Vaux asserted, "a country life affords abundant food for reflection and improvement, but, without these preparations, cannot conduce to virtue, more than the busy scenes of a metropolis." The nation, Vaux argued, needed institutions like pattern farms and agricultural schools to enable farmers to achieve an enlightened

190. "Difficulties and Discouragements in the Establishment of Institutions for the Promotion of Scientific Agriculture—Plan to Be Pursued," 168.

view of their work.[191] Pronouncements from Farmers' College expanded on this view. In an 1856 address during the dedication of a new building for the Agricultural Department of the college, Cary admitted that farmers could indeed make money without much education. Farmers, however, wasted the opportunities their profession presented when they eschewed learning. No profession "affords the materials of a richer or more varied culture, or a more profound and thorough development of all that constitutes true man—and the truly great man too—than does Agriculture." Indeed, agriculture "is the embodiment of all science."[192] An article in *The Cincinnatus* earlier that year made even grander pronouncements on this theme. Agricultural schools with pattern farms would encourage students to employ their minds when cultivating the soil. Such an education would "greatly elevate the present standard of man's intellectual and social condition" by making agriculture more than just a means to make money. Unlike mere book learning, a student's study of agriculture would put him in direct communion with nature, which would give him "a power of investigation and a vigor of thought." This contact with the book of nature would "[turn] every object and occurrence which he meets into an instrument of instruction, and he will find the world around him no longer a dull, desolate, inanimate chamber, but its walls over radiant with lessons of wisdom, and every object with which it is crowded vocal with the teaching of a divine spirit."[193] In these statements about the intellectual possibilities of the study of agriculture, the pattern farm promoters argued that scientific education would elevate the view of the farmer, allowing him to rise above the petty day-to-day concerns of moneymaking and turn his attention to

191. Roberts Vaux, *Address Delivered Before the Philadelphia Society for Promoting Agriculture at Its Annual Meeting on the Eighteenth of January, 1825* (Philadelphia: Port Folio Office, 1825), 23–24, 27.
192. F. G. Cary, "Dedication of Polytechnic Hall," *The Cincinnatus* 1, no. 11 (November 1856): 542–43.
193. "Institutions for the Promotion of Scientific Agriculture—Proposed Advantages," 285–86.

the wonder of creation. An enlightened farmer did not just raise a better crop; he cultivated his mind by contemplating nature, the site of his labor.

Finally, advocates for pattern farms held that institutions for educating farmers would turn them into virtuous citizens in the American republic. Giving farmers a sound education would enable them to represent their class effectively in public offices, Jesse Buel argued. An agricultural school "would soon furnish a body of men, whose feelings, habits and interests would be purely agricultural—whose education would fit them to perform the highest public trusts—and whose influence in our councils, and among the people at large, would afford the best guarantee of a popular—of an honest administration of public affairs."[194] Farmers' College worried that the agricultural class was subject to manipulation by the educated few. "Any demagogue that knows enough to flatter their prejudices against wealth and aristocracy...is entitled to crawl into power and use it for his own rather than his country's good," an 1856 article in *The Cincinnatus* stated. If only farmers as a class received a high level of education, they could resist the designs of these troublemakers.[195] The pattern farm promoters sought to tame not just the democracy of facts, but the democracy of the American polity.

In Defense of Mammon

It is tempting to see the movement to establish pattern farms as a logical and necessary step to bring the definitive judgments of "science" to agriculture. Benjamin Cohen points out, however, that in the early nineteenth century, agricultural writers "[questioned] *whose* science was valid, the farmer's or the philosopher's."[196] Articles in the *Massachusetts Ploughman* of 1850 provide an account of agricultural science than ran

194. J. Buel, "Agricultural School," *The Plough Boy, and Journal of the Board of Agriculture* 4, no. 35 (February 11, 1823): 300.
195. "Institutions for the Promotion of Scientific Agriculture—Proposed Advantages," 288.
196. Cohen, *Notes from the Ground*, 51–52.

counter to the method proposed by the pattern farm advocates. In doing so, the editor of the journal defended an account of science that placed authority in practical working farmers rather than the experiments at a pattern farm. He also stood up for working farmers who did, in fact, desire to make money and rise in society.

All the talk of bringing "science" to agriculture alerted the editor to potential pitfalls in plans to establish pattern farms and agricultural schools. The farmers of Massachusetts would not, and should not, take instruction on scientific agriculture from foreign professors, he remarked. Although any agricultural school that Massachusetts might establish should teach scientific subjects like agricultural chemistry, geology, botany, and entomology, he wrote, the school should also employ "actual, practical, hardhanded men to teach the best practices in Husbandry—in New England Husbandry." The state could identify such men by their ability "to make money by farming." Employing these practical farmers, who made a decent living on their own, would prevent the school from becoming a seat of corruption by attracting ambitious pretenders with the promise of a sinecure. Referencing the state-funded agricultural survey of Massachusetts conducted by Henry Colman in the late 1830s and early 1840s, the editor claimed that Colman "learned more in traversing the State as far as Berkshire, than he had before ever learned of the Art in so short a time." Practical and experienced farmers, therefore, already had solid knowledge of agriculture, and they, not foreign savants, should take the reins of any institution that sought to improve the state of the art.[197]

The editor of the *Ploughman* reiterated many of these points in a response to a letter from a correspondent in Watertown, Massachusetts. In the letter, which the paper

197. "Farm School for Massachusetts," *Massachusetts Ploughman and New England Journal of Agriculture* 9, no. 19 (February 9, 1850): 1.

did not publish in full ("we think the writer, on reflection, would not like to have it go before the public with his name attached to it"), the correspondent took issue with the editor's opposition to the employment of foreign professors in a proposed state agricultural school. From the correspondent's liberal quotations of Greek, the editor surmised that "he is one of those very professors who would like employment here." The correspondent further "laments that we have so little of *Science* in the Ploughman." The paper noted his letter, the editor wrote, "merely to show that we have such men among us —men who assume to know more about our agriculture in consequence of *the books they have read*, than the most intelligent owners and occupiers of our best farms." Then the editor launched into a critique of the glamorization of science. Many foreigners, he said,

> talk much of Scientific Farming. Men who cannot write our native language correctly are the most clamorous to introduce what they call *science*. If we rightly understand the meaning of the term *Science* it is nothing more or less than *knowledge*. It comes from the Latin word *Scio (to know.)* If we are not right our learned friend will correct us.
>
> If we should be in the practice of using the term *knowledge* for *science* people would not be so often imposed upon. They imagine some mystery is covered in the fluent phrase, "Scientific Agriculture."[198]

The editor thus argued that the practical knowledge gained through actually farming in New England trumped the "science" brought from the outside by European savants. This "scientific" knowledge in learned treatises could not claim superiority over the knowledge gained through experience in the fields. The editor's response defended an empirical science that put the emphasis on the observations culled from working farmers who had achieved success in New England, not somewhere else. This approach contrasted with the pattern farm's attempt to uncover general principles of agriculture that

198. *Massachusetts Ploughman and New England Journal of Agriculture* 9, no. 21 (February 23, 1850): 1.

farmers could then apply to their situations. The editor did not speak of uncovering fixed and permanent principles of agriculture; he wanted *New England* farmers to teach in a *New England* agricultural school.

Finally, the editor repeated that actual profits ought to be the sole criterion for judging farmers and farming methods. "We adopt no system that is not to result in profits to the farmer," the editor proclaimed. "We cannot afford to throw away a great deal for fancy." He cited the example of a "Mr. French of Braintree," who "has expended lots of money on his farm. He is rich enough and can afford to amuse himself in this way." Despite this farm's great reputation, French had not published the actual profits he had obtained through farming, and if he did, the editor estimated that he would need to admit to having costs that tripled his revenues.[199] The editor, in contrast with the gentlemen who advocated for pattern farms, did not concern himself with creating an agriculture of permanence that maintained the fertility of the soil over the long haul, nor did he speak of knowing creation more fully through the practice of agriculture. In true democratic style, he defended the ambition of ordinary farmers and vowed to maintain his focus on helping them to get ahead. He unapologetically endorsed the pursuit of wealth and private advancement.

From a traditional reading of the Enlightenment, the *Ploughman*'s account of agricultural science might be considered decidedly unenlightened. The editor displayed marked anti-elitist tendencies that, from a certain vantage point, might seem like opposition to science itself. This interpretation would be mistaken, however. In the first place, the editor and the promoters of pattern farms agreed in their basic methods. Both advocated for an empiricism that sought to use the lessons of experience to improve

199. Ibid.

agriculture. They differed in who exactly had the creditability to produce legitimate facts. For the promoters of pattern farms, the experience of the lone cultivator toiling away on his farm could not produce the complete and accurate information that a pattern farm run by leisured men of science could. In contrast, the editor of the *Ploughman* thought that these pattern farms already existed in the form of profitable working farms in New England. The experience that successful farmers gained throughout their working lives would result in much more accurate knowledge about how actually to cultivate the land than the knowledge promulgated by men of science schooled in the intricacies of chemistry but not in the rigors of plowing and hoeing. The editor's single criterion for choosing teachers for an agricultural school—the ability to make money by farming—meant that he did not concern himself with discovering the universal laws of agriculture; he only cared about what worked. This epistemological pose, with its rejection of the search for general or abstract ideas, reflected the skeptical attitude towards natural philosophy articulated by Locke, Berkeley, Hume, and much of the rest of the British Enlightenment thinkers.

Conclusion: Unfulfilled Expectations

Although the PSPA never succeeded in founding their pattern farm, several agricultural schools that included pattern or experimental farms were started in various states, including Maine, Connecticut, and Ohio. Many of these institutions only survived a few years. The few that made it past 1860 eventually succumbed to the deprivations of the Civil War.[200] Most of the agricultural community seems to have responded to these pattern farms and agricultural schools with indifference. For example, Daniel Lee

200. Bailey, *Cyclopedia of American Agriculture*, 4:363–76.

founded the Western New York Agricultural School in Wheatland, New York, in 1846.[201] In January of 1847, Lee wrote a plea to the agricultural community asking for $300 "to purchase chemicals for the Laboratory, and aid a little in diminishing the tax on the Principal for the high rent for the premises." Lee wanted to ensure that all classes of students, not just sons of the rich, could attend the institution.[202] Lee failed to obtain enough funds, and the institution closed.[203] Ensuring the permanence of experimental farms and agricultural schools would require the patronage of the state and federal governments, which came in the Morrill Acts and the Hatch Act. As Alan I. Marcus notes, the first state-funded experiment station, the New York Agricultural Experiment Station, was explicitly dedicated to increasing the profits of farming through scientific methods.[204] Perhaps, then, in order to garner popular support for these experimental farms, their proponents needed to emphasize the improvement of farmers' material condition over the improvement of natural knowledge and the moral elevation of farmers.

The reaction to the closing of the Mount Airy Agricultural Institute perhaps epitomized the tensions in the scientific culture of the young country. As principal of the Dutchess Agricultural Institute, John Wilkinson moved this school and its students from Dutchess County, New York, to Germantown, Pennsylvania, in 1848. In close proximity to Philadelphia, the school seemed to prosper at first. The institute occupied the farm of James Gowen, a highly regarded agriculturist who had purchased the Mount Airy farm following a career in business.[205] Prominent agricultural papers published attractive

201. Daniel Lee, "Western New York Agricultural School," *The Genesee Farmer* 7, no. 1 (January 1846): 7.
202. "Western New York Agricultural School," *The Genesee Farmer* 8, no. 1 (January 1847): 24.
203. E. Merton Coulter, *Daniel Lee, Agriculturist: His Life North and South* (Athens: University of Georgia Press, 1972), 8.
204. Marcus, "Wisdom of the Body Politic," 16.
205. James Gowen, "Farming and Agricultural Education," *The American Farmer, and Spirit of the Agricultural Journals of the Day* 3, no. 10 (April 1848): 315–17; "Mount Airy Agricultural Institute,"

engravings of the institute's buildings, thus providing advertising for the school.[206] Wilkinson reported in 1849 that Jose Tell Ferrao, a young man "sent by the Brazilian Government," had enrolled in the institute so that he could gain the knowledge to open an agricultural school in his native country.[207] In the same year, several gentlemen made a positive report of the public recitations of the students in many subjects. "The catechetical exercises on *practical agriculture* were very interesting," they reported. "By the promptness and accuracy of their answers it was evident that they were not only familiar with the agriculture of their own country but also with that of others."[208] In May of 1849, Wilkinson boasted of a profit of $741.70 from the 70 acres of land managed by the institute.[209]

Despite all of these positive reports, the institute closed in 1853. The *Southern Planter* expressed its dismay in a biting editorial comment:

> We are sorry, but not surprised, to learn...that the Agricultural School at Mount Airy has turned out an unprofitable speculation, and that the Principal, who has been working there and elsewhere for the last eight years without pecuniary profit, is about to abandon the business. So long as it is thought by the agricultural community that farming comes from nature they will not receive much instruction from schools. The sordid bumpkin, ignorant as his beast, and hardly superior to him in taste, grows rich with his narrow income in spite of his bad farming. The man of liberal expenditure cannot, with his good farming, more than balance his outgoings. The result, in a mere pecuniary point of view, is, perhaps, in favor of the former; and men of sense, as if habits and modes of life were to go

Southern Planter 8, no. 4 (April 1848): 113.

206. "Mount Airy Agricultural Institute," *The Cultivator* 5, no. 7 (July 1848): 216.

207. "The Mount Airy Agricultural Institute," *The Cultivator* 6, no. 1 (January 1849): 31; Mount Airy Agricultural Institute, *Catalogue of the Mount Airy Agricultural Institute, Germantown, Pa., Designed for Instruction in Scientific and Practical Agriculture, Mathematics and the Natural Sciences* (Philadelphia: T.K. and P.G. Collins, 1849), 3.

208. James Smith et al., "Mount Airy Agricultural Institute," *The American Farmer, and Spirit of the Agricultural Journals of the Day* 4, no. 10 (April 1849): 344.

209. John Wilkinson, "Profits of Farming," *American Agriculturist* 8, no. 5 (May 1849): 158.

> for nothing, refer the art of growing rich to the possession of a lucky secret, and set down the practices of each class as equally commendable, or give the preference to the farming of the clown.[210]

This response to the institute's failure contained all the elements of the gentlemanly critique of ordinary American farmers. The typical farmer arrogantly assumed that farming came "from nature" and that no serious study of scientific principles was necessary to achieve success. To his dismay, the editor of the *Planter* noted that those farmers who spent as little as possible on their farms usually made more money than the gentlemen who sought to preserve the fertility of their land through greater expenditures. Since the miserly farmer could boast greater profits, at least in the near term, compared to the more liberal farmer, society judged the former a greater success. The ordinary farmer, according to the editor, could not elevate his view from a blinkered focus on profits to the permanent natural laws that might aid him in improving his cultivation.

Ultimately, as the *Southern Planter*'s reaction revealed, the argument came down to who had the authority to collect and disseminate information about agriculture. Could working farmers improve their art through the give and take of their experiences in the fields, or did men of science need to step in to impose order on the agricultural democracy of facts? Empirical Enlightenment science in America, therefore, found itself bound up in questions about the social status of the investigators of nature.

210. "Use of Guano on Summer Crops," *Southern Planter* 13, no. 2 (February 1853): 40.

CHAPTER 4

GEORGE BLACKBURN, CELESTIAL TRAVELER

Introduction

From 1800 until his death in 1825, Irish native George Blackburn applied his skills as a mathematician and astronomer in various posts in the southern states. He taught mathematics, astronomy, and natural philosophy at the College of William and Mary in Virginia, the South Carolina College, and several other academies. In addition, he served as the astronomer on two projects undertaken by the state of South Carolina, an 1813 expedition to determine the boundary line between North Carolina and South Carolina and an 1816 survey in preparation for the construction of a map of the entire state.

Blackburn's career in America allows for an examination of the practice of mathematics and astronomy in the Early Republic. The Irishman left behind an eclectic collection of records that provide for a close consideration of his attitudes towards American society and the place of science in the young republic. For example, Blackburn wrote a lengthy poem about his experiences during the boundary expedition that mocked the representatives of the two states and criticized what he saw as the rampant religious bigotry in Columbia, South Carolina, the home of South Carolina College. Blackburn's writings reveal a man with great confidence that the progress of sciences, particularly mathematics and astronomy, would triumph over the forces of superstition and

intolerance. He also advocated the employment of astronomical methods on the two South Carolina projects in order to obtain a true account of the state's geography that would allow for internal improvement.

The Light of Science

Blackburn's experience in teaching mathematics, astronomy, and natural philosophy at several colleges and academies provided the background to his surveying activities. His reflections on the value of these sciences in the education of young men and women recalled Condorcet's optimism that the progress of learning would go hand in hand with the progress of society. The diffusion of science, Blackburn argued, would clear away the clouds of superstition and bigotry, especially in matters of religion.

Before beginning his career as a teacher, Blackburn received his education at Trinity College, Dublin. Here, he received his first taste of the sectarianism that he would oppose throughout his life. Born in County Wicklow, Ireland, in 1765, Blackburn probably entered Trinity sometime around 1780.[211] Around this time, Trinity was known as the university of the Protestant Ascendancy in Ireland. Raised in a Catholic family, Blackburn would have been ineligible to receive a degree unless he took an oath renouncing his inherited faith.[212] Blackburn would firmly reject Catholicism, and his writings include satires of church shrines and doctrines. But he also recoiled against the authoritarianism of the Anglican Church, a position that would shape his distrust of

211. Based on a review of a list of Trinity alumni, most young men entered Trinity between the ages of fifteen and twenty. Although LaBorde reports that Blackburn attended Trinity, his name does not appear in the list of alumni. George Dames Burtchaell and Thomas Ulick Sadleir, *Alumni Dublinenses: A Register of Students, Graduates, Professors, and Provosts of Trinity College in the University of Dublin (1593-1860)* (Dublin: A. Thom & Co., Ltd., 1935); Maximilian LaBorde, *History of the South Carolina College* (Columbia, S.C.: Peter B. Glass, 1859), 79; York Lowry Wilson, *A Carolina-Virginia Genealogy* (Aldershot, U.K.: Gale & Polden Ltd., 1962), 49–51.

212. Constantia Maxwell, *A History of Trinity College Dublin 1591-1892* (Dublin: The University Press, 1946), 128n15, 129.

Episcopalian leadership in South Carolina. "The oppressions and avarice of the Episcopal clergy in Ireland exceed perhaps those in any other portion of the globe, not excepting Italy, Portugal, or Spain," he railed in his journal. "They are doing wonders in So. Car."[213]

Trinity provided its students with a thorough grounding in astronomy. Dr. Francis Andrews, Provost of Trinity from 1758 until his death in 1774, left money in his will to improve the school's astronomical resources. His last testament endowed a professorship of astronomy and gave Trinity land and money with which to erect an observatory. Trinity included a variety of mathematical and scientific subjects in its curriculum, including "Euclid, astronomy, mechanics, hydrostatics and optics." A Trinity student's notes on an astronomy lecture in 1777 made plain that the professor regarded astronomy as both useful and morally uplifting:

> *Q.* What is the use of studying Astronomy?
> *R.* …without it we could have no Geography or Chronology of consequence, no certain declaration of History, navigation has received the greatest improvement from it…
> *Q.* What is the moral use of studying astronomy?
> *R.* Because it leads us to entertain just notions of the infinite wisdom and goodness of our Creator.[214]

Blackburn would take a similar position in his reflections on the value of science. He thus encountered at Trinity the two forces that would shape much of his life: sectarianism and a belief in the beneficent power of science to overcome such intolerance.

Blackburn immigrated to Philadelphia in 1800. The turbulent closing years of the eighteenth century in Ireland may provide a clue for his decision to depart. In 1798, Irish republicans, inspired by the American and French Revolutions, had risen up to fight the Protestant Ascendancy and British rule. Britain put down the Irish Rebellion in a matter

213. George Blackburn, *The Astronomer's Journal*, ed. Minerva Wilson Andrews (McLean, Va.: Carolina-Virginia Genealogy Publishing Co., 1995), 40, 44.
214. Maxwell, *History of Trinity College*, 122, 149, 152.

of months, but life in Dublin took a turn for the worse. Martial law was declared in the city, and Trinity was unable to hold examinations. In the aftermath of the rebellion, the Acts of Union fully united Ireland with the rest of Britain and stripped the Protestant Ascendancy of its dominance in Ireland. Trinity suffered through this action; it lost some of its representation in Parliament, and its intellectual life declined.[215] Although Blackburn did not explicitly name these events as the reason for his departure from Ireland, he did mention that he came to America in part because he "was weary of the sanguinary and tumultuary scenes of Europe."[216]

Blackburn carried with him letters of introduction from persons familiar with his knowledge of science and his skill as a teacher, and in his writings Blackburn cited these references as proof of his status as a man of science.[217] Blackburn established academies in Philadelphia and Fauquier County, Virginia.[218] His letters of introduction proved valuable when Bishop James Madison, President of the College of William and Mary, wrote Benjamin Rush to inquire about Blackburn's availability to fill the professorship of mathematics. Thanks to Rush, Blackburn was duly elected to the position in 1804. At least one student remembered Blackburn as a skilled teacher, and students took to calling him "Old Triangle," probably a reference to his mathematical teachings. He apparently needed all of his skill as a teacher, as he found the students unprepared for courses in higher mathematics, and many needed remedial attention in the subject.[219]

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215. Ibid., 179–80.
216. George Blackburn, "To the Governors and Visitors of William and Mary College," n.d., University Archives Faculty-Alumni File Collection, Special Collections Research Center, Earl Gregg Swem Library, College of William and Mary.
217. Ibid.
218. Wilson, *A Carolina-Virginia Genealogy*, 50.
219. Susan H. Godson, *The College of William & Mary: A History*, vol. 1 (Williamsburg, Va.: King and Queen Press, 1993), 178, 166, 176.

