

Northern Designs: British Science, Imperialism, and Improvement at the Dawn of the Anthropocene

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In late October, Captain James Cook and the naturalist Joseph Banks arrived to study the curious features of an island they would inhabit over the coming weeks. Banks spent much of his time examining the exotic plants and animals while Cook turned his sights to astronomical matters, recording an important eclipse to send back to colleagues at the Royal Society in London. Both men found the island an ideal setting in which to work on their larger mission of expanding the frontiers of knowledge and empire through scientific exploration. By diligently cataloguing the precise location and resources of these distant lands, figures like Captain Cook and Joseph Banks were helping to launch a second age of European discovery, commercial expansion, and colonization that would fundamentally shape the course of the nineteenth century.¹

Yet this episode did not take place in Tahiti or some other Pacific island, as one might expect, during the famed voyage of the *Endeavor* (1768–1771), rather it occurred earlier, in Newfoundland, when Cook and Banks both found themselves stationed in the maritime provinces of Canada pursuing scientific missions on behalf of the British government. Following the Seven Year's War, Cook served as a marine surveyor in eastern Canada, producing some of the most detailed hydrographic charts that the British government had ever commissioned while Banks was travelling aboard the HMS *Niger*

with his close friend, and future arctic explorer, Constantine Phipps. These northern waters, in fact, became an important training ground for a rising generation of navigators, surveyors, and scientists working to stake out the strategic trading routes and natural resources of the North Atlantic that were increasingly central to the imperial rivalry between Britain and France.² Indeed, at the very moment that Cook and Banks were in Newfoundland, the French were sending out some of their most talented scientists and cartographers to Iceland in hopes of developing a new base of influence, and new fishing grounds, in the North Atlantic to compensate for the loss of Canada—a prospect that led some officials in Paris to consider trading the colony of Louisiana to the Danish crown in return for Iceland.³

Such ideas reflected a broader transformation unfolding during the middle decades of the eighteenth century, as ideas about scientific exploration, enlightened improvement, and industrial expansion fueled a pointed reappraisal of the economic potential of this sub-arctic world. From the eastern reaches of the Barents Sea to the western shores of Hudson's Bay, contemporaries began to focus on an enticing list of northern commodities, ranging from incredibly valuable fishing and whaling grounds to key supplies of naval stores, pelts, industrial chemicals, minerals, and energy sources like coal, peat, or train oil. In Britain, boosters even tried to rebrand the region as the "Northern Indies," hoping to convince the public that the vast archipelagos of the North Atlantic—stretching from Canada's Maritime Provinces to the North Sea and beyond—could yield the same wealth and naval power that had flowed from the tropics, which they pointed out, had also been deemed uninhabitable in the past because of misguided beliefs about the "torrid" zone.⁴ Nowhere was this shift in geo-political perspective more visible than in the popular maps that emerged at mid-century depicting the globe from a polar vantage point—a simple projection technique that nonetheless brought the expansionary gaze of Europeans into sharp focus (fig. 1).

Unfortunately, this northern perspective, and the historical forces animating it, has been largely overshadowed by the subsequent age of Pacific exploration, associated with the epic voyages of Bougainville, Lapérouse, Willis, Cook, and Vancouver.⁵ Without disputing the latter's importance, or the vibrant scholarship surrounding it, this article reconstructs the earlier intellectual and political climate that fueled European fascination with the subarctic during this turbulent period when international warfare, economic dislocations, and imperial jockeying made the north Atlantic emerge as an appealing zone of European expansion.⁶ These northern campaigns crystalized a new set of relationships between science and imperial power, between the culture of improvement and visions of unlimited economic

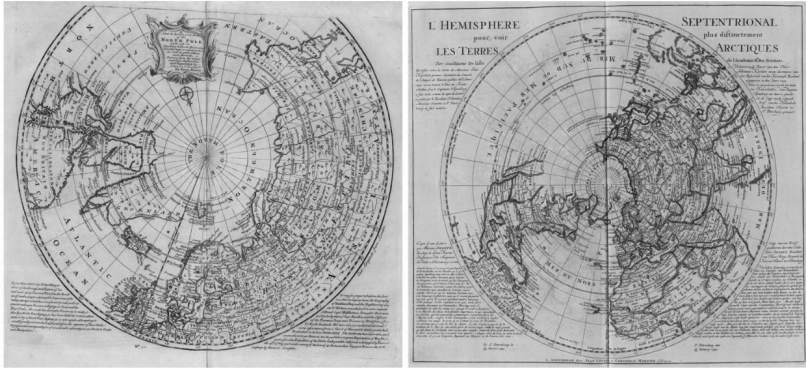


Figure 1. (Left) Emmanuel Bowen, *A new & accurate map of the North Pole* (London, 1747). (Right) Guillaume de L'Isle, *L'Hemisphere Septentrional pour voir plus distinctement les Terres Arctiques*. (Amsterdam, 1742). Courtesy of David Rumsey Historical Map Collection / www.davidrumsey.com.

development, and ultimately between extractive markets and environmental resources that proved to be transformative. Individuals like Cook and Banks may have gained international fame for their exploits in the Pacific, but much of their mission and their worldview had been forged in the icy crucible of the North Atlantic.

This study focuses on the period from the 1730s to the 1770s, analyzing the British campaigns to develop the northern reaches of its Atlantic empire. While the activities of other European nations are important to this story, the British experience is worth exploring in detail because their blend of scientific exploration, improvement, and imperialism blazed a path toward the aggressive development of resources and regions that other nations would follow. In this “age of projects,” as Daniel Defoe famously called it, British scientists, merchants, and politicians spawned an array of enterprising schemes—some fanciful, others quite successful—that sought to harness the rich mineral and marine resources of the North to fuel a new age of British prosperity and power. Indeed, as both an imaginative project and a more complicated reality, the Northern Indies helped crystalize an emerging vision of enlightened progress that combined the aggressive development of natural resources, the growing confidence and authority of scientific improvers, and new conceptions of economic development and imperial power. This therefore proved an important moment in creating the constellation of values that came to define our relationship to the natural world at the dawn of the Anthropocene.

Scientific Improvement and the Knowledge Economy

When the naturalist, Johann Reinhold Forster, surveyed the history of northern exploration in 1786, he emphasized that one of the principle “discoveries” had been that nature was no less bountiful here than in other parts of the globe. Indeed, one could “perceive in all parts the traces of the providence, goodness, and wisdom of a supreme being, who dispenses his benefits over the whole” of creation. While plants appeared “dwarfish” and sparse, Forster marveled at their nutritious qualities capable of fattening the largest animals, such as reindeer. Seemingly frigid oceans were teeming with life, including prodigious fish, seals, walruses, and whales. If the environment was incapable of supporting agriculture, it seemed to compensate by offering rich mineral deposits, furs, and marine resources for the benefit of humankind.⁷ Such resources, he argued, were capable of endless “improvement” at the hands of inventive and scientifically-minded people. Mosses and lichen, for example, could be turned into valuable dyes; whale oil could be used to improve woolen manufacturing; seaweed could be roasted into alkali-rich ashes for industry, and so forth. “An attentive mind will readily conceive,” another observer proclaimed, “how much farther and more extensively useful, every branch of nature’s kingdom may yet prove in the oeconomy of human life.”⁸

This re-evaluation of the North, and of its commercial prospects, was rooted in an Enlightenment blend of providentialism, science, and improvement. Few captured this vision better than James Sterling, an Irish poet and booster of northern expansion, whose poems depicted the bright future of Britain’s subarctic empire:

Declare what Treasures Snow-sunk Rocks produce
 How dreary Deserts howl for human Use
 Tell Industry; ‘twill find, while Ocean rolls,
 Branda, Sainte Barbe, and Guinea in the Poles
 Do Eastern Barriers cramp a Briton’s Soul
 Is West deny’d then elevate the Pole!
 Subdue th’ astonish’d Globe! ‘tis God’s Command
 Who never made unvisitable Land!
 Bid utmost North his Treasury display
 Bask in the Warmth of semi-annual Day.⁹

Here was a world of abundant resources waiting for those with the industry, innovation, and knowledge to unlock nature’s true potential. The fact that Linnaeus was preaching the same message in Sweden—a message embraced by many of the cameralist regimes in northern Europe—only made it seem more convincing to British audiences.¹⁰

But it was Britain's extensive scientific networks, along with its associational world of improvement, that helped translate such ideals into a concrete movement for northern expansion. Over the course of the eighteenth century, growing segments of Georgian society became involved in the pursuits of science—attending lectures, conducting experiments, and cultivating “useful knowledge” for the practical benefit of everyday life.¹¹ Particularly important, in this respect, was the emergence of numerous improvement societies that aimed to promote useful research and experimentation into key areas of public concern, ranging from agriculture and industry to transportation and medicine. Combining aspects of a philosophical society, a social club, and a subscription campaign, these eighteenth-century improvement societies offered contemporaries a powerful tool for generating a range of ambitious projects.¹²