Blackburn expanded on the challenges he faced at the college in a printed broadside that he presented to the board of visitors, the governing body of William and Mary. The Irishman admitted that his initial attempts to instruct students in the mathematical sciences had failed, and he had turned to "a more familiar and popular method of instruction." His students, Blackburn explained, underestimated the effort required to achieve "even a moderate degree of excellence" in the mathematical sciences. He understood why many students were unwilling to give these subjects the attention they deserved. The student entering the college "observes that these sciences had not the easy, attractive, and accommodating charms of Metaphysicks to recommend them; that they seldom introduce their votaries to places of emolument, or of political importance, and that they hardly receive even the agreeable incense of applause." America presented these obstacles in abundance, Blackburn argued, because the country had not caught up to the nations of Europe. "In Europe," he explained, "many centuries elapsed between the establishment of regular government, and the diffusion of literature; in America, a few years has sufficed to produce a similar effect; it is therefore rational to presume that the sciences will advance with equal rapidity as soon as the general mind is awakened to their importance." The sooner the promotion of the sciences occurred the better, he contended, for "their advantages are not confined to purposes of practical utility; to attract and fix the attention, and to enable the mind to discover within itself those solid resources which opinions not founded on demonstration, can seldom afford, are amongst their ordinary effects."[220]

But in order to obtain the beneficial effects of the mathematical sciences, students needed to come to college prepared. Blackburn had found that most of the students that

220. Blackburn, "To the Governors and Visitors."

entered his courses lacked even a basic knowledge of such minor branches of mathematics as arithmetic, algebra, and geometry. To alleviate this state of affairs, Blackburn proposed that he be put in charge of a school of mathematical sciences within the college. Here, Blackburn could teach "all the necessary branches prepatory to a regular course of mathematicks, and of Natural and Experimental Philosophy, such as the mae [more] abstruse parts of Arithmetick...Algebra, and Geometry." All students entering the college ought to take an examination in mathematics, and if found wanting, should attend this school until they were prepared for the higher branches of the science. Blackburn also proposed that this school could "be open to such persons not being students or not intending to become such as may wish to acquire a knowledge of particular branches as Navigation, Military mathematicks, Surveying &c." Besides preparing the children of the elite with a liberal course of mathematical science, Blackburn suggested that the school could also instruct men from more "moderate circumstances" who had an interest in teaching the youth of the state. Only men from these middling backgrounds would "submit to the task of instructing youth" and "discharge the painful duties implied in that profession with zeal and fidelity."[221] Blackburn spoke from many years' experience in struggling to impart knowledge to young people. He reiterated the lack of preparation he observed in Virginia students in two newspaper advertisements for academies he ran in Williamsburg while attending to his college duties. In soliciting students for private lessons in mathematics, Blackburn commented that "the strangely defective state of preparation in which many of them commence their studies in my classes, have compelled me to reject much of the ancient method of demonstration, and many things in modern mathematicks which are more

221. Ibid.

properly objects of speculation than of utility." He mentioned the works of Charles Hutton and John Bonnycastle as models for his teaching. These two Englishmen had both published a series of mathematical textbooks on a variety of subjects in the late eighteenth century.[222] Blackburn also placed an advertisement for a female academy in Williamsburg that he and his colleague Professor Plunkett ran. He promised to teach the young ladies in his charge "as much of Astronomy & of almost every branch of Natural Philosophy as can be understood by popular methods of illustration, and without mathematical investigation." Blackburn planned to add "some minor branches of the mathematics, such as Algebra, Geometry, Spherics, &c." for those young women who displayed promise. This course of study for young ladies might seem odd, Blackburn admitted, "but the experience of ten years in Virginia, and of a much longer period in other countries, has taught me that females are, in many instances, at least as capable of acquiring that kind of learning which demands patient investigation, as the other sex."[223] Blackburn's statements in regards to the female academy stood in contrast to those about his male students. The advertisement for the female academy did not emphasize the practical uses of mathematics. His male students' resistance to abstract mathematics led Blackburn to downplay the more abstruse branches of mathematics in favor of a study that could be applied to practical problems of navigation and surveying.

In 1811, after more than half a decade in service to William and Mary, Blackburn applied for and received the professorship of mathematics and astronomy at South Carolina College.[224] Several factors likely contributed to this decision to transfer to the

222. G. Blackburn, "Mathematical School--William and Mary College," *The Enquirer* 7, no. 57 (September 14, 1810).
223. Geo. Blackburn, "Williamsburg Female Academy," *The Enquirer* 7, no. 57 (September 14, 1810).
224. "Minutes of the Board of Trustees of South Carolina College," November 28, 1811, South Caroliniana Library, University of South Carolina.

new state college in Columbia. During Blackburn's tenure at William and Mary, the college faced an identity crisis. Thomas Jefferson's attempt in the late eighteenth century to modernize the college's curriculum set off a long conflict between traditionalist Episcopalians and secular republicans for control of the college. Bishop Madison, the president of the college, embodied this struggle. He was a political ally of Jefferson, but the Archbishop of Canterbury had given him his title. As one historian puts it, "Where liberals saw a relic of monarchy and an established church, conservatives saw a hotbed of freethinking, Francophilism, and disorder. Led by a living anomaly, a Jeffersonian bishop, suspected by both ends of the ideological spectrum, William and Mary had something to offend everyone." The effort required to keep the college functioning wore on Madison's health, and in 1807 he actually wrote President Jefferson to ask for an appointment as collector of customs at Norfolk so that he could resign as president of the college. Jefferson had already offered the customs post to someone else. Based on his later criticism of South Carolina College's growing sectarianism, Blackburn likely realized that Madison would not be around much longer to stem the tide of Episcopalian attempts to retake the college. The resources for science at the College were unimpressive as well. Although Madison taught courses in natural philosophy with a conviction that science was both useful and morally good, the college owned only one telescope and some apparatuses. Attempts to found a society for the study of natural history at the college floundered. Once a respected bastion of learning in America, the old college was on the decline from infighting and lack of funds. South Carolina College, generously supported by state appropriations, must have seemed like a welcome change.[225]

225. Godson, *The College of William & Mary: A History*, 1:169, 195–97, 191, 177.

Almost immediately upon arriving in Columbia, however, Blackburn began to regret his decision. South Carolina College offered an environment for teaching and science that was in some ways worse than William and Mary. The college charged him with teaching the older students a course on mechanical philosophy, but he found that they lacked the prerequisite mathematical knowledge to begin. Large numbers of students ceased attending his lectures. A student reported that Blackburn commented "that it might be that half of his class were smart fellows, for he never saw them; but the half who attended his recitations were as laborious as oxen, but as stupid as asses." The college possessed as few if not fewer scientific apparatuses than William and Mary, a situation that Blackburn worked to remedy. "I had completed an observatory with its proper furniture," he lamented, "but this useful project must fail" for want of a telescope. The standing committee of the college required Blackburn to submit weekly reports of students' progress, a task that greatly annoyed him. Members of the standing committee overturned Blackburn's decision to suspend certain students for various offenses. Blackburn argued that the faculty should be in charge of the day-to-day operations of the College, and he maintained that the constant infringements of the standing committee were degrading the authority of the professors.[226]

Just as he had done at William and Mary, Blackburn felt the need to set forth the reasons for studying the mathematical sciences in an attempt to convince his classes of their value. In an address to students in the mathematical department at South Carolina College, Blackburn again lamented that the students sought an easy and basic understanding of mathematics instead of applying themselves to a mastery of the higher

226. George Blackburn, *Narrative of Transactions in the South-Carolina College During the Three Last Courses*, 1814, 5–7, 38, 11, 10, 20; LaBorde, *History of the South Carolina College*, 82–83.

branches. His attempts to reform the mathematical department along more rigorous lines had received resistance from students who did not wish to make the necessary effort. Blackburn insisted that "I shall do what I conceive to be my duty, without any regard to idle prejudices, sometimes erroneously dignified with the appellation of public opinion." Getting down to specifics, Blackburn argued that any understanding of "sound philosophy" required the mastery of three "abstract" kinds of mathematics: "numbers, algebra and fluxions, or the infinitesimal calculus." Each of these three branches "grow naturally and regularly out of each other" in the order that he listed them.[227] Blackburn went on to list other branches of mathematics, such as geometry, logarithms, trigonometry, spherics, and conic sections, that students needed to learn prior to entering into the study of natural philosophy and astronomy. He intended to teach "such parts of astronomy as are wanted to determine the latitudes and longitudes of places, such as lunar distances; solar and lunar eclipses, transits and occultations of stars by the moon." In natural philosophy, he intended to cover "all the branches directly dependant on the mathematics," such as the motion of bodies, forces, optics, and the tides.[228]

Blackburn argued that although this course might seem expansive and difficult, such studies had incalculable benefits for training the minds of young men. Proceed through the course he had outlined, Blackburn stated, and you "will then look down upon the gloomy vale of ignorance which you have quitted, with self gratulation and applause, and elevated above the clouds and mists of error, enjoy a world peculiarly your own." Presently, the study of the sciences in America did not serve as "passports to places of honour or emolument," but "they serve a more important purpose; they teach us to think

227. Blackburn, *Narrative of Transactions*, 55–56.
228. Ibid., 56–57.

and reason for ourselves; instructed by them, we reject unfounded theories and hypotheses, though sanctioned by the rust of ages; they remove from our eyes the films of prejudice; they prepare our minds for the reception of great truths; and they shew us where to find the true source of mental independence."[229] Blackburn's advocacy of mathematics and natural philosophy thus reflected Condorcet's account of the mutual progress of the sciences and of the mind in general. The sciences combated ancient prejudices and bigotry and taught men to accept only those ideas that met the test of reason.

Despite Blackburn's optimism about the enlightening power of the sciences, affairs quickly took a turn for the worse in Columbia. In February of 1814, in response to Blackburn's disciplining of students who attempted to steal the college bell, the student body began rioting. The students burned Blackburn in effigy, damaged Blackburn's house with brickbats while his wife and daughters were inside, and succeeded this time in destroying the bell. Authorities were forced to call on the militia to restore order at the college.[230] Blackburn also clashed with citizens outside the college boundaries. One Sunday, a shop keeper refused to sell him "some emollient" to relieve his "Billious fever." In anger, he wrote a note to the shopkeeper "intimating that the Jews were told it was lawful to do good on the Sabbath day." These "heterodox" remarks apparently caused quite a scandal in Columbia.[231] Religious citizens also took issue with Blackburn's lack of church attendance, and the various sects attempted to claim him for their own. Blackburn sarcastically retorted that perhaps his lack of piety made him an inept professor of mathematics. "What right have these people, who have no connxcion [sic]

229. Ibid., 57–58.
230. Ibid., 26; Daniel Walker Hollis, *University of South Carolina* (Columbia: University of South Carolina Press, 1951), 62–63.
231. Blackburn, *Narrative of Transactions*, 8.

with the college nor its professors, to dragoon them into their churches?" Blackburn asked.[232]

Blackburn in fact did possess some unorthodox religious views, as his interest in Emanuel Swedenborg demonstrates. Denouncing the attempt by various sects in Columbia to pressure him into attending their churches, Blackburn stated, "Perhaps I have chosen a different route, and am a pupil of Swedenbourg, the celestial traveller."[233] Swedenborg, a Swedish man of science who experienced prophetic visions in the middle of his life, put forward an alternative account of Christianity that incorporated scientific ideas into his interpretations of his visions and the Bible. For example, Swedenborg utilized contemporary scientific ideas in anatomy and physiology to explain his account of the structure of heaven and hell and the nature of the body of Christ. Blackburn, as a man of science struggling to bring the Enlightenment to South Carolina, must have found Swedenborg's scientifically informed religious teachings intriguing.[234] Swedenborg's theology compared favorably with the sectarianism of Columbia, Blackburn argued. "His religion has some good features, *that these good people might profit by*," Blackburn stated, "since he makes Benevolence the sum of all virtues; and comprehends all the vices in *sordid, selfish, malevolence*."[235] Swedenborgians believed that those who led a life of good works but did not belong to the Swedenborgian church would nonetheless receive salvation. As a man who despised sectarianism and the machinations of various sects, Blackburn likely appreciated Swedenborg's liberal Christianity. Swedenborg and his followers had founded a church, but Blackburn does not seem to have been a fully fledged member. In part of his journal containing a copy of a letter sent to a friend,

232. Ibid., 7–8, 16.
233. Ibid., 16.
234. Jonsson, *Emanuel Swedenborg*, 181, 137.
235. Blackburn, *Narrative of Transactions*, 16–17.

Blackburn declared, "About that Book of Universal Salvation I have too much to say to put it in a Ballade, one thing I think – I would not be very fond, bad as I am, - of belonging to a society in the New Jerusalem, where I should meet everyone I see in the old one."[236] This passage likely referred to Swedenborg's descriptions of heaven. According to Swedenborg, heaven, or the New Jerusalem, very much resembled life on earth, so much so that some recently deceased people did not know that they had died. In heaven, the spirits of the dead actually formed societies with people they had known in life.[237] Ever the cantankerous chap, Blackburn worried that he might have to spend eternity with those he already knew all too well. Swedenborg's religious thought thus reflected Blackburn's hope that "science" would lead to "universal benevolence," a more open and tolerant religious life.[238]

Throughout his career as a teacher of mathematics and natural philosophy, Blackburn lamented that science did not receive its just due in America. In his view, because of their lack of understanding of the sciences, and especially the mathematical sciences, his American students came to his courses unprepared and unwilling to exert the necessary efforts to achieve even a modest understanding of them. The poor status of the sciences in South Carolina went hand-in-hand with Columbia's religious intolerance, and Blackburn put forward Swedenborg as a response to the prejudice that he experienced. Blackburn did succeed, however, in applying his mathematical knowledge to two state surveying initiatives in South Carolina, and an examination of his work on these projects provides further insight into Blackburn's account of science that placed mathematical methods at the head of scientific inquiry.

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236. Blackburn, *Astronomer's Journal*, 42.
237. Jonsson, *Emanuel Swedenborg*, 144.
238. Blackburn, *Astronomer's Journal*, 42.

The Boundary Line Survey, 1813

In 1813, Blackburn served as the astronomer on an expedition to determine the boundary line between North Carolina and South Carolina. The boundary dispute between the two states had remained unresolved since colonial times because of errors in determining the 35th parallel of northern latitude. Many persons along the western part of the supposed boundary line did not know in which state they resided. An 1808 agreement between the two states stipulated that the course of the line would depend on where the 35th parallel struck the Blue Ridge Mountains.[239]

In Blackburn's journal that recounted the expedition, he emphasized the difficulties under which he labored. To determine the latitude at different points near the boundary, he wanted several instruments that he could not obtain in South Carolina: "a circle of Borda, a good circumferentor, a small Theodolite and a zenith sector." All of these devices provided various ways to measure the angle between points. Instead, he could only procure a "sextant of which the short tellescope had been mislaid, and which in its perfect state could be of no use in taking the sun's mer. [meridian] altitude at that season of the year in that latitude." The meridian altitude was the point at which the sun (or any other celestial object) passed through the north-south line. Like the other devices, the sextant, a 60-degree curved instrument, allowed the user to measure the angle between two points. This device found its most common use in determining the latitude of a ship at sea by finding the angle of elevation between the horizon and the North Star. In Blackburn's case, however, the North Star was often not visible because of natural obstructions like clouds, trees, or mountains. In this case, the user could measure the

239. Marvin Lucian Skaggs, *North Carolina Boundary Disputes Involving Her Southern Line* (Chapel Hill: University of North Carolina Press, 1941), 129–40; A. S. Salley, "The Boundary Line between North Carolina and South Carolina," *Bulletins of the Historical Commission of South Carolina* 10 (1929).

elevation of various other stars and planets. He or she would then consult published tables to translate his or her measurements into latitudes. Because Blackburn could not use the sextant to determine the elevation of the sun, "all my observations were made in the night, - the stars also that passed the meridian during the night were few in number, and of small magnitude. On the mountains too the clouds rise so quickly and spread with such rapidity, that the observations were frequently lost." All of these obstacles "render'd the work much more difficult than it would otherwise have been. It was however executed in a correct and satisfactory manner."[240]

Blackburn took pride in his astronomical observations, and he contrasted his method of astronomical surveying with ground surveys. In the poem he composed about the expedition, Blackburn mocked Robert Macnamara, his assistant surveyor, for his lack of astronomical knowledge. The Irishman complained that Macnamara was called an astronomer even though he only had experience as a surveyor. He sarcastically predicted that soon misguided public opinion, which ruled America, would declare Macnamara a professor even though the surveyor had no qualifications for the post.[241] In a pamphlet that Blackburn wrote that blasted the governing board of South Carolina College for interfering with the authority of professors, he stated that "I find there is here a set of men who affect to put a wonderful value, upon what they call public opinion. I call it the humour of the day, and when it meddles with subjects beyond its reach of understanding, I laugh at it."[242] In Blackburn's view, his knowledge of astronomy and natural philosophy gave him expertise that ought to place him in a position of authority over ordinary men in

240. George Blackburn, "Report, Poem, and Notes on the Boundary Expedition of 1813," 1813, South Carolina Archives and History Center; For a description of how surveyors obtained latitude with astronomical measurements, see Edwin Danson, *Drawing the Line: How Mason and Dixon Surveyed the Most Famous Border in America* (New York: John Wiley & Sons, 2001), 38.
241. Blackburn, "Report, Poem, and Notes."
242. Blackburn, *Narrative of Transactions*, 33.

matters of science. The elevation of a mere surveyor to the position of astronomer served as one example of Americans' penchant for giving authority to those who did not deserve it.

Blackburn did not limit his criticism to a lowly assistant surveyor. North Carolina provided its own astronomer on the expedition, Joseph Caldwell, a Presbyterian minister and president of the University of North Carolina.[243] In his poem, Blackburn threw jabs at his counterpart: "His life was so fram'd in morality's school / He had scarce any use for a compass or rule / Besides as the company traveled in state / 'Twas important that we should have grace to our meat." Caldwell may have been a professor of mathematics at the university, but Blackburn criticized his religiosity and his apparent inexperience with scientific instruments. Blackburn mocked his regular prayers at mealtimes, but he credited Caldwell for serving "as a powerful antidote against corrupt doctrines from another quarter," by which he probably meant himself.[244]

Despite the difficulties that attended his observations, Blackburn performed his duties to the satisfaction of the South Carolina contingent on the expedition. As the agreement between the two states on the location of the boundary line depended on the location of the 35th parallel, Blackburn set about to measure latitudes a various points near the supposed boundary. First, he found that the boundary line surveyed in 1772 was at 35 degrees, 11 minutes, 36.9 seconds. To make this determination, Blackburn conducted a series of observations of the elevation of stars near the "Block House," which was near the 1772 boundary line. Blackburn's report to the commissioners representing South Carolina on the expedition gave latitudes for this location derived

243. William S. Powell, ed., *Dictionary of North Carolina Biography* (Chapel Hill: University of North Carolina Press, 1996).
244. Blackburn, *Astronomer's Journal*, 15.

from three stars: a star in the Ophiuchus constellation, Formalhaut, and Antares. Blackburn then averaged these three latitude measurements together to obtain a mean. Finally, he added some seconds of latitude to this mean which corresponded to the length between his observation point and the Block House itself.[245] Later, in a petition he sent to the South Carolina legislature, Blackburn commented that, regarding latitude determinations, "by a mean of many observations, he may, with bad instruments, come near to the truth, but there will be an immense waste of time, and toil, and very little certainty in the result." He made sure to note that, in his observations of the boundary line, "the principal point in dispute, was determined true to a second, but it was by a reiteration of observations, which sometimes employed us a fortnight, in doing what, with better means" he could have accomplished in a day.[246]

This measurement of latitude along the 1772 line undermined the terms of the boundary agreement between the two states. This line was supposed to be at 35 degrees exactly. The initial agreement stipulated "that from the termination of the line of 1772, a line shall be extended in a direct course to that point in the ridge of mountains which divides the eastern from the western waters, where the 35th degree of north latitude shall be found to strike it nearest to the termination of the said line of 1772."[247] Blackburn's observations demonstrated that the 35th parallel lay entirely inside of South Carolina, since the 1772 line was actually slightly north of the 35th parallel. "I have found that the 35th degree of latitude does not anywhere in this state, intersect the ridge dividing the Eastern from the Western waters," Blackburn concluded.[248] A modified agreement

245. Blackburn, "Report, Poem, and Notes."
246. George Blackburn, "Petition of George Blackburn, Relative to the State Map," December 2, 1815, Legislative Petitions, Petition 1815-118, South Carolina Archives and History Center.
247. Thomas Cooper, ed., *The Statutes at Large of South Carolina*, vol. 1 (Columbia, S.C.: A. S. Johnston, 1836), 417.
248. Blackburn, "Report, Poem, and Notes."

allowed South Carolina to lay claim to several beautiful mountains in the upstate, including Caesar's Head and Dismal Mountain. Robert Mills declared in 1826 that "we have won them from North Carolina by fair and honorable means, and they are an ornament to our state. To the talents, industry, and zeal of Professor George Blackburn...South Carolina is indebted for its present possession of these noble mountains."[249] Blackburn agreed that the outcome of the survey constituted a triumph for South Carolina. "So. Car. Gains all she has been 40 years contending for," he declared. "I have good reasons for asserting that the amicable adjustment of this business is principally owing to the steps which I took, in order to prevent any dispute about the observations." He further added that his measurements of latitude nearly matched the observations of Caldwell, "tho I observed und[er] greater disadvantages than he did."[250]

The State Map Survey, 1816

Blackburn resigned his professorship at South Carolina College in July of 1815.[251] Later that year, he sent a petition to the South Carolina legislature proposing the construction of a map of the entire state. Such a map, Blackburn argued, would prove invaluable to the legislature in governing the state. Furthermore, out of all the states east of the Appalachians, South Carolina alone had failed to create an official state map. France, England, and many other European countries had also taken great pains to draw maps, for a map "renders the state respectable in the eyes of other nations, and is useful to them in their intercourse with us, as it presents, at one view, a variety of circumstances,

249. Robert Mills, *Statistics of South Carolina, Including a View of Its Natural, Civil, and Military History, General and Particular* (Charleston, S. C.: Hurlbut and Lloyd, 1826), 579.
250. Blackburn, "Report, Poem, and Notes."
251. George Blackburn, "Letter to the Board of Trustees," November 21, 1814, Manuscripts of Professors, South Caroliniana Library, University of South Carolina.

which when verbally explained, require much circumlocution, and yet leave no distinct impression on the mind."[252]

Blackburn insisted that a "well constructed" map required accurate astronomical measurements. Before anything else, the latitudes and longitudes of fifty points throughout the state should be determined through astronomical observations. These points would "serve as the basis of the map." These astronomical calculations constituted the essential first step in creating the map. Only after the state completed this task could it proceed on to survey roads "by actual mensuration" and to survey the course of rivers, which Blackburn suggested could be accomplished through the use of "waywisers and perambulators." These instruments consisted of a single wheel attached to a long handle that recorded distances. The user counted the number of times that the wheel made a complete rotation while he or she was walking over ground in order to obtain the distance traveled. This part of the task would require surveyors "to run the length and breadth of the state many times, perhaps three or four thousand miles in all." Near the end of his petition, Blackburn reiterated the importance of astronomical measurements for constructing the map. Beyond the practical benefits from the creation of a state map, the South Carolina government's support for the project would provide a powerful rebuttal to "the idle opinion" that the sciences "cannot flourish, in perfection, near the torrid zone." "A good map of a country," he continued,

> is one proof that science is estimable there, for, without science, such a map cannot be formed. Astronomy is, in most cases, made subservient to Geography; one of its primary objects is to ascertain the true position of a point upon the surface of the earth or of a ship at sea; and it is only by the aid of Astronomy that this can be correctly done. By the rude and common methods something

252. Blackburn, "Petition of George Blackburn, Relative to the State Map."

> resembling the truth may be produced, but it is not the truth, and may be widely different from it.[253]

Blackburn thus placed the determinations of astronomical measurements above surveying techniques that only measured distances on the ground. The former, in Blackburn's view, resulted in truth; correct measurements of latitude and longitude gave the exact location of a point upon the earth. Surveys without astronomical calculations, in contrast, could only provide a relative location of a point; for example, the summit of a mountain was some distance from another summit and some distance from a town. This kind of survey could only strike near to the truth; an astronomical survey could provide an absolutely true determination of a point on the spherical earth.