Not surprisingly, groups in northern Britain tended to lead the way in applying the tools of scientific improvement to the northern reaches of the empire. In Ireland, for example, the Dublin Society for Improving Husbandry, Manufactures, and other Useful Arts and Sciences, which emerged in the 1730s, worked to establish much stronger ties between Ireland and the North Sea zone—envisioning a world in which coal, salt, fish, and whale oil would jump-start the local economy and Britain's flagging northern empire.¹³ The “Dublin Society,” as it was commonly known, sought to spur this sort of economic development through a coordinated campaign of premiums, subsidized experiments, and the dissemination of useful discoveries.¹⁴ Their tendency to focus on particular industries—and to devote the kind of attention and resources needed to address key technical challenges facing producers—reflected a kind of “industrial enlightenment” that made public science integral to Britain's economic transformations in the eighteenth century, as the recent work of Joel Mokyr has shown.¹⁵

Commercial fishing offers a revealing window into this industrial enlightenment at work, underscoring how the joint efforts of scientific improvers, merchants, and projectors transformed contemporary perceptions of North Atlantic resources. The lucrative cod and herring fisheries became a subject of intense public focus in Britain during the middle decades of the eighteenth century as observers increasingly bemoaned the nation's small share of this vital industry, estimated to be worth more than £10,000,000 sterling per year.¹⁶ Groups worked accordingly to promote new fisheries off the coast of Scotland, Ireland, Labrador, Greenland, Iceland, and throughout the Barents Sea. Even small islands, such as Cherry Island off Spitzbergen, attracted the attention of British projectors, who saw in its rich coal deposits and fishing grounds a promising commercial base in these northern waters.¹⁷ But improvers did more than canvas maps and travel accounts to pin-point

areas of commercial promise.¹⁸ They also mobilized the scientific community to study the life cycle and migration habits of North Atlantic fish so as to improve the success of British fishing fleets. Local groups worked to compile natural histories of important species such as cod, herring, salmon, and ling. Even the navy supported this research program, as evident from the instructions to naturalists aboard Constantine Phipps' polar expedition in 1773.¹⁹

Yet, if wresting control of northern territories and fishing grounds was an appealing prospect, contemporaries recognized that its success would also depend upon technical advances in salt production and the curing process that had proven elusive in the past.²⁰ Calls for expanding the fisheries would remain idle talk, as one observer noted, "unless we cou'd shew, that we were as capable of curing, as we are of catching the Fish, which is a thing impossible without Salt proper for the Purpose."²¹ Forced to buy more powerful salts from the continent, the British fishing industry had to absorb a considerable surcharge that put them at a competitive disadvantage, not to mention the disruptions caused when wars cut off access to this resource. That was a recurring theme throughout the period: it was one thing to propose a new industry, or to suggest that the empire become more self-sufficient through import substitutions, but it was actually quite difficult to succeed in the technical details that often determined the success or failure of such projects.²²

In the case of the fisheries and salt, improvers were able to mobilize the networks of science to bring collective resources and attention to bear on this problem. In England, for example, the Royal Society helped publicize the work of William Brownrigg, a noted chemist, who had conducted wide-ranging investigations into the techniques of salt-making. Brownrigg discovered that high temperatures and boiling conditions resulted in the formation of hydrochloric acids that undermined the curing power of domestic salt.²³ But perhaps more interesting than the finding itself was the way such research mobilized a vast network of collaborators, which according to one contemporary, ranged from "judicious Salt-Officers" to "inquisitive Navigators, Merchants, and Travellers" to the experimental work of "many learned Physicians, Chemists, and Philosophers."²⁴ Further north, the Dublin Society was offering premiums and public trials to encourage innovation among salt producers, while Scottish circles, led by the Society for Improvers in the Knowledge of Agriculture as well as the Board of Trustees for Fisheries, Manufactures and Improvements, funded promising experiments with different forms of rock, brine, and bay-salts.²⁵ At times, it seemed like no aspect of the fishing industry was too insignificant to warrant attention from improvers. In Scotland, for instance, groups experimented

with using cheaper types of wood as barrel staves in packing cured fish, suggesting that British producers could reduce their costs by 80% if they switched from oak staves to larch ones (larch being an under-utilized staple of the northern boreal forests).²⁶