Blackburn argued that he had the proper qualifications to direct this survey for the state map. "None but a good mathematician and practical astronomer" could overcome the obstacles to the completion of this survey in a correct manner. He cited his experience in working under great difficulties on the boundary survey and his duties as the surveyor of a district in Virginia during his time at William and Mary. Blackburn also listed his academic posts in Virginia and South Carolina. "I have therefore all the theory and all the practice; there is nothing wanting but the patronage of the state, and the encouragement of liberal and enlightened patriots," he concluded.[254]

The government of South Carolina agreed with Blackburn about the usefulness of a state map. Legislative committees charged with reviewing Blackburn's petition enthusiastically approved of his proposal. A state map, the legislators argued, would prove invaluable for the accomplishment of military, agricultural, and legislative purposes. They made particular mention of how a state map could facilitate the drawing

253. Ibid.
254. Ibid.

of congressional and judicial districts. The committees charged the governor with overseeing the project.[255]

Governor David R. Williams appointed Blackburn to head the survey for the state map in February of 1816. In his letter to Blackburn that announced the appointment, Williams began by telling Blackburn that "you are at liberty to add to the knowledge which, a map, made according to these instructions, will contain, but not to lessen the number of objects directed to be ascertained." The legislature, Williams explained, had only appointed Blackburn for a single year; Williams needed to provide the legislature with "exhibits of a just regard to economy of money and time" in order to convince them to extend Blackburn's appointment. Williams demanded that Blackburn keep a journal of his activities and send him reports weekly. "Failing to perform these, and the duties which follow, I shall not hesitate to dismiss you from the service of the state," Williams warned.[256]

Williams's specific instructions to Blackburn about how to conduct the survey clashed with the Irishman's emphasis on astronomical measurements. The governor did agree that Blackburn's "first business" should be the determination of latitude for many points and longitude for a few points to serve as the basis of the map. Following this point of agreement, however, Williams went on to make detailed demands for other tasks that Blackburn should execute in his year's employment with the state:

255. "Committee Report and Resolution on the Petition of George Blackburn, Concerning a Map of the State of South Carolina," 1815, Legislative Papers, Committee Reports, 1815, Item 143, South Carolina Archives and History Center; "Committee Report and Resolution on the Petition of George Blackburn, Concerning Blackburn's Proposals for Procuring a Correct Map of the State," December 13, 1815, Legislative Papers, Committee Reports, 1815, Item 142, South Carolina Archives and History Center.

256. David R. Williams, "David R. Williams to George Blackburn," February 14, 1816, Governor's Messages, South Carolina Archives and History Center.

> You are to take the distances and bearings of the roads you travel. You are to mark all the watercourses that intersect your route; all the ferries, bridges &c that you cross, together with all the noted points, such as cities, towns, villages & court houses upon these routes; and the residence of such land holders, as may appear upon the map without incumbrance; also, extensive mills, manufactories & iron works. These routes will be on the principal market and mail roads.

Williams was not finished. He also wanted Blackburn to mark "the points at which, your route intersects the boundary lines of the primitive divisions of this state, into districts, and the lesser divisions of the same, into Parishes." Blackburn should also note the topographical character of the places he passed through. The governor next moved on to information he desired on rivers. He not only wanted facts about "their various bendings and distances" but also sought intelligence about the obstacles that prevented navigation along their courses. "You will perform an acceptable and not less important service," Williams continued, "to ascertain where canals may be best constructed, so as to open water communication from the various principal rivers to Charleston." Williams then requested information about "the principal navigable inlets to the sea ports of the state," particularly the latitudes of these inlets. Oh, and if that were not enough, if Blackburn found the time, he should note "the actual variation of the magnetic needle," or the shift in magnetic north, over the course of his route.[257]

Blackburn apparently did not meet these requirements to the South Carolina government's liking. From March to August of 1816, Blackburn traveled throughout the state making latitude measurements. His reports from this period are not available, but a copy of his latitude measurements survives in the 1821 report of the Board of Public Works for South Carolina. This report listed around thirty latitude measurements for

257. Ibid.

points around the state, including cities, towns, and courthouses.[258] In December, the legislature refused to appoint Blackburn for another year. Historian Gene Waddell convincingly surmises that Blackburn had concentrated too much on astronomical calculations, and even then Blackburn had only provided latitudes, not longitudes.[259] When the map was completed in 1822, however, Blackburn received credit for "astronomical observations."[260] Given Blackburn's other written records, we can imagine that the cantankerous Irishman complained that the government had given him an impossible task; the determination of latitudes required extremely careful measurements, which would leave little time to gather all the other sundry pieces of information that the governor demanded.

Although the lack of records directly pertaining to Blackburn's performance on the 1816 survey makes interpretation of this episode difficult, it seems that Blackburn and the government had conflicting visions of the proper way to conduct the survey. In his petition, Blackburn had stressed above all the necessity of accurate astronomical determinations of latitude and longitude that could form the basis of the map. Governor Williams's letter to Blackburn, in contrast, demanded that Blackburn supply details of such important state resources as rivers, roads, and towns. For Williams, the creation of a state map provided an opportunity to conduct a physical inventory of the state and to consider possibilities for improvement, especially in the construction of canals. Blackburn saw the survey as a way for South Carolina to demonstrate its commitment to science. The Irishman pointed to the practical uses of such a map, but he also insisted that

258. David Kohn and Bess Glenn, eds., *Internal Improvement in South Carolina 1817-1828* (Washington, D.C., 1938), 101–4.
259. Robert Mills, *Mills' Atlas: Atlas of the State of South Carolina, 1825* (Easley, S.C.: Southern Historical Press, 1980), ii.
260. John Wilson, "A Map of South Carolina, Constructed and Drawn from the District Surveys, Ordered by the Legislature" (Philadelphia: H. S. Tanner, 1822).

astronomical calculations would result in a map that precisely reflected the truth. The same could not be said, Blackburn argued, of a survey that only took note of distances between landmarks. Blackburn prioritized placing the lands of South Carolina in their true positions as reflected by the stars, while Williams desired a map that gave a rendering of the state's physical resources. The government of South Carolina agreed with Blackburn that the state needed a map, but it favored a map that led quickly to practical uses. The government probably thought Blackburn's painstaking astronomical observations were important but not so important as to put the gathering of more useful knowledge of the location of roads, rivers, and towns on hold until the latitude and longitude determinations were completed.

Conclusion

Blackburn's career as a professor and his service to South Carolina on two surveys revealed a man who had great faith in the power of science, and particularly the mathematical sciences, to bring enlightenment to mankind. He found this ambition frustrated again and again in America. His students had neither the skill nor the inclination to attempt to master the mathematical sciences, and the state of South Carolina spurned his opinions on the proper, scientific method of constructing a state map. Blackburn's struggles, then, provide an almost too-perfect example of nineteenth-century Americans' rejection of the theoretical and the abstract in favor of the useful and tangible.

CHAPTER 5

THE ENSLAVED ANTS AND THE PECULIAR INSTITUTION

"Go to the ant"

An examination of a strange episode involving ants provides an opportunity to consider how knowledge from natural history influenced the controversy over slavery. In 1810, Genevan naturalist Pierre Huber published a book on the habits of European ants. Among his remarkable findings, Huber discovered that two species of ants undertook expeditions to capture other ants and make them their slaves. Numerous publications on both sides of the Atlantic retold Huber's astonishing discoveries, and several made the obvious comparison between the slavery of the ant and the peculiar institution of man. Proslavery and antislavery commentators' reactions to the enslaved ants allows for an examination of how knowledge from natural history influenced a highly charged political controversy. This episode spoke to the question raised in Enlightenment philosophy of how one could properly employ empirical evidence in moral and political questions.

Several scholars have noted connections between knowledge about insects and knowledge about human beings. Brian Ogilvie has examined European studies of insects during the seventeenth century. He shows that naturalists often discussed the "emblematic" qualities of insects; the industrious bee, for example, provided a moral lesson about the value of hard work.[261] Christopher Hollingsworth has analyzed the uses

261. Brian W. Ogilvie, "Nature's Bible: Insects in Seventeenth-Century European Art and Science," *Tiddskrift for Kulturforskning* 7, no. 3 (2008): 9. Ogilvie is working on a book project entitled

of insects as metaphors in literature from Antiquity to postmodernism.[262] J. F. M. Clark's work on understandings of social insects in nineteenth-century Britain touches on the themes of this chapter most closely. As Clark argues, observations of the habits of social animals like ants and bees "is often inextricably entangled in anthropocentric and ethnocentric assumptions." As such, accounts of ant behavior tell the historian more about the observer than the observed. Clark also notes how the enslaving ants provided Darwin with an example of how natural selection could give rise to complex behaviors that helped to ensure the survival of the species. Darwin also held that the advanced social instincts of even the lowly ant indicated a link between the vaunted intelligence of human beings and their insect cousins. Thus, human beings could not be exempted from the mechanisms of natural selection.[263] This chapter attempts to clarify the cultural uses of facts from natural history by focusing on the impact of a particular fact from natural history on a particular place and time.

Natural history in the nineteenth century enjoyed a high status in transatlantic culture because of its ability to reveal the presence of the divine in nature. In a review of a natural history of ants, a writer in Britain's *Eclectic Review* in 1821 declared that the authors had "disclosed new proofs of the wisdom and beneficence of the great Organizer of existence; and they have dissected out new ramifications of that grand system of intelligence which, while in its fulness and prevalence it resides in man as the lord of the

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"Nature's Bible: Insects in European Art, Science, and Religion from the Renaissance to the Enlightenment."

262. Cristopher Hollingsworth, *Poetics of the Hive: The Insect Metaphor in Literature* (Iowa City: University of Iowa Press, 2001).

263. J. F. M. Clark, "'The Complete Biography of Every Animal': Ants, Bees, and Humanity in Nineteenth-Century England," *Studies in History and Philosophy of Biological and Biomedical Sciences* 29, no. 2 (1998): 249, 260, 254, 251–52; J. F. M. Clark, "'The Ants Were Duly Visited': Making Sense of John Lubbock, Scientific Naturalism, and the Senses of Social Insects," *British Journal for the History of Science* 30, no. 2 (June 1997): 151–76.

creation, actuates...all the tribes of animation from the elephant to the mite." *The National Recorder*, a Philadelphia newspaper, reprinted this review for American audiences.[264] In other words, natural history uncovered the designs of nature's God. Ants, in particular, demonstrated an extraordinary instinct for social organization clearly gifted to them by the creator.

For centuries before Huber's investigations, ants fascinated human beings with their complex social structures, their amazing ability to construct intricate habitations, and their selfless devotion to the collective. The book of Proverbs advised, "Go to the ant, thou sluggard; consider her ways, and be wise: which having no guide, overseer, or ruler, provideth her meat in the summer, and gathereth her food in the harvest."[265] In the nineteenth century, naturalists easily drew analogies between the social structures of humans and the ants. Thus, the ant-hill was divided between the workers and the royal court, and the ants made war on rival tribes for patches of ground.[266] A contributor to *The Friend*, a Quaker journal published in Philadelphia, held up the worker ants as worthy examples. They "appear to be actuated in the care and concern they evince towards those under their protection, by the most exquisite sentiments of maternity, unalloyed by passion—living, thinking, and acting...solely for the offspring of another [the queen], with a disinterested devotion truly astonishing."[267] Ants, then, seemed to provide positive models of behavior. Their enslaving practices would complicate the opinion of this otherwise laudable insect.

Huber's book, translated into English in 1820, described two different ant species that practiced slavery. The first, the pale red rufescent ant (also called the Amazon or

264. "Huber on Ants and Bees," *The National Recorder* 5, no. 23 (June 9, 1821): 354.
265. Prov. 6:6-8 KJV.
266. Clark, "Complete Biography," 250, 252.
267. Huber, "Insects," *The Friend* 8, no. 41 (July 18, 1835): 321.

legionary ant), went frequently on expeditions to capture the larvae and pupae of the ash-colored ant and the mining ant, both mostly black in color. At certain times of the year, the rufescent ants poured out of their hills and went in search of colonies of black ants. A struggle would ensue, and the rufescent ants inevitably triumphed. The victors spirited the larvae and pupae of the opposing species back to their colony. Once the black ants hatched, they served the colony just as they would in their native nest.[268] In fact, Huber remarked, it seemed that the enslaved ants did all the work for the colony except going on expeditions for more slaves, which the rufescent ants continued to do.[269]

An experiment conducted by Huber demonstrated how much the rufescent ants depended on their slaves for basic necessities. He placed thirty rufescent ants in a case with some larvae and pupae of both their own species and the ash-colored ants. The rufescent ants did nothing to construct tunnels or care for the young. In two days, over half of the rufescent ants died because they did not even eat the honey placed in the box. Finally, Huber deposited a single black ant into the case. He reported that this ant succeeded in performing all the necessary labor to ensure the well-being of the colony.[270] Huber also described the same slave-making behavior in the blood-red sanguine ant, although this species seemed to capture fewer slaves, and they continued to work for the colony even after taking a number of captives.[271]

Huber's sensational account of the enslaving habits of ants appeared in numerous publications, including natural history texts and general interest periodicals. Although proslavery theorists did cite the enslaved ants as an example of nature ordaining the

268. P. Huber, *The Natural History of Ants*, trans. J. R. Johnson (London: Longman, Hurst, Rees, Orme, and Brown, 1820), 248–77.
269. Ibid., 277.
270. Ibid., 287.
271. Ibid., 329–41.

peculiar institution, they used this fact from nature sparingly. The writings of William Van Amringe, a New Yorker who composed a treatise on the natural history of man, provide an indication for why proslavery Americans were hesitant to employ the slave ants in their defense of the peculiar institution.

"By a most unerring law"

Van Amringe's *An Investigation into the Theories of the Natural History of Man* (1848) entered into an already rollicking transatlantic debate over the question of human origins. In the early nineteenth century, several Americans took the lead in promoting the theory that mankind consisted of not one but multiple species that had completely different ancestries, or polygenism. Adam, then, was not the common ancestor for all of humanity, and blacks and whites actually belonged to different species, not just varieties of the same species. Historians have noted the importance of the "American school" of anthropology in arguing for polygenism. This group included such noted men of science as Samuel G. Morton, who measured cranial capacity as a proxy for intelligence, and Josiah C. Nott, a southern physician who in 1854 published the polygenist treatise *Types of Mankind*.[272] The debate between polygenists and monogenists touched on a wide variety of issues, not least of all the compatibility of polygenism with the account of the creation in Genesis and, of course, racial justifications for African slavery.[273] Adrian Desmond and James R. Moore have argued that Darwin's antislavery views and his distaste for the implications of polygenist theories drove him to develop his account of human evolution, which explained the varieties of man as a result of both natural and

272. William Stanton, *The Leopard's Spots: Scientific Attitudes toward Race in America, 1815-59* (Chicago: University of Chicago Press, 1960); Stephen Jay Gould, *The Mismeasure of Man* (New York: Norton, 1996); Reginald Horsman, *Josiah Nott of Mobile: Southerner, Physician, and Racial Theorist* (Baton Rouge: Louisiana State University Press, 1987).

273. David N. Livingstone, *Adam's Ancestors: Race, Religion, and the Politics of Human Origins* (Baltimore: Johns Hopkins University Press, 2008).

sexual selection rather than separate creations.[274] Crucially, however, support for polygenism did not equate with support for slavery, or vice versa, and the same went for monogenism and antislavery. For example, John Bachman, a South Carolina minister and naturalist who supported slavery and the secession of the southern states, conducted a personal crusade against polygenists by publishing *The Doctrine of the Unity of the Human Race* in 1850.[275] Van Amringe's book took the opposite position, and although he clearly argued for the inferiority of black people, he felt slavery was an obsolete institution.

Van Amringe dedicated one chapter of his treatise to a critique of naturalists who used analogies to argue for the unity of the species. He took particular issue with James Cowles Prichard, an English physician whose *The Natural History of Man* (1843) had maintained the unity of the human species. Prichard, Van Amringe wrote, had fallaciously used the noted variation in plant and animal species under domestication to argue, by analogy, that human beings could undergo the same variation over generations, thus producing the dramatically different races of man. To show the danger in using analogies as the basis for a science, Van Amringe launched into a discussion of the definition and proper uses of analogies. A philosopher, he said, should not confuse similarity with analogy. As he put it, "Having the whole organic kingdom for a range, it would be strange if a man of even superficial knowledge of science, could not find some animal, or vegetable, to prove any, the most absurd position, if he were permitted to regard every similitude as an analogy." As an example of "the absurdity of this mode of reasoning,"

274. Adrian J. Desmond and James R. Moore, *Darwin's Sacred Cause: How a Hatred of Slavery Shaped Darwin's Views on Human Evolution* (Boston: Houghton Mifflin Harcourt, 2009).

275. Peter McCandless, "The Political Evolution of John Bachman: From New York Yankee to South Carolina Secessionist," *The South Carolina Historical Magazine* 108, no. 1 (January 2007): 16–18; Lester D. Stephens, *Science, Race, and Religion in the American South: John Bachman and the Charleston Circle of Naturalists, 1815-1895* (Chapel Hill: University of North Carolina Press, 2000).

Van Amringe pointed to the resemblance between human slavery and the ant slavery discovered by Huber. By analogy, then, "we have an example, by a most unerring law, derived directly from the Creator, manifested in the instinct of these insects, that slavery is permitted, if not ordained."[276] But a proper view of this subject, Van Amringe continued, would demonstrate that this behavior of ants merely resembled the slavery of humans; one could not make an analogy between the two. Although people used the terms "resemblance" and "analogy" interchangeably in everyday conversation, they meant quite different things in science. "Resemblance is an apparent likeness of sensible qualities," Van Amringe explained, "but analogy is an agreement of proportions, or relations of a property, or properties, common to two or more subjects."[277] As an example, Van Amringe asserted that "all mammalia agree in suckling their young, and are, in this respect, analogous; but some have the mammae in the breast, others over the abdomen...in which respects they do not agree, and are not analogous." By carefully attending to these various analogies between animals and plants, naturalists classified the diversity of living things in the world. In this practice of classification, "two animals of the same genus have analogous generic properties; of the same genus, but of different species, the generic properties are analogous, and their specific properties diverse."[278]

Finally, Van Amringe presented an example of the proper use of analogy to make philosophically sound inductions. "All the planets of the solar system," Van Amringe stated, "agree in so many particulars, in the laws known to govern them, that, because our planet contains organic beings, and from the known wisdom and benevolence of the Creator in forming them, we may infer from analogy that all the planets contain organic

276. William Frederick Van Amringe, *An Investigation of the Theories of the Natural History of Man* (New York: Baker & Scribner, 1848), 311.
277. Ibid., 312.
278. Ibid., 314–15.

beings." He stressed that such an inference could not rise to "a matter of science," but only "a highly probable speculation." A philosopher could only reach this sound speculation by knowing the "points of agreement" between the various planets, such as their relative proximity to the sun and their obedience to the universal laws of gravity. Without this prior knowledge, the speculation that life existed on other planets "would be only a visionary saying of a dreamer, and not the sober reasoning of a philosopher." Thus, speculative analogy, when employed correctly, could serve as a powerful method in pursuing truth, especially "when the subject is of such a nature as not to be susceptible of positive proof; or when circumstantial evidence has been given of a fact, and it is desirable to add other probable circumstances, to give to it additional weight." Even then, speculative analogy could only yield probability, not certainty. Analogy certainly could not form the "basis" of an argument, and Van Amringe claimed that the advocates for the unity of the human race were doing precisely this in their analogy between domesticated animals and humans.[279] He went on to argue that, at the foundation of Prichard's argument, the domestication of animals was not analogous to the domestic or civilized habits of humans. The physical and mental powers of animals, Van Amringe argued, degenerated when humans domesticated them. Domestication, for animals, was "a slavery so absolute and perfect that their very natures are subdued." In contrast, man actually achieved improvement of both his body and mind within a domestic, or civilized, setting. Thus, the two "domesticated" states were completely dissimilar, and therefore the analogy made between them to argue for the unity of the human race failed at its foundation.[280]

279. Ibid., 317–18.
280. Ibid., 343–45.

In this analysis, Van Amringe closely reflected the discussions about the usefulness of analogy in the Enlightenment philosophy of mind literature. Locke argued that philosophers could employ analogy when discoursing about things that human beings could not directly observe with the senses. These unobservable subjects consisted of two categories. The first category included the existence of certain material or immaterial beings that, for various reasons, human beings could not observe with their senses. Secondly, Locke noted the use of analogy to investigate "the manner of Operation in most parts of the Works of Nature: wherein, tho' we see the sensible Effects, yet their Causes are unknown." Propositions about these cases "can appear more or less probable, only as they hold proportion to other parts of our Knowledge and Observation. *Analogy* in these matters is the only help we have, and 'tis from that alone we draw all our grounds of Probability."[281] George Gregory, who drew from David Hartley's discussion of the use of analogy in comparative anatomy, pointed out that claims about the operation of the stomachs of different animals only had credibility to the extent that the animals resembled each other.[282] George Berkeley also warned of the dangers of extending analogies too far. Natural philosophers, Berkeley explained, attempted to discover "Analogies, Harmonies, and Agreements" in nature. They must exercise caution, however, in applying these analogies to disparate phenomena. For example, large bodies clearly obeyed Newton's law of gravitational attraction, but some phenomena, such as "the perpendicular Growth of Plants, and the Elasticity of the Air" seemed to run counter to this law. Thus, philosophers could not use analogies to derive real phenomena from the general laws that they had promulgated to explain particular phenomena.[283] James Hutton

281. Locke, *Works*, 1:313–14.
282. Gregory, *Economy of Nature*, 3:536–37.
283. Berkeley, *A Treatise Concerning the Principles of Human Knowledge*, 126–28.

reflected Van Amringe's analysis very closely. Philosophers could only form a "perfect judgment" from "data that are complete," and thus the strength of an argument by analogy depended on how closely the two cases under examination agreed with each other.[284] Finally, Thomas Reid also employed a similar analysis as Van Amringe. There existed two ways to investigate the human mind, Reid argued: "*the way of reflection*" and "*the way of analogy.*" The first of these involved the philosopher attending closely to the operation of his own mind and observing how it was affected by external objects. The second merely required philosophers to find some resemblance between the operations of the mind and some other phenomenon in nature and draw conclusions from this observation. Only the first method could lead to truth in philosophy, Reid maintained. He even provided the same example of the probable existence of life on other planets in the solar system to demonstrate that analogy could only result in a degree of likelihood, not certainty. Reid provided another example; the potato plant, he explained, had a great resemblance to another plant with poisonous properties, but experience demonstrated that the potato was not, in fact, poisonous. Relying only on analogy, therefore, could easily lead to mistakes.[285]

Although Van Amringe did not return directly to a discussion of the enslaved ants, his analysis of the function of instinct in animals provided an indication as to why one could not make an analogy between the slavery of ants and the slavery of humans. Although insects such as ants and bees could display a remarkable capacity to adapt to different circumstances, they operated purely on instinct and made no improvements to their methods over time. Human reason, in contrast, was susceptible of improvement, as

284. Hutton, *Investigation of the Principles of Knowledge*, 1794, 2:275–77.
285. Reid, *Inquiry into the Human Mind*, 355–57.

the entirety of human history demonstrated: "The Greeks improved upon the Egyptians and Phoenicians; and most assuredly the present age has improved upon the Greeks and Romans, to say nothing of the middle ages." Van Amringe concluded that man possessed "a *universality* of mental power, *different in kind and degree*, from the specific, instinctive, limited mental powers of animals, which never have a range beyond their physical necessities."[286] Thus, one could not draw an analogy between ant slavery and human slavery because the ants enslaved purely by instinct, while the human institution was a creation of reason. For his part, Van Amringe expressed his hope that the continued improvement of the steam engine, a product of the progress of the human mind, would eventually make human slavery a relic of a bygone era.[287]

Van Amringe's analysis of the uses of analogy in science indicated some reasons why proslavery ideologues did not make the enslaved ants the foundation of their case for the justice of slavery. Van Amringe, along with several Enlightenment philosophers, stressed the fragility of arguments by analogy. An analogy could only point the way towards objects for investigation or provide support for an argument that already had a strong empirical foundation. Thus, those proslavery commentators who did employ the enslaved ants in their writings cited them as merely one more brick in the edifice of solid evidence for the naturalness and justice of slavery. Antislavery writers attempted to goad the proslavery contingent into using the ants in an argument from analogy, without success.

286. Van Amringe, *An Investigation*, 338–39.
287. Ibid., 204.

"Natural distinctions in society is the rock on which American Republicanism is built"

In 1851, Samuel A. Cartwright, a prominent southern physician, penned an article for *De Bow's Review* that drew on the empirical tradition to strike back against the attacks on slavery originating in the North. Cartwright composed this piece as an open letter to Daniel Webster, the antislavery politician from Massachusetts who was then secretary of state. The slavery question, Cartwright wrote, was tearing the union apart. He argued that the source of this rift lay in the incompatible epistemologies employed by the North and the South. Some northerners, he explained, had adopted the "hypothesis" of the equality of the races of man without any empirical justification. This hypothesis had previously led to the disastrous experiment in Haiti of blacks attempting to govern themselves. Observation of the different capabilities of the races also provided evidence against the hypothesis. "Free negroes will not work, (having tried the experiment)," Cartwright claimed, and white people, unlike blacks, could not work effectively in the torrid environments of sugar cane and cotton plantations. The doctrine of racial equality "has no foundation in Truth or Nature. All history disproves it. The science of comparative anatomy bears positive testimony against it." To further underscore his empirical stance, Cartwright argued that "our admirable system of government is founded on the Baconian philosophy carried into politics, and not on impracticable abstractions...Natural distinctions in society is the rock on which American Republicanism is built."[288] He reiterated this point about the empirical origin of American government: "It is worthy to be remembered that our fathers were practical men, and founded our government on the truths taught by experience, and rejected the sophisms of the *a priori* logic of the

288. Samuel A. Cartwright, "How to Save the Republic, and the Position of the South in the Union," *De Bow's Review* 11, no. 2 (August 1851): 185–86.

Illuminati. Unfortunately those sophisms have outlived the many republics they have killed." Cartwright specified that one of these fallacies was the idea that "the negro is only a lampblacked white man debased by slavery," which was a "Jacobinical sophism picked up amongst the ruins it so largely helped to make of republican institutions in France."[289] Thus, according to Cartwright, antislavery and abolition stood on nothing but unconfirmed theory, while the South had learned through experience that only slavery could enable blacks to thrive.

Cartwright made this distinction between the empiricism of the South and the abstraction of the North even sharper in his interpretation of the modes of reasoning that each section used. "The southern mind has adopted the *a posteriori* method of reasoning on the slavery question, and the northern the *a priori*," he explained.

> These two methods of considering the subject have brought the two sections to exactly opposite conclusions. An admixture of the two modes of reasoning for a long time gave the great mass of the people, North and South, mixed and indefinite notions on the merits of the question. The *a priori* logic leading them to look upon domestic slavery as an evil, while the facts, observations, and experience of the inductive mode of investigation clearly proved, that if it be an evil, it is one of theoretical evils for which there is no remedy without incurring greater evils—in other words, no evil at all.

Unfortunately, Cartwright continued, some southerners amongst the founding generation, most notably Thomas Jefferson, had adopted the view that slavery was a necessary evil, not a positive good. Jefferson had racked his mind to find a way to deal with the inferior black population in Virginia, Cartwright wrote, but the rise of cotton, sugar cane, and rice had provided an outlet for these people in the Lower South. Cartwright continued to press the difference between the North and South in the consideration of the slavery question.

289. Ibid., 189–90.

"Neither party, North or South," he asserted, "has viewed the question of negro slavery in a philosophical point of view. It has been mere experience on the one side, and mere theory on the other." If only "statesmen" like Webster consulted "comparative anatomy," they would see the fundamental physical differences that existed between the races. The science of anatomy, therefore, could supply the knowledge that could justify the "paradox of slavery in a free republic, and demonstrate the reason and justice of our political institutions, in not according to all classes the same privileges." In particular, Cartwright pointed to the great knowledge of the physical differences between blacks and whites that southerners had gained over long experience amongst the two races. This knowledge could only ease sectional tensions, however, if a respected statesman like Webster diffused it to the masses.[290] Cartwright expressed confidence that "comparative anatomy, physiology, chemistry, and history" would all testify that "the higher law, which keeps the negro in servitude" was "written in his organization."[291] These sciences, which combined experience and theory, could finally put an end to the incessant controversy over slavery. In his repeated emphasis on the difference in reasoning between the two sections, Cartwright took a firm stand for an empirical or *a posteriori* method of inquiry that privileged observations drawn from experience over abstract theory. Reality, he claimed, had rudely demolished the abolitionists' fanciful reasonings on the subject.

As part of Cartwright's turn to empirical science as a solution to the slavery controversy, he cited the presence of slavery amongst the ants. Contrary to the moralistic claims of the abolitionists, slavery was not a sin: "The white and the red ants make slaves of the black ants, yet they are the very insects to which the Holy Scriptures refer us to

290. Ibid., 191–92.
291. Ibid., 194.

learn wisdom...Slavery, therefore, of the black to the white man is not incompatible with the economy of Nature...If it be a sin, it is unlike any other sin, in doing good to the whole world instead of evil."[292] Cartwright did not expand much on this passing reference to enslaved ants; much of his letter to Webster implored the Massachusetts politician to seek answers to the sectional conflict in history, comparative anatomy, and medicine. The citation of the enslaved ants functioned as just one more pebble in the mountain of evidence for the compatibility of slavery with nature generally. Naturalists' discovery of enslaved ants, Cartwright seemed to say, provided just one more testimony from empirical science that demonstrated the naturalness of slavery in both the animal and human realms. Cartwright had no need to make an analogy from the natural world the cornerstone of his case.

Georgia lawyer Thomas R. R. Cobb also utilized the example of slave ants in his 1858 magnum opus *An Inquiry into the Law of Negro Slavery*. Cobb contended that critics of slavery used a faulty definition of natural law to claim that slavery violated such law. One particular error these critics committed was arguing that the law of nature consisted of "those deductions which may be drawn from a careful examination of the operations of the natural world."[293] Such a definition, Cobb claimed, would justify cannibalism because many uncivilized human tribes engaged in this practice. But even if this definition were accepted, the presence of enslaving ants would show slavery to be compatible with the law of nature. Cobb cited French entomologist Pierre André Latreille's observation that the rufescent ants did not have adequate jaws and mouths to do the work needed for the nest's survival, thus reflecting Cartwright's justification of

292. Ibid., 189.
293. Thomas R. R. Cobb, *An Inquiry into the Law of Negro Slavery in the United States of America* (Philadelphia: T. and J. W. Johnson & Co., 1858), 8.

slavery by the supposed greater aptitude for labor among blacks.[294] Cobb settled on his own definition of natural law: "when applied to man in his intercourse with his fellow-man, [natural law is] that obligation which reason and conscience impose, so to shape his course as to attain the greatest happiness, and arrive at the greatest perfection of which his nature is susceptible."[295] Adopting a similar strategy as Cartwright, Cobb cited a plethora of authorities from various fields that confirmed that blacks had a particular nature that fitted them for servitude instead of freedom. Cobb brought forward numerous authorities from medicine, anatomy, natural history, and human history to demonstrate that blacks required the guidance of a superior race to bring them to a state of improvement. He concluded that slavery indeed provided blacks with the best chance to achieve the height of what nature allowed them in physical, intellectual, and religious terms.[296]

New Yorker Samuel Seabury, a clergyman of the Episcopal church, also crafted an argument in favor of slavery based on natural law. A misunderstanding of the Justinian Code of Roman law, Seabury contended, had led many antislavery advocates astray. Although the Romans practiced slavery, the Justinian Code indicated that slavery was "contrary to natural right."[297] This declaration seemed to indicate that slavery was inherently immoral and unjust. Seabury argued, however, that this conclusion was incorrect if one understood the actual meaning of natural law according to the Romans. They held that the law of nature referred to the operations of the natural world:

294. Ibid., 9. I would like to thank Michael Woods for pointing out to me this connection between the observations of the ants' physical features and the observations of blacks' physical differences from whites.
295. Ibid., 16.
296. Ibid., 17–51.
297. Samuel Seabury, *American Slavery Distinguished from the Slavery of English Theorists, and Justified by the Law of Nature* (New York: Mason Brothers, 1861), 111.

procreation, the raising of young, and other behaviors of animals. Seabury concluded, "To say that slavery is against Nature, or the law of Nature, in this sense, is merely to say that no precedent or analogy could then be drawn in favor of slavery from the brute creation." But if the Romans had known about the enslaved ants, Seabury claimed that this fact "would have restrained them from saying slavery was *contrary to Nature*." Quoting a work of natural history, Seabury highlighted "the mutual good-will and affection, which prevails between the negro ants and their masters, and that, too, mauger the fact that the relation had its origins in hostility and violence."[298] Seabury went on to justify slavery by an appeal to the law of nations, which governed human beings living in society. Thus, Seabury argued that although slavery might not be a beneficial institution for every society, it was not in itself unjust. Seabury worried that the abolitionists' zeal for progress and change would lead to a breakdown of orderly society. Will the abolitionists, he asked, "who reject Revelation, because it allows slavery, go farther and proclaim war upon the common sense of mankind? But for particular men, or even for a single age, to set up their own reason as the measure of all human reason, what is this better than insanity?" Surely the beliefs of a small minority of antislavery fanatics did not outweigh the opinion of men throughout the ages who did not find slavery or involuntary servitude contrary to justice.[299] Seabury's concern about the attack on common sense revealed a broader anxiety amongst the proslavery contingent. According to Seabury, Cobb, and Cartwright, abolitionists only consulted their own consciences and rejected the lessons of experience and the authority of anyone besides themselves. Such arrogance could lead only to radical changes with unforeseen, and likely nefarious, consequences.

298. Ibid., 112–13, 113n.
299. Ibid., 108–9.

In all of these works, the enslaved ants provided at most an auxiliary piece of evidence for the increasingly confident proslavery argument. The example of slavery in the animal kingdom seemed to function as just another notch in the proslavery theorists' belt. Taking their cue from Enlightenment epistemology, proslavery Americans knew that an argument by analogy could only add strength to an already solid case; such an argument could never form the basis of their case, especially because so much empirical knowledge already pointed to the justice of slavery. Indeed, antislavery writers brought up the enslaved ants, hoping that their proslavery adversaries would take the bait and make an argument by analogy.

"The Anglo-Saxon need only eat the negro"

Some antislavery commentators, dripping with sarcasm, ridiculed the supposed connection between ant slavery and the peculiar institution and dared proslavery writers to take up the enslaved ants as proof of the compatibility of slavery with natural law. An 1846 article in the *Boston Recorder* that reviewed Huber's discoveries asked why slaveholders had declined to make more out of the enslaved ants. The correspondent declared, "It has seemed to us a little remarkable that slaveholders and their apologists have never built upon these facts, *an argument from analogy*. The ant hill, though generally sandy, would be a rather better foundation for a proslavery argument than the Bible." This writer elaborated on the possible arguments masters might draw from the insects in bondage, including that one race was meant for leisure while another was meant to labor; that the existence of slavery in nature meant that God established and approved of the institution; that, like the rufescent ants, wealthy planters could not perform the required labor to provide for themselves; and that, like the black ants, black

human slaves performed labor happily and without complaint. The article concluded with a tongue-in-cheek defense of its modest proposal:

> If it should be said again, that the negro ants have no reason, and no knowledge of rights, and no sense of degradation, and that therefore the analogy fails, how easy it would be to reply that this was all intended to teach us that the negro slaves have *in fact* no rights, and that they ought to be kept so ignorant that they would have no more idea of rights or injustice than an ant has, that tugs all day in and about the hill of its dignified and lazy owner.[300]

A correspondent to the *Philanthropist*, an Ohio antislavery newspaper, also noted the intriguing similarities between southern slaveholders and the slave-making ants. The story of the rufescent ants' attacks on the black ants, the correspondent argued, taught that the master class was "too lazy to work," but "are first rate fellows *to fight*." On Huber's experiment that took all the black ants away from the rufescent ants, the correspondent wrote that the rufescent ants' behavior demonstrated that the master class was "so unskillful, effeminate and lazy, that though the materials were furnished them, they could not build a House—nor feed their young" without the tireless labor of blacks.[301]

A British writer also got in on the act, noting that the slavery of the ants compared favorably to that of southerners. Miss L. M. Budgen, who wrote a book about insects for general audiences under the pseudonym "Acheta Domestica," noted that "our Lilliputian slave-owners are wofully [sic] behind-hand, as compared with those of larger stature, especially with the dwellers in a certain Trans-Atlantic Land of *Freedom*. They know not the meaning of Lynch-law, the sound of a whip is never heard within their territories. The slaves live as well as their possessors, and on some occasions, the common rule of such

300. "Legionary Ants and Negro Ants," *Boston Recorder* 31, no. 29 (July 16, 1846): 114.
301. J. D., "The White and Black Ants of Geneva," *Philanthropist* 2, no. 53 (February 17, 1837): 3.

relationship being reversed, would seem to take the chief authority into their own hands."[302] In an article for *Tait's Edinburgh Magazine*, Budgen wondered, as her American antislavery brethren had, why southern slaveholders had failed to employ the enslaved ants in defense of slavery. The ants, Budgen continued, "attend more to the injunctions contained in Paul's Epistle to Philemon, than the slave-holders of the southern States."[303]

In another example of this use of the enslaved ants to ridicule slaveholders, Presbyterian minister Robert L. Stanton crafted a direct response to Seabury's discussion of natural law and slavery in 1864, near the end of the Civil War. Stanton, the brother-in-law of abolitionist and women's rights activist Elizabeth Cady Stanton, savaged Seabury for defending the rebel slaveholders of the South. Referencing an address by Confederate Vice President Alexander Stephens in which he proclaimed slavery the cornerstone of the Confederacy, Stanton wrote that "this great New York Doctor tells us what this 'corner-stone' rests upon—an ANT-HILL."[304] If the behaviors of the animals provided a guide to the law of nature, Stanton reasoned, then cannibalism would also be justified. He darkly suggested to starving Confederates that "even though it were true, that the carnivorous animals eat other species only than their own...we could get along with that difficulty very easily. The Anglo-Saxon need only eat the negro."[305] By this derision, Stanton successfully ignored much of the substance of Seabury's argument, for Seabury had

302. Acheta Domestica, *Episodes of Insect Life* (London: Reeve, Benham, and Reeve, 1849), 109–10.
303. Acheta Domestica, "Episodes of Insect Life," *Tait's Edinburgh Magazine* 16, no. 181 (January 1849): 66.
304. R. L. Stanton, *The Church and the Rebellion: A Consideration of the Rebellion Against the Government of the United States; and the Agency of the Church, North and South, in Relation Thereto* (New York: Derby & Miller, 1864), 518–19.
305. Ibid., 521.

maintained that it was not necessary to demonstrate the presence of slavery among animals to justify slavery as compatible with natural law.

Edward Hitchcock, naturalist and president of Amherst College in Massachusetts, produced *History of a Zoological Temperance Convention*, an allegorical tale of a temperance convention attended by representatives from the animal kingdom. He wrote that he hoped "that this allegorical mode of exhibiting Temperance and some other important subjects, may excite more interest than a method more didactic."[306] At this convention, the rufescent and sanguine ants made an appearance to argue for the advantages of slavery. The rufescent representative admitted that man had given slavery a bad name, but he insisted that the ant version of slavery was much less cruel because only infant ants were taken. He wondered, furthermore, why some of the larger animals had not adopted slavery. The rufescent ant "had no doubt but nature intended that the strong and the wise should thus compel the weaker and less important animals to sustain them."[307] Following the rufescent ant's speech, the anteater denounced his offensive ideas. Reflecting common critiques of slavery's negative effect on slaveholders, the anteater claimed that the constant war the rufescent ants waged to gain slaves made them violent, proud, and lazy. They were easily insulted and often dueled. The anteater also rejected the intimation that the particular physical characteristics and innate attitude of the rufescent ants made them naturally disposed to take slaves. "But I will not waste time in attempting to prove to this Convention," the anteater continued, "that the Author of the Universe never created animals of any sort for the purpose of making them kidnappers, slave-holders...or...licentious gluttons and revelers."[308] Another speaker blamed man's

306. Edward Hitchcock, *History of a Zoological Temperance Convention, Held in Central Aftrica in 1847* (Northampton [Mass.]: Butler & Bridgman, 1850), vii.
307. Ibid., 134–35.
308. Ibid., 138.

Fall in the Garden of Eden for this wicked enslaving behavior and all other vices and cruelties in the animal kingdom.[309] Hitchcock thus challenged the notion that slavery in the natural world justified the enslavement of human beings.

Other antislavery responses to the reports of enslaved ants consisted of more nuanced discussions of the proper uses of natural historical facts. An 1832 commentary on a textbook of natural history in the highbrow *North American Review* anticipated mischievous uses of the enslaved ants. Defenses of human slavery based on enslaved ants, the author argued, were no more valid than defenses of monarchy based on the habits of bees. Monarchy might work for the bees, the commentator continued, but monarchy could not satisfy the "wants and improvement of man."[310] In other words, the analogy between human and ant slavery did not hold. This conclusion did not stop the author, however, from commenting approvingly on the feminine modesty of queen ants: "The female ants, when they become mothers of a family, cut off their wings and throw them away, thinking, doubtless, that domestic cares and duties will leave them no time to fly round as in former days."[311] Similarly, a correspondent in the Quaker journal *The Friend* sought to defend natural history even as the science revealed the dark underside of animal behavior. In response to letters to the paper expressing uneasiness at its publication of facts about ant slavery, which could be used to prop up the peculiar institution, the correspondent attempted to reconcile the study of natural history with Christian moralism. God made man, the writer claimed, with faculties of observation and reason to explore the world. The discovery of the enslaving behavior of ants reminded men of the necessity of the saving power of Christ: "We should never be deterred in

309. Ibid., 139.
310. "Habits of Insects," *The North American Review* 35, no. 76 (July 1832): 222.
311. Ibid., 223.

consequence of discovering in these inferior natures an evidence of dispositions, which Christianity alone can enable us to subdue within ourselves."[312] Far from being evidence for slavery's compatibility with natural law, the barbaric slaveholding instinct in ants revealed that man must constantly struggle to overcome his own beastly tendencies. In this case, the editor accepted the analogy between human and ant slavery, but instead of agreeing that it justified the peculiar institution, the editor took it as a lesson in the need for humans to turn to the better angels of their nature to overcome sinful predispositions.

Conclusion

What are we to make of the role of the enslaved ants in the slavery controversy? For proslavery theorists, the example of the enslaved ants served merely as a minor supporting fact, if that. The sarcastic reactions of Stanton and the correspondent in the *Boston Recorder* partially explain why proslavery did not take this tack: they would have left themselves open to claims that they saw ants as equivalent to humans. In addition, putting an argument for slavery by analogy at the front and center of their rhetoric ran counter to the warnings about the fragility of analogy in the philosophy of mind literature.

But the significance of their reluctance goes beyond potential rhetorical pitfalls. As Cobb's book demonstrated, proslavery theorists saw human beings as social creatures embedded in a society. Seabury warned against following the abolitionists' argument to its logical conclusion. Declare slavery contrary to the law of nature because it deprived certain individuals of freedom, and soon the abolitionists and their ilk would be attempting to liberate women from the tyranny of marriage or to outlaw private property.

312. G., "Subserviency of the Study of Natural History to Moral Improvement," *The Friend* 9, no. 5 (November 7, 1835): 36.

These meddlesome reform impulses, according to the defenders of slavery, stemmed from a flawed notion of natural law, one that attempted to impose an excessively individualist vision of what was natural onto society. For the proslavery theorists, natural law followed from man's nature as a social being, not an atomized individual. Thus, to understand what was natural and just, one needed to observe society and study *human* history, not draw analogies between the natural and human worlds. The defenders of slavery, therefore, had no need to find the peculiar institution amongst the animals to know that the institution was just; their examinations of *human* nature through observation and the study of history accomplished this task. This episode of the enslaved ants, then, demonstrated the ambiguous status of natural history in the nineteenth century. On the one hand, the science could reveal the presence of the divine hand in nature. On the other, both pro- and antislavery advocates recognized that it was ludicrous to apply the creator's designs for insects to human society.

CHAPTER 6

INDIAN CORN, METEORS, AND RACIAL HAIR: THE SCIENCE OF PETER A. BROWNE

Introduction

Peter Arrell Browne (1782-1860) practiced law in Philadelphia and served as professor of geology and mineralogy at Lafayette College in Easton, Pennsylvania. Throughout his career, Browne published on a wide variety of scientific topics, including Indian corn, meteors, and the hair and wool of animals. At first blush, it seems that these diverse interests could have nothing in common with each other. But a consistent philosophy of science pervades Browne's corpus. In short, Browne operated in a natural historical mode of investigation.[313] In each subject he undertook, Browne attempted to gather as many relevant facts as he could, and for the most part he hesitated to construct complete theories from these facts. Browne also displayed a strong interest in classification of natural objects; his work on hair and wool in particular shows him organizing hair and wool by type, and he used these observations to contribute to the classification of the types of mankind.

Three particular themes stand out in a review of Browne's work. First, Browne emphasized the necessity of gathering numerous accurate facts prior to systematizing and theorizing. As he stated in an 1826 lecture that advocated for a geological survey of

313. Lewis, *A Democracy of Facts*.

Pennsylvania, "all correct reasoning upon natural history, must be founded upon facts, and these facts must be laboriously collected by the *practical* mineralogist and geologist, before they can be analyzed, compared, and reduced to a system."[314] Second, Browne repeatedly underscored the constancy of nature's laws, and he argued that science should seek to reveal these laws. In his address on the potential for a geological survey, Browne stated that "the laws of geology can be deduced with more certainty, from the rocks of the United States, than from those of any other country hitherto examined."[315] Finally, many of Browne's works advocated the pursuit of science in service to the United States. Several of Browne's publications bore the motto "Ducit Amor Patriae" ("love of country leads me") on the title page.[316] His treatise on hair and wool in particular emphasized how a greater knowledge of the natural history of wool would enable Americans to compete with foreign sheep breeders. As revealed in his scientific publications, Browne practiced a science that echoed the British empiricists in its emphasis on the collection of facts and its assumption of the constancy of nature's laws. Browne also reflected Condorcet's optimism in his argument for the ability of careful measurement to lead to unlimited progress in the sciences and, in turn, society in general.

The Nativity of Indian Corn

In 1837, Browne read a paper on corn before the Chester County (Pennsylvania) Cabinet of Natural Science. He made plain to his audience that he was speaking on the

314. Peter A. Browne, *An Address, Intended to Promote a Geological and Mineralogical Survey of Pennsylvania, the Publication of a Series of Geological Maps, and the Formation of State and County Geological and Mineralogical Collections* (Philadelphia: P. M. Lafourcade, 1826), 3.
315. Ibid., 4.
316. Peter Arrell Browne, *Trichologia Mammalium; Or, A Treatise on the Organization, Properties and Uses of Hair and Wool; Together with an Essay upon the Raising and Breeding of Sheep* (Philadelphia: J. B. Jones, 1853); Peter A. Browne, *An Essay on Indian Corn* (Philadelphia: J. Thompson, 1837); Peter A. Browne, *An Inquiry into the Expediency of Altering and Amending the Naturalization Law of the United States, Respectfully Addressed to the American People* (Philadelphia: Barrett & Jones, 1846).

Indian corn, known by the binomial name *Zea mays*, and not generic corn, which could refer to any kind of grain that had seeds growing "on *ears*, and not in *pods*." In this way, British statutes concerning any kind of grain were labeled as "corn laws." Browne thus dedicated his speech to the plant that we call corn today.[317] A large portion of the paper consisted of an extended discussion on whether corn originated in the New World or somewhere else. According to Browne, he undertook this investigation of corn's nativity because of the disturbing lack of consensus on the subject. Francis Lieber's *Encyclopaedia Americana*, Browne said, stated that the birthplace of corn was unknown. "It is a reflection upon, not only the learned, but the mass of the community," Browne complained, "that their great *staple commodity*—the plant that demands and receives the patronage, the skill, and the industry of a large agricultural part, of a great agricultural nation, should be so imperfectly known."[318] Browne thus argued that the natural history of Indian corn would never be complete without an understanding of the plant's origin.

Browne proceeded to give an exhaustive summary of what writers had said on the subject. He demonstrated that the "corn" spoken of in the Bible could not have been the *Indian* corn known to Americans, but rather a kind of wheat or other small grain. A review of histories of European contact with the Americas followed, and Browne cited sources from the Spanish, French, and British. All of these writings pointed towards an American birthplace for corn, for the writers continually testified that explorers and settlers either had seen corn cultivated by Indians or had witnessed Indians making use of corn as a major part of their diets. Browne also analyzed an Indian language, which gave evidence that the Lenni Lennape Indians considered corn "the ORIGINAL GRAIN," or a

317. An illustration that accompanied the published speech depicted an ear of Indian corn found in the tomb of a Peruvian mummy. Browne, *An Essay on Indian Corn*, 5.
318. Ibid., 6.

native plant. Finally, Browne brought Peter Kalm, a student of the great Linnaeus himself, to the witness chair. Kalm, who traveled to North America in 1748, wrote in a narrative of his trip that the Indians had been unfamiliar with European crops such as wheat, barley, and oats, but they had planted corn extensively. Browne insisted that Kalm "was a pupil of Linaeus, and a good botanist, and therefore his evidence is very creditable upon this subject."[319]

The sum of all of these testimonies, Browne argued, gave strong support for the American origin of corn. In defending his reliance on the testimony of other men, Browne made similar arguments as the philosophers of mind did when discussing the authority of human testimony in seeking knowledge:

> What are the inferences to be fairly adduced from this body of concurring testimony? It must be recollected that it emanates from many persons of different habits and propensities, and belonging to different nations, civilized and savage; among whom there could have existed no connivance or collusion: it has been made public at different periods of time, and under various circumstances; and relates to different parts of a widely extended territory, and it is therefore not obnoxious to the objection of having been an ancient error originally fallen into by accident, and unintentionally adhered to and copied by subsequent writers. Standing as it does on independent ground, each piece of testimony corroborates and strengthens the others; and the whole taken together, establishes in a way that defies refutation that the Indian corn claims this hemisphere for the place of its nativity.[320]

In particular, this small disquisition on the authority of testimony recalled the analyses of John Locke and Isaac Watts, both of whom argued for the credibility of testimony that came from multiple witnesses that concurred in the facts that they related.[321]

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319. Ibid., 7–12.
320. Ibid., 13.
321. Locke, *Works*, 1:308–9; Watts, *Improvement of the Mind*, 393–94.

Browne concluded his essay with hints on how agriculturalists could improve the culture of Indian corn. He quoted a letter from Thomas N. Baden, a planter in Maryland, who claimed to have improved his corn crop by only selecting the finest kernels for from his present crop to use as seeds for the next year's crop. Those farmers who had used his corn seed, Baden claimed, had greatly increased their corn yield per acre. If Chester County farmers followed Baden's principles, Browne claimed, they could also greatly increase their output of corn to the great benefit of the state and the country.[322] Thus did Browne's essay include a patriotic call to improvement in addition to its detailed discussion of corn's nativity.

The Natural History of Meteors

In 1843, Browne presented an essay on meteors, solid objects that traveled at great speed across the sky, to the National Institute for the Promotion of Science. This paper offered no original observations of meteors from Browne. Instead, he undertook a comprehensive review of observations of meteors by others, and he scrutinized the theories that attempted to account for them. The essay displayed several noteworthy epistemological strategies. First, as in his essay on corn, Browne combined the testimonies of many observers to provide evidence for his contentions about meteors. Second, Browne relied on the constancy of the laws of nature to reject accounts of meteors that he found flawed. Finally, Browne concluded his essay with a statement of his own suggestion for the origin of meteors, but he offered this account only as a "supposition," not a fully fledged "theory," for he argued that the "natural history" of meteors was not complete enough to warrant such a definitive statement.[323] All in all,

322. Browne, *An Essay on Indian Corn*, 25–27.
323. Peter A. Browne, *An Essay on Solid Meteors, and Aërolites or Meteoric Stones* (Philadelphia: United States Job Printing Office, 1844), 36.

Browne's essay on meteors exhibited a highly inductive method that drew from the British empirical tradition.

In a similar manner as his review of the evidence for the nativity of corn, Browne brought forth the concurring testimony of numerous witnesses to argue that, contrary to some accounts of meteors, these objects were completely solid, not gaseous or of electromagnetic origin. Browne claimed that "there is a body of evidence, consistent in all its parts, emanating from numerous eyewitnesses, living in different countries and ages, persons of known integrity and of sufficient skill and knowledge to guide the judgment" that the pieces of meteors, called aërolites, were made up of "iron, nickel, silex," and other solid substances. Naturalists had collected these aërolites and had deposited them in natural history museums, and chemists had analyzed them closely. "Upon this solid basis of human testimony the learned have pronounced, that aërolites, and the meteors from which they are ejected, are *Solids*," Browne concluded.[324] Once again, the concurrence of all these witnesses provided solid support for Browne's description of meteors.

At several points throughout the essay, Browne pointed to the constancy of the laws of nature to argue against certain accounts of meteors. For example, Browne reviewed the observations of Tiberius Cavallo, who described a meteor that passed over England in 1783. Cavallo wrote that the meteor initially appeared almost still before traveling at a rapid rate across the sky. Browne explained this strange behavior by pointing out that an object moving directly towards the observer often appeared still even if it had great velocity. Furthermore, "if the meteor was at rest when Cavallo first saw it, there is no possibility of accounting for the prodigious velocity which it was immediately

324. Ibid., 12.

afterwards known to have had. On the contrary, it would have fallen in a direct line to this earth in obedience to the universal law of gravity."[325] Later in the essay, Browne evaluated theories that argued for the terrestrial origin of meteors. According to some men of science, the constant and immense heat provided by the sun could transform normally solid substances on the surface of the earth into gases, which would then rise into the atmosphere and recombine into solid masses, finally emerging as the meteors that observers had identified. Browne pointed out several flaws in these theories. First, the sun's rays lacked the necessary magnitude of heat to vaporize solid substances like iron. Second, chemists had found that aërolites were composed of metals that were never or rarely found together in the earth. Finally, even if the sun somehow had the power to vaporize solid substances, Browne could not conceive how the particles could recombine in the atmosphere to form the large meteors that observers had reported. These particles could only recombine with each other, Browne explained, if they were attracted to each other "according to that law which says that every particle of matter in the universe attracts every other particle, with a force directly proportioned to the mass of the attracting particle and inversely to the square of the distances between them." If the meteors were formed in this way, they should have immediately become attracted to the earth and should have proceeded to the earth's surface, "as takes place with rain, hail and snow." But, as many observers had attested, meteors traveled at a very great velocity through the air and were not observed to crash into the earth. Browne concluded, "Before, therefore, we can admit this theory of solid meteors being formed in our atmosphere, we must believe that a fundamental and universal law of nature has, in their

325. Ibid., 10–11.

cases, been abrogated, or at least suspended."[326] He thus took the constancy of nature's laws as a given; any explanatory narrative of natural phenomena needed to accord with these generally applicable laws.

After pointing out numerous flaws in many of the theories that purported to explain the origin of meteors, Browne concluded his essay with a defense of his own proposition. He argued that the sun ejected meteors from its body at a great velocity, and that after running a course throughout space and through the peripheries of planets, they returned to the sun. Browne proposed this idea, however, in a modest manner that urged the collection of more facts before making any attempt at a definitive judgment. Indeed, Browne refused to call his idea a "theory." As he explained, "Sufficient facts have not yet been collected in relation to the natural history of these extraordinary objects whereon to find an *hypothesis*." He put forward his proposal as "a more *possible supposition* than any theory of their origin yet promulgated."[327] As an example of Browne's desire for more facts, earlier in the essay he had stated that "as that the rate at which solid meteors move is a feature of the greatest importance, in their natural history, it is to be regretted that upon *it* more attention has not been bestowed." Only five out of the many observed cases of meteors included information about their velocity. Many accounts merely remarked that the meteors had a "very great velocity" or some similar imprecise statement.[328] In this case, Browne desired a quantified observation of the meteor in order to make a better supposition about its origin. Thus, Browne adopted an empirical stance that emphasized the more complete collection of the facts of an object's natural history before making theoretical judgments about it.

326. Ibid., 27–28.
327. Ibid., 36.
328. Ibid., 10.

Hair and Wool Studies

In the early 1850s, Browne published a book, two pamphlets, and several newspaper articles on his exhaustive investigations of hair and wool, which he referred to together as "pile."[329] His studies aimed for nothing less than a complete natural history of the hair and wool of all animals. Browne's investigations in this area revealed his concern with the classification of the varieties of pile. As Peter Dear has argued, scientific classification during the Enlightenment aimed for more than just an organized arrangement of natural objects like plants, animals, and minerals. Taxonomists attempted to create classificatory systems that revealed the fundamental order of nature. In botany, for example, naturalists argued over how to arrange the numerous species of plants so that the result would demonstrate the very design of God in creating the different species. Should botanists look to the form of the flowers to organize plants, as Linnaeus did, or should the classificatory system take account of the minute differences between all parts of a plant, as several critics of Linnaeus argued? In addition to these philosophical disputes about the proper order of things, some naturalists attempted to claim that a legitimate classificatory system would also serve useful purposes. In botany, this concern with practicality meant that the best system of classification would simultaneously put plants in the correct philosophical order and place plants with similar medical, dietary, or ornamental qualities close to each other.[330] Browne contended that his classification of wool and hair would serve these two purposes. Defending his focus on such a peculiar aspect of natural history, Browne argued that his studies of hair and wool could both inform debates about the "unity of the human species" and improve the raising of animals

329. Browne, *Trichologia Mammalium*, 7.
330. Peter Dear, *The Intelligibility of Nature: How Science Makes Sense of the World* (Chicago: University of Chicago Press, 2006), 47–60.

for wool and hair.[331] Thus, his work on pile would accomplish the philosophical purpose of distinguishing between the different types of mankind and fulfill the practical purpose of enabling American sheep breeders to compete with the rest of the world. Besides this concern with classification, Browne revealed his intellectual descent from the Enlightenment epistemological literature throughout his writings on pile.

First, Browne gestured to the Enlightenment discussion about the nature of ideas and, in particular, Locke's analysis of complex ideas of substances. In the first chapter of his treatise *Trichologia Mammalium*, Browne attempted to define exactly what he was studying. To his knowledge, no one had supplied "an accurate *definition*, nor even an exact *description*, of pile, hair or wool." Browne found that he also could not compose such a definition. He stated that "a definition, to be logical, should furnish a general idea of the nature of the *genus* of the object defined, with *all* the essential *specific* differences. To do this, we are not, *at present*, prepared. But a *description* may pass examination, if it contains *the most remarkable* properties of the objects described." He then provided a complex description of pile that attempted to include numerous characteristics that all specimens of hair and wool shared.[332] In this brief discussion of the definition of pile, Browne recalled Locke's argument about complex ideas of substances. Locke had pointed out the problem that the human mind encountered when discoursing about substances. Complex ideas of things in the world, Locke argued, could only be made up of simple ideas that "have been discover'd to co-exist in Nature." Philosophers erred, he continued, when they attempted to claim that underneath the observable qualities of a thing lay some real "essence" that could explain all of its properties. "*The Names of*

331. Browne, *Trichologia Mammalium*, iii.
332. Ibid., 7–8.

Substances then," Locke explained, "*whenever made to stand for Species, which are suppos'd to be constituted by real Essences,* which we know not, *are not capable to convey Certainty to the Understanding*."[333] Using Locke's vocabulary, Browne formed a complex idea of pile by including many of the simple ideas excited by the object. He noted, for example, pile's great "ductility, flexibility, elasticity and tenacity."[334] Much of the rest of Browne's treatise consisted of exhaustive descriptions of hair and wool specimens, thus reflecting Locke's emphasis on finding the simple ideas that coexisted in nature rather than uncovering some root essence of a natural object.

In order to construct this descriptive science of pile, Browne created an elaborate method of classification and description that recalled the classification systems of Linnaeus and other botanists. Browne listed nineteen items that the trichologist should include in his description of a specimen.[335] He followed this system in each specimens he described. For example, Browne provided a description of hair from a three-toed sloth specimen kept at the Academy of Natural Sciences in Philadelphia.[336] In constructing this descriptive system, Browne attempted to bring standardization to the studies of pile. From these observations, Browne made a fundamental distinction between two kinds of pile: hair and wool. The two differed in at least eleven ways, Browne argued. In brief, hair had a rounder shape than wool; hair had fewer scales that jutted out from the central shaft when compared to wool; hair hung straight or curled while wool kinked and "frizzled"; and "the coloring matter of a *perfect hair*" was found in a "central canal," while wool always had the coloring matter distributed throughout the entire strand.[337] In

333. Locke, *Works*, 1:264–67, 271.
334. Browne, *Trichologia Mammalium*, 7.
335. Ibid., 133–34.
336. Ibid., 40.
337. Ibid., 8–9.

elaborating on the specific characteristics that defined the difference between hair and wool, Browne perhaps drew from the method of the great French zoologist and anatomist Georges Cuvier. The Frenchman had effected a revolution in the classification of animals by attending to the specific differences in the structure of various organs used for the survival of the species, such as the teeth, which served as essential appliances in enabling animals to receive nutrition. Close analysis of different animals' teeth, for example, had enabled him to argue that varieties of animals thought to have been the same species actually belonged to completely different species.[338] Hair and wool might seem superficially similar, Browne argued, but close examination revealed important differences. We will see shortly how Browne used these small differences to argue that the different races of mankind were actually different species.

Browne's descriptive system required more than just naked-eye observations of strands of hair and wool. The cross-sectional shape of the hair or wool constituted a crucial characteristic of the specimen in question. One could not determine, however, the cross-sectional shape of a strand of hair or wool by simply viewing the sample. Browne argued that the investigator needed to view the cross section under a microscope in order to ascertain the true shape of the hair. This observation could only be accomplished with a special device that could cut cross sections from the strands.[339]

From these observations of hair and wool cross sections, Browne constructed a classification system for the pile of the human head. He divided human pile cross sections into three categories, which, he argued, corresponded with the three "species" of humankind. The first category, the "cylindrical" pile, included pile cross sections that

338. Dear, *The Intelligibility of Nature*, 62–66.
339. Browne, *Trichologia Mammalium*, 52–53.

approximated a circle. Second, Browne named the "oval" pile, which had a cross section in which the longest diameter was one-third greater than the smallest diameter. Browne called the third category "eccentrically elliptical" pile, which had a cross section in which the longest diameter was two-thirds longer than the smallest diameter. Some specimens fell in between these three divisions. Browne included particular names for those piles that fell between the cylindrical and the oval or between the oval and eccentrically elliptical. He remarked that intermediate cases should be included in whichever main division was closest to it.[340]

The three main categories, Browne explained, nicely corresponded with the "direction" of the pile, or the "path which a filament of pile pursues from the point where it pierces the epidermis to its apex." Cylindrical pile always hung "straightly and lankly from the head." Oval pile "must inevitably flow or curl." Finally, eccentrically elliptical pile "must always be crisped or frizzled, and sometimes spirally curled." Browne explained these three different directions by pointing to the action of the "fibres" within a single strand of hair or wool. In cylindrical pile, all of the fibers resided equidistant from the center of a single strand. Thus, cylindrical pile hung absolutely straight from the head. But oval pile "has a greater number of fibres on its two flattened sides than upon the ellipses," and therefore the pile flowed or curled "in the direction of one of these flattened sides." Eccentrically elliptical pile had an even flatter shape than oval pile, and therefore the pile curled even more dramatically to result in a frizzled or spirally curled organization. To convince the reader of these "laws" of the direction of pile, Browne made an analogy between oval and eccentrically elliptical pile and a spatula. One could easily bend the spatula "in the direction of either of its flattened surfaces," but one found

340. Ibid., 51–52.

it impossible to bend in the opposite direction. In the same way, oval and eccentrically elliptical pile flowed in the direction of either of the two long sides. Finally, Browne reviewed the "inclinations" of pile, or the angle by which the strand of pile exited the skin. Although the inclination of pile did not depend on the shape or the direction, Browne found that cylindrical and oval pile always made an acute angle with the skin, while eccentrically elliptical pile always made a right angle with the skin.[341]

Browne used these three distinctive types of the pile of the human head to argue that each type represented a different species of mankind. As Browne wrote, "if we can prove that there are three portions of men who now exist, and who from time immemorial have existed, the covering of whose heads, respectively, do, and have, uniformly, corresponded with these three species of pile, there will be no difficulty in pronouncing that (judging from the pile of their heads) they belong to three distinct species of men."[342] Browne proceeded to describe the results of his examinations of the pile of living American Indians and Indian mummies from North and South America, and he concluded that all of them were of the cylindrical type. Indians in both the present and the past, then, displayed the same characteristics in their hair. He wrote that his collection of Chinese pile also followed the cylindrical prototype.[343] Browne proffered a similar analysis for oval and eccentrically elliptical pile. His many examinations of hair from white Europeans and Americans demonstrated that they all were of the oval type. He also cited the ubiquitous appearance of flowing and curly hair in classical poetry and mythology as evidence for the ancient heritage of oval hair amongst the white race of man.[344] Finally, Browne turned to the eccentrically elliptical pile. He prefaced his analysis

341. Ibid., 57–59.
342. Ibid., 59.
343. Ibid., 59–63.
344. Ibid., 63–65.

by writing that "it might easily be supposed that in a city like Philadelphia, abounding in black faces, no difficulty would be encountered in procuring *pure* negro hair. It is quite the contrary." Browne admitted that he could only obtain fifteen specimens of "pure" negro pile, and all of these came from either slaves in the United States or present-day Africans. These specimens all displayed the characteristics of eccentrically elliptical pile.[345] "We have thus shown," Browne concluded, "by the pile of the head, that there are three distinct species of human beings inhabiting this globe, and whose ancestors have been its inhabitants for at least from 2,700 to 3,000 years—probably from the first creation of man." Using his distinction between hair and wool, Browne held that the pile on the heads of Indians and whites was hair, while the pile of blacks was wool.[346] Browne confidently asserted this conclusion about the antiquity of these species of man even though he admittedly did not have ancient specimens of negro hair. Furthermore, Browne pointed out the superiority of the hair of the white man compared to the wool of blacks. Filaments of whites' hair, Browne asserted, contained a central canal that carried the coloring matter within it. Blacks' wool lacked this canal; the coloring matter was instead suffused throughout the filament. "According to the rules of science," Browne proclaimed, "one organ is considered *more perfect* than another, if it employs a greater variety of apparatus in the performance of its functions." The inclusion of a coloring canal in whites' hair, then, made this pile superior to blacks' pile.[347] Here, Browne clearly applied Cuvier's differential analysis of organs to make distinctions between the pile of whites and blacks. Although both kinds of pile covered the head, and thus served the

345. Ibid., 65–66.
346. Ibid., 66.
347. P. A. Browne, *The Classification of Mankind, by the Hair and Wool of Their Heads, with an Answer to Dr. Prichard's Assertion, That "The Covering of the Head of the Negro Is Hair, Properly So Termed, and Not Wool"* (Philadelphia: A. Hart, 1850), 7–8.

same function, the white man's pile displayed a completely different, and superior, organization when compared with the black man's pile.

Browne utilized this three-species classification of man to launch into a discussion of hybridization. In his treatise on hair and wool and a smaller pamphlet, Browne put forth a complex system of nomenclature for human hybrids based on the fraction of black, white, and Indian blood that an individual possessed.[348] Returning to the subject of the pile on the human head, Browne asserted that "the pile of the head of human hybrids does not exhibit one uniform new variety, varying from that of both parents; but generally, perfect filaments which resemble that of the one parent, and other perfect filaments which resemble that of the other parent; for example, the progeny of a white and black will have some perfect oval hairs, and some perfect eccentrically elliptical wool." At other times, "the constitutional energy of one parent outweighs that of the other," and then the hybrid would only have one category of pile on his or her head. Browne further explained that, "in accordance with the general laws of hybridism," these hybrids could not form a self-perpetuating intermediate race. In some cases, multiple generations of hybrids breeding together gradually lost the ability to reproduce entirely. In other cases, the union of two or more species resulted in the offspring tending towards the species of *one* parent, and thus the offspring of this hybrid fell back into one species rather than forming a new hybrid species.[349] He warned, however, that even if the hybrid offspring resembled a member of one of the pure species, the blood of the "inferior" species still remained in his or her veins. Thus, Browne urged whites to avoid marrying mulattoes who appeared white, "for fear of finding ourselves, some day, *blessed* with a

348. Browne, *Trichologia Mammalium*, 67–72; P. A. Browne, *The Classification of Mankind, by the Hair and Wool of Their Heads, with the Nomenclature of Human Hybrids* (Philadelphia: J. H. Jones, 1852).
349. Browne, *Trichologia Mammalium*, 73–74.

black heir."[350] Browne supported these arguments with citations of William Van Amringe's *An Investigation of the Theories of the Natural History of Man* (1848), which defined the several races of man as different species. Van Amringe, for example, pointed out that the offspring of mulatto parents usually did not maintain the intermediate color of their parents, and they often appeared either completely "white" or entirely "black." Browne added that he had discovered a similar phenomenon in the pile of mulattoes; some strands of their pile appeared to be similar to their white parents while the others had the characteristics of their black parents. This evidence, Browne argued, amply demonstrated the "natural abhorrence to the amalgamation of *species*." He continued, "The natural disgust planted in the minds of all animals to the mixture of species, seems to have been wisely pre-ordained, in order to *preserve* the purity and beauty of creation."[351]

Armed with these observations, Browne entered into the controversy over the unity or plurality of the human species. In 1849, he read a paper before the American Ethnological Society that took direct aim at James Cowles Prichard's contention that black and white people were of the same species. First, Browne took issue with Prichard's contention that unions between the different races of man could form self-perpetuating intermediate races. The cases Prichard had brought forward, Browne argued, failed to demonstrate this proposition, thus showing that the different races of man were in fact different species, not just different varieties of the same species. Second, Prichard attempted to argue that because domesticated animals could produce numerous varieties of the same species, the same process could occur with man. "Change of climate and

350. Ibid., 169.
351. Ibid., 166–67.

habits" could also lead to the differentiation of the same species. Browne contended that Prichard's attempt to use an analogy between the "lower animals" and man also failed to prove his argument. Historical sources, Browne explained, demonstrated that the races of man had remained basically constant over a long time period. For example, Herdotus's description of black men matched the current appearance of Africans. Furthermore, long experience had shown that a "tropical climate" could not turn white men into black ones. "To these unyielding facts," Browne declared, "all reasoning from analogy must succumb, and all biases of religion and humanity must give way." Reflecting a Newtonian disapproval of preconceived theories, Browne accused Prichard of wedding himself to his "hypothesis" instead of allowing himself to be led by facts towards the truth.[352]

Browne also objected to Prichard's contention that the covering of the heads of blacks was hair, not wool. In a systematic analysis of Prichard's observations of the pile of human beings, Browne pointed out several confusing passages and mistakes. In the first place, Browne argued that Prichard, despite citing several authors on the subject of hair and wool, never specifically gave a precise description of the difference between the two. Prichard's descriptions of pile specimens that he examined, then, were filled with imprecise claims about their characteristics. For example, Prichard claimed that a sample of a black's hair when viewed under a microscope "was extremely unlike that of wool." Browne replied, "This is not the language of a naturalist, examining an object with the microscope. He either explains the particulars in which an '*extreme unlikeness*' exists, or he furnishes drawings and descriptions of both objects, and leaves the reader to judge of the discrepancy for himself." Other claims made by Prichard, such as his assertion that

352. Browne, *The Classification of Mankind...with an Answer to Dr. Prichard*, 11–13.

"the hair of the negro had the appearance of a cylinder," completely contradicted Browne's observations. "Where the negro blood is pure," Browne wrote, "they are *always eccentrically elliptical* or *flat*."[353] Prichard went on to claim, according to Browne, that even if naturalists rejected his claim that blacks had hair, not wool, on their bodies, this opinion would make no difference for his main contention that all the races of man shared a single species, for many animals grouped into a single species could display variations in their coverings, with some having wool and some having hair. Browne rejected this assertion outright. If one variety of an animal always possessed hair, and another always possessed wool, then a naturalist could offer no argument why the two should not be considered species instead of varieties. "Since the white man has hair upon his head, and the negro has wool," Browne concluded, "we have no hesitancy in pronouncing that they *belong to two distinct species*."[354] For this reply to Prichard, Browne earned the admiration of Thomas R. R. Cobb, a Georgia proslavery theorist.[355]

Browne applied these admonitions against hybridization directly to the practical question of the improvement of American sheep breeding. According to Browne, there existed two completely separate species, not breeds, of domesticated sheep. The first species produced hair, and the second species produced wool. The hairy species yielded a fabric that would not shrink, and thus the fleece of this animal could be made into flannel, worsted, blankets, and hose.[356] The fleece of the wooly species could be felted and fulled; in brief, manufacturers matted the wool fibers together "to form a compact mass." Browne explained the felting and fulling processes by relating observations of wool under the microscope, which revealed numerous scales on the wool fibers that jutted out

353. Ibid., 15–17.
354. Ibid., 19–20.
355. Cobb, *An Inquiry into the Law of Negro Slavery in the United States of America*, 31–32.
356. Browne, *Trichologia Mammalium*, 157.

from the central shaft. These scales allowed the wool fibers to become entangled with one another, thus forming a single piece of fabric. This operation required the wool fibers to shrink, and thus the wooly sheep provided a completely different material than the hairy sheep, whose pile did not shrink.[357] Yes, Browne admitted, there existed sheep that possessed both hair and wool, but he argued that these were likely hybrids, exactly analogous to mulattoes who had both hair and wool on their heads. In conclusion, then, Browne urged the American sheep breeder to breed only the best hairy sheep together and only the best wooly sheep together. Careful breeding practices that followed this "*golden rule*" would result in "a *permanent, self-producing* stock." Hairy sheep would produce hair, and their offspring would produce only hair without the chance of blood from the wooly sheep ruining the purity of the product, and the same would apply for the wooly species.[358]

In addition to Browne's discussion of the implications of his pile studies for the natural history of man and the science of breeding, he put great emphasis on precise measurement of pile specimens. Browne invented several instruments for measuring different characteristics of pile. First, he offered a method to ascertain the fineness, or thinness, of pile. In the wool business, the finer the wool, the more valuable it was. An exact measurement of the fineness required one to cut an individual filament into disks before using the micrometer, a tiny ruler used in conjunction with a microscope, to measure the diameter.[359] Before this method came into use, Browne contended that "the fineness (diameter) of wool was a mere guess, founded upon the experience of the wool

357. Ibid., 154–56.
358. Ibid., 158, 171.
359. Browne cited John Quekett's description of the micrometer. John Quekett, *A Practical Treatise on the Use of the Microscope, Including the Different Methods of Preparing and Examining Animal, Vegetable, and Mineral Structures*, 3rd ed. (London: H. Bailliere, 1855), 234.

stapler." With the advent of these instruments, the fineness became "a matter of mathematical certainty." Because these apparatuses cost a large sum, Browne suggested a shortcut method for breeders. He recommended the construction of a "series of tubes" that could be "[drawn] out one from another, like those of a telescope." The user would then take one strand from the sample of wool and place it on a card. After attaching this card to the end of the tubes and looking through the other end, he would lengthen the nested tubes until he could no longer see the strand of wool. Then, he would replace the sample card with another card that contained a number of strands of wool already measured by the micrometer. Upon determining the thickest strand on the card that he could no longer see, the user would obtain an estimate of his wool's fineness. This device thus provides a particularly explicit example of embodied technology. As Browne acknowledged, the vanishing point of the hairs depended on the eyesight of the individual user.[360]

Second, Browne described a method of measuring the ductility, elasticity, and tenacity of pile. His measuring instrument consisted of two clamps that stretched between them a single strand of pile a little longer than one inch. These clamps were mounted vertically and one inch apart on a brass plate that also held a ruler divided into small parts of an inch which could be shifted up and down. The bottom clamp included a small suspended disk on which the user would place weights during the measurement of the pile's characteristics. To determine the ductility, or the ability of the pile to be stretched, the user added weights to the disk until the strand began to stretch. The user then measured how far the strand stretched using the ruler. For elasticity, or the ability of the pile to return to its original length, the user removed the weights added to the disk and

360. Browne, *Trichologia Mammalium*, 102–3.

measured how far the strand returned towards its initial one-inch length. Finally, the user repeated this process until he determined what weight caused the strand to break. This weight constituted the measure of the tenacity, or the strength of the pile. The more ductility, elasticity, and tenacity the wool possessed, the more valuable the sample, for the first two characteristics stood in for softness, while tenacity stood for the overall strength.[361]

Efforts to quantify the qualities of wool, Browne and agricultural reformers argued, would necessarily improve American production by determining the caliber of wool exactly, without relying on the experiential knowledge of manufacturers and breeders. A committee from the Philadelphia Society for Promoting Agriculture inspected Browne's trichometer in 1849 and pronounced it inexpensive and easy to use. Most importantly, it would "enable farmers to select the best wooled sheep with much more certainty than can be done by the eye or hand alone, and consequently to improve their flock by rejecting those of inferior quality."[362] In his treatise, Browne claimed that his instruments would allow the breeder and manufacturer to "determine the four most essential properties of fleece" without relying on the word of the purchaser regarding the fleece's value. "It is to this platform of independence that we desire to elevate the American farmer and manufacturer," Browne claimed. Usually, he continued, the softness of the fleece was "judged by passing it through the fingers or over the inside of the lips, but may be *determined* with the trichometer."[363] The editor of the Philadelphia journal *The Plough, the Loom, and the Anvil* agreed that measurement could bring great

361. Ibid., 53–57, 149, 153.
362. Algernon S. Roberts, B. B. Long, and Aaron Clements, "Report of the Committee on Peter A. Brown's Inventions" February 17, 1849, Box 17, Folder 373, Philadelphia Society for Promoting Agriculture Records, University of Pennsylvania.
363. Browne, *Trichologia Mammalium*, 148–49, 151.

improvements in American sheep breeding. "Hitherto the qualities of wool have been too much a matter of loose comparison and conjecture, without any certain test," the editor wrote. "The mathematical precision with which its fineness is ascertained by Mr. Browne, leaves no room for cavil."[364] Browne then provided a list of his measurements of the fineness of wool from around the world. The fineness of wool samples originating in certain American states rivaled that of the supposedly finest wool in the world, which came from eastern and central European states like Russia and Saxony. With careful breeding that avoided the creation of hybrids, Browne argued, the United States could easily compete with the rest of the world in wool production, for "the sheep, like the sheep's master, improves in this free and happy country."[365] In a letter to the Pennsylvania Agricultural Society, Browne reported his measurements of the hair of the Rocky Mountain goat. Because of the hair's great fineness and strength, Browne urged the society to lobby the federal government to promote the domestication of the goat, for careful breeding could render the goat a competitor of "the celebrated Goats of Cashmere & Thibet."[366] Quantification, Browne and his supporters argued, would free farmers and manufacturers from the uncertain judgments of practical experience and provide a precise and definite measurement of the pile's quality.

Browne's extraordinarily detailed studies of hair and wool depended on the many individuals who donated pile specimens to him. His preface to the treatise on pile claimed that "after years of untiring exertions, we have at length the largest and most valuable known cabinet of pile."[367] This cabinet included several specimens from famous men,

364. P. A. Browne, "The Wools of Various States and Countries Compared," *The Plough, the Loom and the Anvil* 2, no. 11 (May 1850): 688.
365. Ibid., 688, 691.
366. Peter A. Browne, "Peter A. Browne to Pennsylvania Agricultural Society" July 16, 1850, Box 1, Folder 24, Philadelphia Society for Promoting Agriculture Records, University of Pennsylvania.
367. Browne, *Trichologia Mammalium*, iii.

including none other than George Washington. Browne used the cross-sectional shape of Washington's hair as the prototype for the oval category of human pile, thus making him the model for the hair of the white man.[368] In 1851, *The United States Magazine* published Browne's trichometer measurements of a strand of hair from the first president, then nearly 52 years in the grave. The paper noted that the strand "finally broke with the enormous weight of 1120 grains."[369] The citizens of mid-century America surely enjoyed the knowledge that the hair from the father of their country retained its great strength decades after his death. Browne's treatise included measurements and descriptions of other eminent individuals, such as Henry Clay, Andrew Jackson, and James Madison.[370] In the tradition of natural history, Browne had brought together pile specimens from a wide variety of sources so that he could measure, compare, and classify them.

Conclusion

Browne's natural history put him squarely in an Enlightenment mode of scientific practice. In all of his works reviewed here, Browne emphasized the collection of facts, and in the British empirical tradition, he mostly foreswore constructing elaborate theories in favor of letting the facts lead him to some plausible conclusion. Many of his scientific interests did not stop at academic questions but extended to the practical problems of how to advance the interests of the United States in a global market system. His interest in classifying the world's hair and wool also revealed his intellectual debt to Enlightenment taxonomy. Finally, and not least of all, his account of the types of mankind put him right in the thick of the heated dispute over the unity or plurality of the human race.

368. Ibid., 51–52.
369. "Scientific," *The United States Magazine, and Democratic Review* 29, no. 161 (November 1851): 476; Browne, *Trichologia Mammalium*, 54.
370. Browne, *Trichologia Mammalium*, 41, 56.

CHAPTER 7

POLITICAL REASONING

Introduction

Although interpreters of late eighteenth- and early nineteenth-century America have called into question the impact of the Enlightenment in the wider society, they generally agree that in the realm of political philosophy, Americans drew heavily from Enlightenment thinkers, as the very words of the Declaration of Independence and the Constitution testify. This chapter attempts to demonstrate that Americans drew on more than just Enlightenment *ideas* about government; Americans also applied Enlightenment *epistemology* to their analysis of the relationship between state and citizen. Their methods of argumentation thus reflected the patterns of deductive and inductive reasoning outlined in the philosophy of mind literature.

A brief review of political treatises published in the late eighteenth and early nineteenth century provides a window onto the ways in which Americans were making use of Enlightenment epistemology to support their accounts of the nature of government and society. In doing so, this chapter builds on the rich historiography of ideology in the Early Republic, but instead of entering into the well-worn debate over the conflict between republican and liberal ideologies in this period, my analysis focuses on the particular epistemic methods that authors used to support their arguments.[371] This chapter

371. Drew R. McCoy, *The Elusive Republic: Political Economy in Jeffersonian America* (Chapel Hill: University of North Carolina Press, 1980); Joyce Appleby, "Commercial Farming and the 'Agrarian

thus brings the history of the science of the human mind to the political history of the Early Republic.

Universal Laws of Government

In the years following the adoption of the Constitution, a number of New England citizens took to pulpits or pages to enunciate the universal laws that determined the workings of governments throughout history and to show how the Constitution accorded with these laws. Samuel F. Dickinson, Samuel W. Dana, and Nathaniel Chipman all followed a similar method in their treatises on the nature of government. First, they identified a principle or set of principles within man or society that explained the operation of governments. Second, they used historical cases to demonstrate the applicability of these principles to the establishment and maintenance of governments. These writers thus employed a Lockean deductive method that chained intermediate ideas together to arrive at a conclusion. Importantly, Dana and Chipman were members of the Federalist faction in the first party system. Wary of the excesses of popular government, Federalists generally argued for the rule of a natural aristocracy to restrain the passions of the mob. A review of the writings of Christopher Manwaring, a Jeffersonian Republican from Connecticut, provides an alternative account of government that employed a Common Sense analysis of human equality and thus attacked the Federalist attempt to institute a ruling class for the young country. Finally, Dana and Manwaring both

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Myth' in the Early Republic," *Journal of American History* 68, no. 4 (March 1982): 833–49; Lance Banning, *The Jeffersonian Persuasion: Evolution of a Party Ideology* (Ithaca: Cornell University Press, 1978); Lance Banning, "Jeffersonian Ideology Revisited: Liberal and Classical Ideas in the New American Republic," *William and Mary Quarterly* 3rd Series 43, no. 1 (January 1986): 3–19; Gordon S. Wood, "Ideology and the Origins of Liberal America," *The William and Mary Quarterly*, Third Series, 44, no. 3 (July 1987): 628–40; Daniel T. Rodgers, "Republicanism: The Career of a Concept," *Journal of American History* 79, no. 1 (June 1992): 11–38; James T. Kloppenberg, "The Virtues of Liberalism: Christianity, Republicanism, and Ethics in Early American Political Discourse," *Journal of American History* 74, no. 1 (June 1987): 9–33.

employed a gendered discourse in their writings that equated sound reasoning with masculinity. As Carroll Smith-Rosenberg has argued, Americans in the Early Republic tended to masculinize virtues like bravery, industriousness, and self-reliance while feminizing vices like corruption, frivolity, and wastefulness.[372] Dana and Manwaring's accounts of reasoning utilized similar tropes.

Samuel F. Dickinson's speech given in Massachusetts on July 4th, 1797, sought to "show the connection of civil government with manners and taste." Dickinson, a law student, proceeded on the assumption that "the laws...which regulate the changes in civil government and manners, are as fixed and certain, as those, which regulate the revolutions of nature."[373] Civil government, he argued, arose in tandem with the manners and taste of particular societies. Thus, "the savage, whose form of government is as simple as his manner of life, reposes with confidence his rights, in the bosom of his chief, or in the council of his fathers." As civilization advanced, the form of government needed to grow in complexity, and therefore systems of checks and balances were introduced to frustrate the designs of "intriguing politicians."[374] Dickinson provided several historical examples of this connection between government and manners, dwelling in particular on how the barbarian invaders of the Roman Empire caused a decline in civilization, which in turn led to irrational practices like the trial by ordeal.[375] Only in the twelfth century, with the rise of independent cities in Italy and the corresponding improvement in the arts and sciences did government and taste begin to improve. Thus, Dickinson argued, only

372. Linda K. Kerber et al., "Beyond Roles, Beyond Spheres: Thinking about Gender in the Early Republic," *The William and Mary Quarterly*, Third Series, 46, no. 3 (July 1, 1989): 572–73.
373. Samuel F. Dickinson, *An Oration in Celebration of American Independence; Delivered at Belcherstown, July 4th, 1797* (Northampton: William Butler, 1797), 5, 6.
374. Ibid., 10.
375. Ibid., 13–14.

the "*mutual aid*" of government and manners could lead to sustained progress.[376] He concluded that "the connection of civil government with manners and taste is the point, on which the scale of national happiness turns. When this balance is destroyed, either by the too bold strides of the one, or by the rapid progress or decline of the other, convulsions ensue, and such convulsions as rend the political soul."[377] Turning to a contemporary example of this phenomenon, Dickinson suggested that "an ally-nation," presumably Revolutionary France, may have "pushed its civil government one step farther than its social state allows."[378] Dickinson thus identified a single principle that, he argued, governed all human societies from ancient times to the present. This principle, the mutual dependency of government and manners, could then be applied to show the wisdom of the framers in crafting a constitution that fit the habits and manners of the American people and to explain the general prosperity of the country since the Constitution's passage.[379]

In a similar manner, Samuel W. Dana's anonymously published *Essay on Political Society* (1800) offered a defense of the American constitution based on a train of reasoning from principles. This treatise represented a defense of Federalism in a state where Jeffersonian Republicans were beginning to make gains against the strong Federalist establishment.[380] Dana began his essay by asking "the grand question, in the republic of letters...*How shall humanity be protected against despotism?*"[381] Happily,

376. Ibid., 14–15 (emphasis in original).
377. Ibid., 15–16.
378. Ibid., 16.
379. Ibid., 18–21.
380. Andrew Siegel, "'Steady Habits' under Siege: The Defense of Federalism in Jeffersonian Connecticut," in *Federalists Reconsidered*, ed. Doron Ben-Atar and Barbara B. Oberg (Charlottesville: University Press of Virginia, 1998), 204, 210, 214–15.
381. Samuel W. Dana, *Essay on Political Society* (Philadelphia: William Young, 1800), 9–10 (emphasis in original).

Americans, through their written constitution, had nearly achieved "the art of permanently exerting the will of society over all the depositaries of power."[382] Dana defended the Constitution by an appeal to social principles. Just as in the "natural world," in society there existed certain "forces" that needed to be balanced against each other so as to "conduce to that order in the moral world which resembles the sublime and beautiful in the natural." This "reciprocity," Dana explained, constituted the principle which ought to govern political society.[383] Dana then went on to define the forces that were subject to this reciprocity. Echoing Locke's call for grounding moral science in clear and distinct ideas that could lead to mathematical certainty, Dana argued that man's universal "attachment to happiness" served as the "causal power" in human society akin to the "motive force in physics." This principle operated universally throughout societies to effect various causes, and Dana contended that "if we could discuss ethical subjects with the same freedom from prejudice as those which are physical, perhaps we might eventually reason concerning moral quantities with the mathematical correctness which is observable in natural philosophy."[384] Returning to his concept of reciprocity, Dana argued that "justice" was achieved when "the persons interested" gave their "moral concurrence" for some action. In this way, the human motive force of the attachment to happiness received restraint from the law of reciprocity.[385]

After developing these ideas about forces and laws that operated in human society, Dana applied this system to government. In society, Dana reasoned, the rule of reciprocity took on two faces. First, one could demand something from another, such as payment of a loan. Second, one could refuse the excessive demands of another, such as

382. Ibid., 11–12.
383. Ibid., 14–16.
384. Ibid., 25–26; Locke, *Works*, 1:255–56.
385. Dana, *Essay on Political Society*, 26–28.

the refusal to pay to a lender more than that to which the parties originally agreed. The operation of these two tendencies, he continued, led to the formation of two distinct classes in society, those who "restrain and govern" and "those liable to such restraint and government," or, respectively, the aristocratic and democratic classes.[386] Aristocrats and democrats naturally formed two rival parties in order to protect their interests against the other. Allow one party to triumph over the other, and either "oppressive exaction" by the aristocrats or "fraud and licentiousness" on the part of the democrats would result. Thus, the political system needed to set these two parties against each other, "it being certain, that their reciprocal counter-action would restrain them mutually to the point of justice." The bicameral legislature adopted in the Constitution presented the solution; the Senate would guard the rights of property, while the House of Representatives would guard the rights of the people.[387] In the same way, the various branches of government operated reciprocally to protect their own prerogatives and, at the same time, protect the general integrity of the political system.[388] A written constitution, instituted by society itself, could create this system, and thus, "the will of society may be permanently exerted over all."[389]

Dana supported the effectiveness of a bicameral legislature by contrasting it favorably to the various legislative schemes adopted during the French Revolution. His attack on this French mode of government employed a gendered analysis to reinforce his argument. The instability of French governments, Dana argued, proved that the French framers of the constitutional systems had failed to construct a constitution on a sound

386. Ibid., 33–35.
387. Ibid., 37–48.
388. Ibid., 77.
389. Ibid., 81.

basis. This French experience compared particularly poorly to the success of the American Constitution:

> Whether the framers of the American constitution were controlled by an [sic] happy necessity of political situation; whether their profound acquaintance with the most correct theories of government determined the frame of the system; or whether a manly force of mind, combined with scientific skill, aided by much personal experience, and influenced by a respectful attention to preconceived opinions, led to a system so original in its general structure, so intervolved in its parts, so compacted by the association of the whole; whether and how far any or all of these causes operated to produce the American constitution, one thing is certain.....The citizens of the New World have abundant cause to felicitate themselves on their political destiny. The American nation has now a municipal legislature constituted to "provide for the common defence and general welfare."[390]

In true empiricist fashion, Dana refused to say definitively which causes necessarily led to the beneficial effect observed. But he suggested that the framers' masculine reasoning ability certainly could have contributed to the success of the American experiment.

Dana put forward a similar analysis in his discussion of the executive powers that the president possessed under the Constitution. Rightly, he argued, the Constitution enabled the president to conduct diplomacy with foreign nations; the president was responsible for receiving foreign ambassadors and for appointing ambassadors to other countries. The success of American diplomacy during the wars in Europe that followed the French Revolution had demonstrated the correctness of the principles laid down in the Constitution on this point. American diplomacy's "general character" had consisted of "temperate investigation; precision in the detail; comprehension and perspicacity in the great; a lucid order, a manly sense, in the discussion of questions arising under the law of

390. Ibid., 102–3.

nations as applicable within the circle of modern Europe."[391] Once again, Dana associated clear and precise reasoning with masculinity.

The operation of the government instituted by the Constitution resembled the grand principles of the universe uncovered by natural philosophy. Reciprocity operated just as universally in the natural world as in the human world: "Is not this the law which is observed in the action and reaction of all physical bodies, in all their varieties of minuteness and grandeur?" Dana further asserted that America provided "experimental demonstration" of the principles he had originally promulgated.[392] The second part of his essay therefore used the young republic as "an experimental commentary on principles" which he had explicated in the first section.[393] He concluded his essay with a restatement of the principles that were confirmed by the experience of the American polity. Natural philosophy, Dana wrote, had discovered that gravitation universally operated as an attractive force throughout all of creation. In addition, natural philosophy had observed the reciprocal "action and reaction of all physical bodies." Likewise, Dana stated that his essay had shown "that political philosophy admits to a like simplification and universality: It recognizes *one universal motive*, THE ATTACHMENT TO HAPPINESS; and *one universal law*, THE RULE OF RECIPROCITY."[394] Dana's essay employed a deductive method. Starting from two principles in human nature, he deduced the proper way for societies to institute sound government. He then found experimental confirmation of his ideas in the success of the young republic of the United States.

The writings of Christopher Manwaring, a Jeffersonian Republican from Connecticut, present a contrast with the reasoning of Dana. The Federalist Dana, upon

391. Ibid., 148–50.
392. Ibid., 78–79.
393. Ibid., 85.
394. Ibid., 78, 234 (emphasis in original).

reasoning from principles, had found that society naturally divided into two conflicting classes, aristocrats and democrats. Manwaring based his arguments upon the assumption that all men were created equal, and he thus rejected any political system that sought to erect a division between the rulers and the ruled. He thus strongly opposed a property requirement for the franchise.[395] In his arguments, Manwaring employed a Common Sense retort to counter Federalist salvos. In an essay on government, he first attacked the idea that all societies contained a natural aristocracy that ought to rule over the rest of society. "We scarce know which are most deserving of our pity, or abhorrence," Manwaring commented—the aristocrat who would claim the right to "sacrifice the rights of others at the altar of his own aggrandizement," or the man "who would meanly submit to these aristocratical impositions." Both of these persons, the "contemptible" man who would voluntarily submit to this kind of "slavery" and the "inconceivably abhorant and destestable" aristocrat who would claim power over other men, had a defect in their mental faculties, Manwaring argued:

> As the mind bowed down by slavery, loses in silence its elastic powers—so, when it is buoyed up by folly it becomes incapable of exerting them. Aristocrats do not have just ideas of themselves or of others.—They constantly look through a false medium. When they take a view of themselves, to discover their own greatness, they comparatively look through a convex glass, which makes them appear near, and magnifies them to an enormous size...But when they take a survey of those whom they call THE PEOPLE—they shift the perspective, and look through a concave glass, which diminishes the object.

In this passage, Manwaring drew from the discourse on Common Sense. He argued that the aristocrats' preconceived notion of their own superiority overwhelmed their Common

395. Christopher Manwaring, *Republicanism & Aristocracy Contrasted: Or, the Steady Habits of Connecticut, Inconsistent with and Opposed to the Principles of the American Revolution: Exhibited in an Oration, Delivered at New-London, (Con.), July 4th, 1804, on the Celebration of American Independence* (Norwich, Conn.: Sterry & Porter, 1804), 13.

Sense and resulted in a skewed perception of the common people. If only the aristocrats would reflect on "the true state of their own minds," they would find that "their minds were as poor as *Pharaoh's lean kine*." And why did aristocrats engage in such flawed reasoning? Manwaring argued that "It is impossible that the mind which is occupied with titles, stars, garters and ribbons, should ever be great, the childishness of the objects intirely destroys the man." Remove these marks of distinction, Manwaring continued, and they appeared "just about the size of common men." As he concluded, "if they did not exhibit such striking proof of their knavery and folly, we should be willing to allow them *common sense*."[396] Manwaring thus symbolized the frivolity of would-be aristocrats by a reference to pointless marks of distinction worn on a person's dress. He explicitly stated that concern with these superficial signs of superiority made someone less than a man, or, in other words, emasculated them.

Manwaring reiterated these themes in an essay "On Mutual Dependance and Independence." He began by arguing "that neither birth, rank, equipage or wealth, constitutes *the man;* but correct sentiments reduced to practice."[397] A few paragraphs later, he declared that "reason is the distinguishing characteristick of man; and acting agreeable to enlightened reason, is what constitutes him both great and good."[398] Manwaring went on to discuss the wants that man experienced throughout his life. Some of these were "natural and absolutely necessary," and others were "merely superfluous and imaginary." This observation led Manwaring to criticize the tendency that he observed to devalue the contribution that farmers and manufacturers made to society. "By what principle in philosophy or religion," Manwaring wrote, "mankind judge that there is

396. Christopher Manwaring, *Essays, Historical, Moral, Political and Agricultural* (New-London, Conn.: Samuel Green, 1829), 33–36.
397. Ibid., 101–2.
398. Ibid., 103.

more merit and attention attached to a ribbon, or piece of gauze, than to a hoe or grid-iron, I am at a loss to determine. Or why there should be more honour or respect given to the man who stands behind the counter and vends the articles, than the husbandman and manufacturer, is equally unaccountable." Manwaring thought he had an explanation for this phenomenon in "the vanity of the human mind," for when the mind "leaves real substances, it pursues shadows; while on the flight, not unfrequently lights on equipage, parade, and external show, and in its rage for gratification, how often is real utility sacrificed to vanity and extravagance."[399] This analysis of honor and rank in human society also drew from Common Sense philosophy. Reid had insisted that humans did not perceive ideas but real, existent things outside the mind. When the mind removed its attention from the objects of perception, it could pursue airy notions that had no relation to the external world revealed by perception. Manwaring added to this analysis by once again associating the mania for visible marks of distinction with the devaluation of the professions that actually provided valuable *things* to society rather than merely moving them around.

Nathaniel Chipman returned to the deduction of the operations of government from principles in his *Principles of Government* (1833). A Vermont Federalist who had served in the United States Senate, the Vermont Supreme Court, and the US District Court for Vermont, Chipman wrote this treatise in the latter part of his life. He proceeded to outline his views on government in a progressive historical manner. According to Chipman, human beings possessed certain "principles" provided to them by nature that induced them to form societies. These principles included man's desire to associate with other men and man's capability of receiving impressions of the external world and of

399. Ibid., 104, 106–7.

pleasure and pain.[400] Chipman then provided a narrative of how these innate principles led to the formation of ever more complex forms of law and government. As he argued, "man, in an unimproved state," had very little ability to explore the "operations of his own mind, the extent of his powers and faculties and the result of their various combinations." Man could only accomplish the improvement of his mind and society through experience, for "as in physics, no reliance can be had on reasonings a priori." The fleeting impressions experienced in the mind could only be investigated with difficulty. Also, the powerful effect of "habit" on the human mind led to "bias" in sorting through man's experience. Thus, any improvement required a great deal of time, as the history of the human race attested. In the beginning stages of society, for example, men's minds "are unable to connect private injuries with the public concerns of the nation or tribe." The only "practical checks" on such injuries were "hatred and revenge"; the hatred of a man towards his assailant obliged him to take revenge on him or her. As society progressed, however, "the multiplication of desires and objects of gratification" led to more and more chances for men to injure one another. The old checks on injury, hatred and revenge, could no longer serve, for the increase in men seeking to take revenge would lead to a brutish and chaotic society. Fortunately, Chipman argued, "nature is always equal to her occasions. Active enterprise and more extensive pursuits invigorate and enlarge the powers of the mind, and render men equal to the task of a more extensive legislation." Government provided alternatives to individual acts of revenge in the form of "reparation."[401] Thus, the human mind and society progressed together.

400. Nathaniel Chipman, *Principles of Government: A Treatise on Free Institutions, Including the Constitution of the United States* (Burlington [Vt.]: E. Smith, 1833), 9–21.
401. Ibid., 22–24.

This mutual progression promoted the rationalization of the polity by introducing a measure of predictability to human relations. As Chipman explained, the individuals who made up human societies had diverse backgrounds, interests, and predilections. Unlike in the physical sciences, in which men could find out some of the "causes" and "laws" of nature, human nature presented a much more complex picture. "To descend to every situation, to every character, and thence to learn, fully, the particular influence of motives, and the individual actions that will follow in each," Chipman argued, "is far beyond the reach of human sagacity." In pursuing their various interests and passions, men would clash with each other. "However innocent and right those interests and pursuits may be, when considered separately," Chipman wrote, "they will by frequent, though unintentional, interferences and oppositions, form a scene too intricate for the powers of the human mind to evolve." Nature presented one solution to this exceedingly complex problem, Chipman argued: "By the establishment of laws, which the individuals of the community have become bound to observe, as the rules of their future conduct, each is enabled to foresee, with a sufficient degree of certainty, the future interests and pursuits of others." Civil government, therefore, provided laws to regulate society analogous to the natural laws that governed the physical world.[402] Chipman's argument here thus paralleled Hume and Reid's discussion of the constancy of nature. The two philosophers attacked the problem from very different premises, but both found that human understanding of the world and of humanity depended upon their natures remaining constant, even if one could not definitely prove this proposition. In a similar manner, Chipman held that law and government provided a constancy to human affairs that society would otherwise lack. This predictability enabled humans to direct their

402. Ibid., 52–54.

future conduct with relative confidence in their ability to tailor their means to particular ends. In this way, Chipman also followed a similar method as Dana. Dana had found a single motive and a single law that governed political society. Chipman did not reduce his system to two short premises, but he did identify a number of principles inherent in human nature that inexorably led to the rise of civil government.

Joseph Story and the Exceedingly Complex Science of Government

In 1834, Supreme Court Justice Joseph Story delivered a lecture to the American Institute of Instruction, a Boston-based organization formed to promote "the diffusion of useful knowledge in regard to education."[403] Story's address advocated the inclusion of the science of government in educational curricula for young men and boys. His lecture provided a brief outline of the nature of this science. As Story argued, the science of government "is the most profound and exhausting of any, which can engage the human mind."[404] This very complexity, he explained, recommended its presence in a young man's education. Story's account of the science of government contrasted with the deductive method of Dana, Chipman, and Dickinson. Indeed, Story argued for a science of government that employed an inductive method and thus could lead only to probabilities, not certainties. In this manner, Story drew more from the induction of Hume and Reid instead of the deduction of Locke.

Story repeatedly emphasized the complex nature of the science of government. In investigations into "the true ends of government, and the means, by which those ends can be best achieved or promoted," one needed to "reason from the imperfect experience of the past for the boundless contingencies of the future." Thus, one could only aim for

403. Richard B. Michael, "The American Institute of Instruction," *History of Education Journal* 3, no. 1 (Autumn 1951): 27.

404. Joseph Story, *A Lecture Delivered before the American Institute of Instruction, at Their Anniversary, in August, 1834, at Boston* (Boston: Tuttle and Weeks, 1835), 5.

"nearer and nearer approximations to truth, without our ever being certain of having arrived at it in a positive form."[405] The most respected ancient writers on government, Aristotle and Cicero, confined themselves to the "suggestion of hints" rather than "the formation of systems." They refused to indulge in "the speculations of Plato," who discoursed only of his "own imaginary republic." In the same way, the moderns found little use for "the Utopia of Sir Thomas Moore, or the cold and impracticable reveries of one of the most accomplished men of the last age, David Hume."[406] Here, Story likely referred to Hume's essay entitled "Idea of a Perfect Commonwealth," in which he laid out a plan for the legislature, executive, and judiciary of an imaginary country.[407] Such speculations did not result in any progress, Story argued, because the science of government "rarely admits of annunciations of universal application." The diversity of climates, customs, and institutions of societies across the globe prevented any prescription for the one form of government that would satisfy every situation. Indeed, government could be called "the *science of adaptations*—variable in its elements, dependent upon circumstances, and incapable of a rigid mathematical demonstration."[408] This complexity, Story contended, gave the lie to the too common notions "that government is a matter of great simplicity; that its principles are so clear, that they are little liable to mistake; that the fabric can be erected by persons of ordinary skill." In particular, "a large survey of human experience" demonstrated that free governments required complex structures that could provide checks and balances against the ambitions of various parts of society, unlike tyrannical governments in which one man directed all

405. Ibid., 4.
406. Ibid., 5.
407. David Hume, *Essays, Moral, Political, and Literary*, ed. Eugene F. Miller (Indianapolis: Liberty Fund, 1987).
408. Story, *A Lecture Delivered before the American Institute of Instruction, at Their Anniversary, in August, 1834, at Boston*, 5–6.

parts of the state.[409] Story's description of the exceedingly complex science of government thus cast doubt upon any attempt to rationalize its study. Those who sought to master this science could not learn a few simple principles and apply them to the situation at hand. The science required deep and broad learning that drew lessons from history to apply in the present.

Why would young men and boys benefit from learning the exceedingly complex science of government? For the future statesmen of the republic, such studies were indispensable. The science of government, with its consideration of the numerous factors that exercised sway in political society, taught them to exercise caution and restraint in discharging their duties under the Constitution and in making policy for a great nation that contained a diversity of interests.[410] But regular citizens without political aspirations also required at least a basic understanding of this science. Learning about the complexity of the science of government would lead them to consider carefully the programs advanced by parties and ambitious politicians. Story sought reasoned and prudent change rather than bold reforms. As he put it, "What is theoretically true, is often practically false, or doubtful...what constitutes the true policy and security of free governments lies not so unfrequently so distant from immediate observation and experience, that it is rashly rejected, or coldly received."[411] The study of government would thus empower ordinary citizens to resist the nefarious designs of demagogues who promised easy solutions to supposed problems. Beyond these practical benefits for the health of the republic, Story expounded on the intellectual fruits of the study of government. "There are no studies," Story explained, "better fitted to discipline the mind, or to accustom it to

409. Ibid., 8–9.
410. Ibid., 12–13.
411. Ibid., 16–17.

severe and close examination. They combine in a very high degree the speculations of philosophy with the varied events of history, and increase the separate interest of each." Furthermore, the science of government taught young men to have a healthy skepticism towards simplistic theories. "Nothing is so fascinating, and so delusive, as the simplicity of theory, in the earlier stages of life," Story asserted. "Nothing can have a more salutary effect in repressing this undue pride and confidence than the study of the science of government." American youth would learn how useless "mere abstract speculations" were in the practice of government; history testified to how often even the most learned and skillful framers of governments had seen all their best laid plans fall into ruin when confronted with political realities.[412]

O. A. Brownson and the Common Sense Retort

In the 1840s and 1850s, New England journalist Orestes Augustus Brownson presented a Common Sense retort to what he saw as the rampant radicalism of the first half of the nineteenth century. Brownson, once a member of the transcendentalist movement in New England, converted to Catholicism in 1844 and proceeded to adopt a highly conservative stance that denounced the radical religious and social movements sweeping through much of the western world.

Brownson took particular issue with the Protestant emphasis on private judgment over the authority of an established church. All of the errors of the nineteenth century, he argued, flowed from this rejection of any authority outside of the individual. In an 1846 essay on Protestantism and transcendentalism, Brownson mounted a sustained attack on Protestants' rejection of the Catholic Church as a religious authority. Once Protestants denied that the Church was a divinely established institution for promulgating the faith,

412. Ibid., 26–27.

he explained, they had no basis for their religion outside of the private judgment of the individual. Protestant claims for the authority of the Bible stood on no other grounds besides that of private judgment, for the Protestant had "no external authority to decide that the Bible is the word of God, and to declare its true sense."[413] This elevation of private judgment "necessarily lays down the principle, that each and every man is in himself the exact measure of truth and goodness,--the very fundamental proposition of Transcendentalism."[414]

Such faith in individual reasoning, according to Brownson, unfortunately made men blind to the teachings of "common sense" and "experience."[415] In an 1846 essay, Brownson lamented the rampant "speculation and experiment" in religion and politics. The overriding attitude of the age, he observed, held that "we must borrow no light from the past, adopt none of its maxims, and take no *data* from its experience." In an apparent attack on Locke and Hume's theory of ideas, Brownson stated that the arrogant reformers of the age declared that "it is not safe to affirm that black is black, for the word *black* only names an idea which the past entertained, and most likely a false idea."[416] Here, Brownson joined with the Common Sense philosophy of Reid, who argued that properties like colors had an actual existence outside of human perception.

Brownson traced the regrettable triumph of reason over common sense and experience to New England's opposition to the War of 1812. Yankee ministers, he argued, in expressing their opposition to the war, went entirely too far and declared that war was, in principle, unlawful and immoral. This kind of abstract reasoning that ignored God's

413. O. A. Brownson, *Essays and Reviews: Chiefly on Theology, Politics, and Socialism* (New York: D. & J. Sadlier & Co., 1852), 218.
414. Ibid., 225.
415. Ibid., 414.
416. Ibid., 324–25 (emphasis in original).

sanctioning of war in the Bible and the whole history of the human race led to other equally ridiculous radical ideas, such as antislavery. Some even took the "peace principle" so far as to denounce George Washington as an "inhuman butcher." Brownson characterized the reformers' attitude: "There was no true morality in the world before these modern societies sprung from the womb of night, and we are required to look to a few canting ministers, strolling spinsters, and beardless youths, as the sole authoritative expounders of the precepts of the divine law." Brownson further denounced these "self-constituted guides" who attempted to instruct their fellows on "what it is safe to eat or to drink" and "when to rise up or sit down," as if such guidance was suddenly needed after eons of humanity getting along well without them.[417] For Brownson, it seemed like reason had overstepped its bounds, with self-proclaimed experts submitting every idea, not matter how commonsensical, to the test of their own reasoning.

This reliance on reason would inevitably lead to disruption and discord, Brownson argued. In an 1848 essay, he attacked the "anarchy" that seemed to dominate the times.[418] With the rise of democratic sentiments in the early nineteenth century, it seemed as if Americans recognized no authority as legitimate apart from public opinion. Government, however, could not take its legitimacy from public opinion, for it often changed with the slightest provocation, and the people often judged wrongly.[419] But how could one know that government had overstepped the bounds of sovereignty given to it by God? Only through the determination of the Catholic Church could the citizens have a firm authority for resisting the unjust actions of government. The countries who insisted on the absolute separation of the Church from government necessarily descended into

417. Ibid., 328–31.
418. Ibid., 386.
419. Ibid., 454.

"anarchy" or devolved into "despotism," for these countries denied the authority of God's established Church and raised the possibly unreliable private judgment of the people and the rulers to the seat of authority.[420] Both "reason and experience" proved that the final court of appeal for determining the legitimacy of civil laws ought to be the Church. Without the legitimate authority of the Church in pronouncing on the lawfulness of governmental actions, revolutions would occur at the slightest provocation. As Brownson argued, "if you will listen either to common sense or to the lessons of experience, you will grant that revolutions tend only to throw men into barbarism and savagism." No one, he continued, could cite an instance in which the total destruction of a state's (unwritten) political constitution was followed by a better constitution. Brownson brought up the American Revolution as a successful uprising that *preserved* rather than destroyed the constitution of the thirteen colonies.[421]

Brownson made a particularly bold statement against the ascent of reason in an 1848 essay that attacked Fourierists and Associationists who were attempting to reorganize society into a supposedly more rational form. According to Brownson, the Associationists sought to enable each individual to follow his or her inclinations by alleviating barriers to the free pursuit of one's interests such as poverty. For Associationists, man fulfilled his destiny when he fulfilled his natural desires, which Brownson derided as "nothing but our old Epicurean philosophy, decked out in the latest Parisian mode."[422] In order to accomplish these ends, the Associationists proposed to organize people into "phalanxes" that would provide the necessary goods and services to all of their members and thus allow each member to pursue freely their particular desires.

420. Ibid., 404.
421. Ibid., 386–415.
422. Ibid., 454.

Brownson pointed out various practical problems with the Associationists' plan, but he devoted particular attention to what he saw as the Associationists' philosophical errors. Most fundamentally, Brownson argued, the Associationists misidentified the destiny of man. The Associationists often made analogies between humans and animals. The pig, for example, naturally sought out food when it was hungry. Thus, according to the Associationists, man ought to be free to fulfill his own natural desires. Brownson, however, defended the Christian doctrine that one's natural tendencies ought to be controlled by reason. Furthermore, contrary to the views of the Associationists, man's destiny was not to obtain natural objects but to achieve salvation, a supernatural, not natural, end. "Nature can guide us," Brownson explained, "only on the assumption that the end is natural," which could not apply to man's fate.[423] Furthermore, "man is never satisfied by the possession of the natural objects to which he is naturally drawn. All experience proves it."[424] Satisfy every physical desire, Brownson argued, and man would still want more. "There arise in him wants which are far too vast for nature, which swell out beyond the bounds of the universe, and cannot, and will not, be satisfied with anything less than the infinite and eternal God." All men knew this fact, "a fact deep graven on all hearts that have experience."[425] Finally, Brownson objected to the Associationists' focus on advancing mankind via collective action. Only through the reorganization of society into a more rational form, the Associationists argued, could man achieve his destiny in the world. This idea that one could improve the race only through collective effort startled Brownson. "The species has actual existence only in individuals," he argued. The Associationists talked only about advancing the human race,

423. Ibid., 458.
424. Ibid., 459.
425. Ibid., 460.

"an abstraction." Such talk amounted to blasphemy, Brownson declared, for it supposed that salvation was beyond the reach of the individual and required collective human effort, a barrier that God would not in justice place in front of an individual.[426] This final objection offered by Brownson thus indicted the Associationists for creating an abstraction—the human species—which did not actually exist in the world and then fixing their attention on the improvement of that abstraction rather than the individual. Instead of analyzing man as man, the Associationists operated on a creature created by reason, without an actual existence in the real world.

In Browson's critiques against the reform impulse of the nineteenth century, he continually turned to common sense and experience to bolster his arguments. The arguments for antislavery and Associationism, for example, relied far too much on abstract reasoning that neglected the lessons of common sense and experience. Brownson's work, then, might be seen as a counter to the deductive reasoning that the New England Federalists employed earlier in the nineteenth century. For Brownson, too much reliance on individual reason led to a disturbing disregard for traditional sources of authority, such as the Catholic Church. In addition, placing personal reason above other sources of authority resulted in a presentist arrogance that derided the thoughts and experiences of people in the past as worthless or dangerous. In this way, Brownson lamented, modern thinkers failed to employ the experience and common sense of the human race in both the past and the present in crafting their analysis of humanity's condition. Only disaster could result from this epistemological narrowness, he argued.

426. Ibid., 472–73.

Tocqueville and the Democratic Mind

Alexis de Tocqueville's classic examination of nineteenth-century America, *Democracy in America*, provided an analysis of the "philosophical method of the Americans" that closely resembled Brownson's critique.[427] Tocqueville's consideration of the workings of the human mind in a state of social equality merit attention because the Frenchman put forward an account of the sources of intellectual authority in American society. He also observed that Americans tended to consider very specific and particular ideas or very general and vague ideas, with little in between.

For Tocqueville, equality of condition constituted the most important feature of American society. Americans recognized no ranks or titles of nobility, and all citizens possessed equal rights and privileges within the American Republic. According to Tocqueville, this equality gave rise to "a philosophical method common to the whole people." He summarized the features of this method thus: "To evade the bondage of system and habit, of family-maxims, class-opinions, and, in some degree, of national prejudices; to accept tradition only as a means of information, and existing facts only as a lesson to be used in doing otherwise and doing better; to seek the reason of things one's self, and in one's self alone; to tend to results without being bound to means, and to aim at the substance through the form." Tocqueville argued that he could further contain all of these elements under the single proposition that "each American appeals only to the individual effort of his own understanding." In this manner, the Americans had applied the principles of Descartes without reading him. Because a rigid class system did not exist in America, its citizens could not look up to a superior class for their ideas. Also, the

427. Alexis de Tocqueville, *Democracy in America*, trans. Henry Reeve and Francis Bowen, vol. 2 (Cambridge: Sever and Francis, 1863), 1.

constant scramble for wealth and distinction in American democracy shattered the link between generations, and therefore individuals could not look to tradition as an authority. Finally, because all Americans stood "on an equal footing," the individual could not turn to his fellows as a source of authority. "It is not only confidence in this or that man which is destroyed," Tocqueville explained, "but the disposition for trusting the authority of any man whatsoever." The individual, then, had no recourse except his or her own reason. The Americans had ended up applying Descartes's *cogito ergo sum* in their reasoning on all sorts of topics. As Brownson had argued, private judgment had become the chief source of authority.[428]

But Tocqueville pointed out that American society imposed certain limits on the operation of private judgment. First, the strong Christian roots of Anglo-America meant that private judgment usually did not extend to questioning the truth of Christianity. Although Americans had founded numerous Christian sects, almost no one challenged Christianity itself. Second, in contrast to France, America had never undergone a social revolution that rapidly introduced equality of condition into society. The Americans "arrived upon the soil they occupy in nearly the condition in which we see them at the present day." Thus, America had never experienced a social upheaval that, in France, had shaken the very foundations of authority and belief. This lack of a cataclysmic event constituted another reason why Americans confined the operation of private judgment only to certain spheres, while in France private judgment exercised a much broader influence.[429]

428. Ibid., 2:1–3.
429. Ibid., 2:5–7.

Tocqueville argued, furthermore, that the essential equality of democratic society provided another, more important check on the operations of private judgment. Because men in democracies all had quite similar conditions, there existed no class that the individual could look up to for his beliefs. In addition, the individual's confidence in his own ability to understand meant that he distrusted "supernatural" sources of authority, or authorities "above humanity." Tocqueville concluded, then, that Americans "commonly seek for the sources of truth in themselves, or in those who are like themselves." A strange shift in the locus of authority took place: "At periods of equality, men have no faith in one another, by reason of their common resemblance; but this very resemblance gives them almost unbounded confidence in the judgment of the public; for it would not seem probable, as they are all endowed with equal means of judging, but that the greater truth should go with the greater number." Public opinion, then, constituted the primary intellectual authority in democratic societies. "In the United States," Tocqueville explained, "the majority undertakes to supply a multitude of ready-made opinions for the use of individuals, who are thus relieved from the necessity of forming their own." The individual stood powerless against this tide of public opinion, for in comparison with the rest of society, "he is instantly overwhelmed by the sense of his own insignificance and weakness." Thus, ironically, the authority vested in democratic public opinion had the potential to enslave the mind completely. The sheer force of public opinion could banish contrary opinions from discussion, continually circumscribing the bounds of thought and enforcing a rigid conformity on all members of society.[430]

Tocqueville continued his discussion of the democratic mind with an analysis of the taste for general ideas in democratic societies like America. Equality of condition and

430. Ibid., 2:10–13.

the lack of separate classes induced men to seek general ideas that applied to the whole of humanity. Democratic man "cannot turn his mind to any one portion of mankind, without expanding and dilating his thought till it embrace [sic] the whole." This tendency, Tocqueville argued, explained why the Americans had a greater taste for general ideas than their English ancestors. "The English have long been a very enlightened and a very aristocratic nation," Tocqueville asserted, "their enlightened condition urged them constantly to generalize, and their aristocratic habits confined them to the particular." Because of their sudden democratic revolution, the French displayed even more of a taste for general ideas than the Americans. In his native land, Tocqueville explained, "I am informed every morning when I wake, that some general and eternal law has just been discovered which I never heard mentioned before." But another cause, one more insidious, operated on the democratic mind to turn its attention to general ideas. The constant scramble for wealth and distinction that characterized democratic societies gave rise to men who "have a great deal of curiosity and little leisure." Because most democratic citizens had very little time to probe the intricacies of some subject, they preferred to make hasty generalizations based upon a cursory examination. Furthermore, the democratic desire for "easy success and present enjoyment" led men to engage in the less demanding pursuit of general ideas rather than the painstaking research of particulars.[431]

But Tocqueville immediately followed this observation of a democratic mania for general ideas with a discussion of why Americans questioned and resisted general ideas in certain pursuits. In many branches of knowledge, he explained, Americans' lack of leisure caused them to take only a superficial view of subjects and to adopt general

431. Ibid., 2:14–19.

notions rather than contemplate particulars. This attitude only applied, however, to those branches of knowledge that Americans did not practice regularly. For example, "mercantile men will take up very eagerly, and without any close scrutiny, all the general ideas on philosophy, politics, science, or the arts, which may be presented to them." But offer them general ideas related to commerce, and these merchants would hesitate to adopt them. Their daily practice of commerce introduced them to too many intricacies and details that a general theory could never completely capture. Tocqueville went on to argue that because Americans had a long experience in participating in government at the local, state, and national levels, Americans tended to question the legitimacy of general ideas in politics.[432] This analysis of how practice moderated the desire for general ideas in politics suggested an interpretation of the Federalist political treatises earlier in the century that sought to deduce the nature of government from a few general principles inherent in society or human nature. The New England Federalists began from the assumption of the inequality of mankind; although the laws should apply to all citizens equally, a natural aristocracy would always exist to rule over the masses. The practice of American politics over the course of the nineteenth century, however, would turn in a democratic direction that would give ordinary citizens the opportunity to practice politics on a daily basis. These Federalists, writing at the early stages of democratic politics in America, demonstrated a greater appetite for general ideas than democrats with experience in politics. In addition, Tocqueville's argument about practice moderating the desire for general notions suggested the reason why many Americans would distrust general ideas in agriculture, an activity that a large portion of Americans practiced.

432. Ibid., 2:21.

Returning to his analysis of the democratic desire for generalization, Tocqueville identified particular intellectual pursuits in which Americans displayed this tendency most vividly. Most importantly, Americans possessed very general and expansive ideas about religion and its account of human nature. Tocqueville explained this phenomenon by arguing that "fixed ideas about God and human nature are indispensable to the daily practice of men's lives; but the practice of their lives prevents them from acquiring such ideas." In response to these difficulties, the Americans wisely refused to exercise their private judgment on questions of God and human nature and instead deferred to the authority of religion. "The first object, and one of the principal advantages, of religion," Tocqueville argued, "is to furnish to each of these fundamental questions a solution which is at once clear, precise, intelligible to the mass of mankind, and lasting." A religion that provided these goods to its followers "imposes a salutary restraint on the intellect." By providing a kind of epistemological grounding, religion prevented the rise of debilitating doubts, which if left unsolved, could easily lead men to submit voluntarily to tyranny. When men lacked such grounding, chaos reigned within the mind. "As everything is at sea in the sphere of the mind," Tocqueville explained, "they determine at least that the mechanism of society shall be firm and fixed; and, as they cannot resume their ancient belief, they assume a master."[433] Here, we can detect a somewhat Reidian response from Tocqueville to Humean skepticism about finding any kind of truth. Tocqueville posited that the precepts of religion could provide the same epistemological grounding that Common Sense did for Reid. This account of the dangers of ungrounded private judgment also reflected Brownson's attack on the lack of authority that he observed all around him. In another argument that Brownson would have wholeheartedly

433. Ibid., 2:23–24.

endorsed, Tocqueville predicted that, despite the Protestant heritage of the majority in the United States, more and more citizens would find themselves drawn towards Catholicism. As he observed, "equality inclines men to wish to form their own opinions; but, on the other hand, it imbues them with the taste and the idea of unity, simplicity, and impartiality in the power which governs society." Americans were skeptical towards religious authority, "but if they consent to subject themselves to any authority of this kind, they choose at least that it should be single and uniform." Thus, the "great unity" of the Catholic Church provided an attractive answer to those who desired to ground their lives in the general ideas promulgated by religion.[434]

The writing of history also saw the citizens of democratic countries engage in general theorizing. In aristocratic times, Tocqueville argued, historians dwelt on the particular personalities and decisions of great men to explain the course of history. In contrast, democratic historians lived in a society where each individual appeared rather insignificant, but the masses appeared great and strong. Democracy thus induced historians to explain all the events of the past as a result of huge, impersonal forces not subject to the will of individuals. This method not only lined up well with democratic sensibilities but also saved historians from the effort required to trace the innumerable effects of specific events and individuals on the past. The democratic historian "prefers talking about the characteristics of race, the physical conformation of the country, or the genius of civilization." Tocqueville admitted that this attempt to find general causes in history served to explain the movements of society in a democratic age rather well, but he also perceived dangers in this mode of reasoning. A blinkered focus on general causes inherent in civilization, the environment, or certain races of people had the potential to

434. Ibid., 2:33–34.

deny human beings free will. Democratic historians thus "deprive the people themselves of the power of modifying their own condition, and they subject them either to an inflexible Providence or to some blind necessity." Historical literature such as this failed to teach men "how to command"; it could only teach men "how to obey."[435] In this analysis, Tocqueville echoed Brownson's disgust at how some modern thinkers denied the free will of the individual and made the salvation of the collective human race the primary purpose of man's earthly existence.

Perhaps reflecting the constant activity that he observed in his travels in America, Tocqueville's account of the democratic mind had Americans shifting the nature of their ideas based on the particular subject at hand. As he argued in a discussion of the "inflated style" that American writers and orators often used, it seemed as if Americans could find no middle ground between an obsession over details and an embrace of vague generalities:

> In democratic communities, each citizen is habitually engaged in the contemplation of a very puny object, namely, himself. If he ever raises his looks higher, he perceives only the immense form of society at large, or the still more imposing aspect of mankind. His ideas are all either extremely minute and clear, or extremely general and vague: what lies between is a void. When he has been drawn out of his own sphere, therefore, he always expects that some amazing object will be offered to his attention; and it is on these terms alone that he consents to tear himself for a moment from the petty, complicated cares which form the charm and excitement of his life.[436]

Similarly, in a discussion of oratory in Congress, Tocqueville remarked that the speeches of representatives often vacillated between "great general truths" that touched on the weightiest affairs of state and "petty minutiae" which concerned only the parochial

435. Ibid., 2:103–7.
436. Ibid., 2:94.

interests of their constituents. Tocqueville explained this curious mixture by observing that the representative depended entirely on the approval of his constituents to maintain his office, and his constituents demanded that the representative simultaneously pursue the general welfare of the country while attending to the particular concerns of the district. To make matters worse, the individual representative often had only a few opportunities to make a speech before Congress. Each time he spoke, then, he attempted to fit everything of importance into a brief address "so as to furnish a sort of complete and brilliant epitome off his constituents and himself. On these terms, they will vote for him in the next election."[437]

Combining these observations of writing and oratory with his discussion of how practice moderated the taste for general ideas, Tocqueville's account of the democratic mind posited that Americans moved back and forth between two epistemologies. In pursuits that Americans practiced a great deal, such as manufacturing and politics, they engaged in the collection of particular facts and resisted the imposition of systems or theories. On more esoteric or difficult subjects, such as religion, human nature, and history, the natural democratic taste for general ideas took over, and Americans eagerly embraced ready-made systems and theories that did not require a close analysis of particulars. On raising their view to the prospect of the human race as a whole, Americans conceived of mankind as a single, all-powerful force animated by common passions and steered by God's providence.[438]

437. Ibid., 2:108–12.
438. Ibid., 2:91.

Conclusion

Tocqueville's analysis of the democratic mind provides a useful framework to review the practice of science in America, a country that came of age in the latter stages of the Enlightenment. Although Tocqueville did not mention Reid by name, the Frenchman echoed several of the themes of Common Sense philosophy. Reid had argued that all human beings of sound mind possessed an inherent Common Sense that enabled them to search out the truth. Tocqueville observed that democratic societies took this principle even further and gave public opinion, the sum of the workings of all the minds in society underpinned by a Common Sense, a supreme authority. The rise of Common Sense in the libraries and colleges of the Early Republic might therefore reflect a rapport between Reid's epistemology and democratic sensibilities.

Tocqueville also sheds light on the attempt to found pattern farms in the Early Republic. The promoters of these farms, who usually did not have much experience in farming, tended to speak of generally applicable laws of agriculture that could be deduced from experiments on pattern farms. Representatives of working farmers, in contrast, threw doubt upon this search for generally valid ideas in agriculture and preferred to focus on what experience had proved useful.

Similarly, proslavery theorists hesitated to make their stand on an analogy between the slavery of ants and the slavery of humans. As Samuel A. Cartwright argued, the specific empirical evidence that southerners had gained from years of observation of the black population provided enough support on its own for the defense of slavery. A general and vague appeal to analogy felt ineffective because direct experience had induced southerners to avoid general ideas about slavery.

George Blackburn certainly would concur with Tocqueville's observation of the natural desire for easy success in democratic societies. Very few of his students were willing to make the necessary efforts to make progress in the mathematical sciences. Even the South Carolina government wanted a quick and cheap state map rather than a precisely accurate one.

Finally, Tocqueville's analysis casts doubt on the traditional interpretation of nineteenth-century Americans as unenlightened and unconcerned with ideas. The Frenchman did remark that Americans cared little for formal philosophy and for the disputes between the philosophical schools of Europe.[439] But he nonetheless recognized that American society gave rise to a people with a particular philosophical method that ranged between the minute analysis of particulars and the sweeping consideration of generalities. As such, the Americans combined the particularism of their English forbears with the grand abstractions of the French. Tocqueville noted the weaknesses and pitfalls of this method, but he never questioned America's presence in the great arena of ideas that we now call the Enlightenment.

439. Ibid., 2:1.

CHAPTER 8

CONCLUSION

The practice of science in the Early Republic constituted one of the flash-points of the late Enlightenment. Indeed, the discourse surrounding science might represent the most important arena of ideas in the Enlightenment, for the questions raised about science and knowledge in this period spoke directly to the fundamental issue of how human beings could know and understand the world.

As the records of American libraries revealed, Americans engaged in this conversation about the nature of knowledge on a foundation of English and Scottish epistemology, with the continental optimism of Condorcet as a significant minority view. The philosophers that appeared in American libraries presented varying accounts of how human beings could know. Most of these philosophers, with the obvious exception of Condorcet, expressed nagging doubts about the ability of the human mind to achieve definite knowledge of the external world. Epistemology in the Enlightenment raised difficult questions; philosophers provided few settled, final answers. When discussing the nature of knowledge about the natural world, these philosophers generally agreed that only an empirical and inductive method could lead to any kind of truth. This empiricist account of knowledge contained inherent uncertainty. In the most dramatic example of these doubts, David Hume observed that one could not prove that the sun will rise tomorrow; faith in this occurrence only resulted from unchanging observations of the

phenomenon. Thus, although empiricism provided the only means to achieve knowledge of the natural world, this method could never result in the certainty of deductive reasoning or mathematical proof. The method of deduction used relations of ideas to form a chain of reasoning. Each step in this chain had a necessary connection with the previous step, so as long as one agreed with the premises, the deductive method could yield definite truths akin to the unquestionable propositions of geometry. John Locke suggested that this deductive method could prove useful in uncovering truths in moral philosophy, but not natural philosophy.

If empirical methods could never eliminate uncertainties, then the creditability of investigators of nature mattered a great deal for the legitimacy of knowledge. Only credible persons could be trusted to produce true, or at least faithful, reports of the natural world. The American discussion about pattern farms revolved around this very question of who had the authority to make sound knowledge of agriculture. As the gentlemen who promoted pattern farms argued, ordinary farmers had neither the time, means, nor proper education to produce useful knowledge about farming. The exchange of hints about farming in the agricultural press offered no solution, because no one took the various facts reported to the press and proceeded, by induction, to find universally applicable laws of agriculture. Pattern farms run by qualified men of science would provide the institutional space for an empirical science that would finally lead to improvement. The promoters of pattern farms thus attempted to shift authority in agricultural knowledge from a loose and scattered network of farmers to centralized agricultural research institutions that could conduct experiments and derive general laws of agriculture from these experiments.

Scientific investigations were not limited to empirical accounts of the natural world. George Blackburn attempted, with many frustrations, to convince Americans of the importance of mathematics for advancing science in the young nation. In his advocacy of teaching and practicing mathematics, Blackburn represented the epistemology of Condorcet, who emphasized the construction of scientific theories susceptible to calculation. To his continual disappointment, Blackburn found that his mastery of the mathematical sciences did not provide him with great authority amongst Americans. The government of South Carolina, for example, agreed with Blackburn about the need for a state map and enthusiastically hired him to complete the task. But instead of allowing Blackburn to perform the work as he saw fit, the government demanded that he record numerous details about the physical resources of the state. While Blackburn emphasized the importance of exact calculations of latitudes and longitudes within the state, the government desired a natural history of the state. In this case, the government was more interested in an empirical description of the land's features than exact mathematical calculations. Blackburn's mathematical mastery, therefore, did not lead to Americans conferring great authority on him.

The discovery of slavery amongst the ants raised questions about the role of analogies in the pursuit of knowledge. Drawing from the Enlightenment empiricists' warnings about the fragility of arguments by analogy, the supporters of slavery regarded ant slavery as just another fact that demonstrated the natural basis of the peculiar institution. This episode presented another instance of the American adoption of an empirical epistemology that advocated the use of inductive reasoning to pursue truth. The proslavery theorists, for example, preferred to base their case on a long list of

observations drawn from experience living among the black race rather than a speculative argument by analogy. Authority in questions about slavery, the proslavery theorists argued, should derive from knowledge of human nature (particularly the nature of blacks) and human history rather than knowledge of the natural history of animals. The behavior of animals had little to teach human beings about how they should conduct themselves, for an analogy between the human mind and animal instinct could not hold.

The scientific work of Peter A. Browne demonstrated the practice of empirical principles in the pursuit of natural historical knowledge. Throughout his writings, Browne hesitated to develop theories without first gathering as many facts as possible. Only after this collection of facts could he proceed to employ induction to suggest the true origin of meteors, for example. He attempted to make sense of hair and wool by developing a system of classification that required the careful measurement and observation of a sample's qualities. This taxonomic practice further underscored Browne's commitment to an empiricism that sought the exhaustive collection of facts about the various kinds of hair and wool. Some advocates of agricultural improvement saw Browne's measurements of the wool of sheep as authoritative analyses that would lead to progress in American sheep breeding. His precise measurements, the agricultural improvers argued, provided a much more credible judgment of the wool's quality than common methods that relied on the look and feel of the wool.

The operations of reason in the political tracts of the Early Republic presented a contrast to the mostly inductive method of investigating the natural world. Although several authors, including Orestes Augustus Brownson and Christopher Manwaring, turned to the lessons of history and Common Sense to understand politics and society, the

New England Federalists, following in the footsteps of John Locke, adopted a deductive method that proceeded from first principles to uncover the universal laws that governed politics and society. The political reasoning of the Early Republic, then, revealed a clash between inductive and deductive methods. Commentators such as Brownson and Tocqueville discussed the diffuse and confused nature of authority in America. The mostly free reign of private judgment in America gave rise to a society in which nothing seemed settled, and the lack of a stable center of authority led to constant experimentation in thinking about politics and society.

As revealed in the practice of both the natural and human sciences, Americans found themselves in the thick of the transatlantic Enlightenment discussion about the nature and limits of knowledge and authority. The English and Scottish empiricists had recognized the inherent uncertainty of knowledge, especially knowledge gained through sensory experience. Their investigations into knowledge had left many questions open even as they constructed frameworks to structure the human understanding. Scientific practice in the Early Republic confronted these thorny questions, and Americans attempted to sort through them. Americans engaged in a continual disputes over which persons and methods had authority to produce sound knowledge about the world. In the end, Americans' struggles with these questions placed them squarely within the arena of ideas that we now call the Enlightenment. Like many of the other participants in the Enlightenment, Americans produced very few settled answers to these questions.

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