Equipped with the resources of the scientific community and the social capital of improvers, various groups collaborated on a wide-ranging agenda for the economic development of the Northern Indies that focused on promising fields such as the tanning industry, linen production, naval stores, whaling, deep-sea fishing, coal and copper mining, salt-works, and industrial chemicals and dyes. If Britons were relatively familiar with many of these activities, northern improvers also tried to introduce more exotic branches of trade. The Canadian ginseng “boom,” for example, began when scientific accounts and engravings of the prized Chinese plant were circulated among colonists in Quebec and British North America, inspiring locals to “discover” large caches of domestic ginseng that would bring enormous profits in Asian markets. By 1750, ginseng could make up as much as 20% of the value of northern cargoes arriving at European trading depots. Members of the Royal Society not only helped establish this branch of trade in British colonies but also conducted experiments on domestication and the curing process that observers hoped would transform ginseng into a full-blown cash crop.²⁷ In a similar vein, the swift rise of the kelp industry underscored how new resources and trades could be discovered throughout the northern reaches of the empire. By harvesting and burning sea weed, coastal communities learned to produce ashes rich in alkalis and sodas desperately needed by the growing textile industry, soap-makers, glass-makers, alum producers, and the like. The coastline of the Orkneys, Hebrides, and other islands became sites of a bustling kelp industry, as improving landlords organized the trade into a consolidated business that yielded nearly 20,000 metric tons of ash per year by the end of the century.²⁸ For their part, scientific improvers conducted experiments and corresponded with experts to identify the types of seaweed that yielded the most sodium rich ashes, new types of kilns to increase purity, and improvements in aquaculture to boost yields.²⁹ Yet these scientific networks did more than provide intellectual capital in the form of useful knowledge or technical know-how. The involvement of well-connected merchants, aristocrats, and officials also provided access to social and political capital that could be equally decisive in launching challenging projects.

In fact, the political dimensions of this story are worth underscoring since these campaigns to redeem the subarctic forced contemporaries to wrestle with questions about the nature of resources: who should have access to them; whose expertise and authority should guide their use; and to what larger ends

or purpose? Northern improvement, in other words, evinced a new “political ecology” of empire as various civic groups used their expertise of the natural world to position themselves as the gatekeepers of progress and patriotism.³⁰ The institutional world of improvement, after all, helped carve out a new sphere of civil society in which members of the public could work together to advance the welfare of the nation—at times even acting like a government agency in the way it promoted economic development or imperial projects. At a time when the government appeared hamstrung by party politics and factionalism, this associational world of improvement offered Britons an attractive arena for civic action and leadership.³¹ As a result, the political ecology of northern expansion helped legitimate the centrality of science and enterprise to the imperial mission and the aggressive development of natural resources ordained by providence for the “improvement” of the world.

The Trials of Exploration

Within this context, British improvers seized upon exploration as a vital tool in opening new avenues of trade in the North Atlantic and beyond as a series of dramatic campaigns to discover the Northwest Passage helped generate new levels of public interest and support. This renewed push for northern exploration began in Ireland in the 1730s with the inveterate improver Arthur Dobbs, who convinced the British navy in 1741 to send a small expedition to search for the passage in Hudson’s Bay. Afterwards, Dobbs and his supporters changed tactics, organizing a privately funded expedition in 1746, which attracted subscriptions from merchants and gentlemanly investors to the tune of £10,000. Like many of the northern projectors of this era, Dobbs showed a canny ability to rally scientists, merchants, and high officials to his cause while courting public support through a steady stream of pamphlets and newspaper articles. By mid-century, these activities had created a noticeable shift in public opinion about the merits of scientific exploration, the prospects of a Passage, and the commercial potential of these northern waters.³²

If such quests appear almost quixotic with the benefits of hindsight, contemporaries believed they were precisely the kind of bold initiatives the nation sorely needed. With the intense commercial pressures wrought by closing markets in Europe and aggressive competition abroad, Britons had to begin actively searching for any and every opportunity to open new branches of trade—a view that expressed itself in a pervasive nostalgia for the exploits of the Elizabethan age, when England’s appetite for discovery and expansion knew no bounds. “We cannot think so meanly of our

Countrymen,” the Scottish authority John Campbell complained, “as to suppose that either their Courage, their Judgment, or their Spirit, is inferior to that of their Ancestors.” Instead, he and others blamed Britain’s current complacency on a public culture that had allowed “quick wits...to ridicule Voyages to cold, barren, desert Countries; and to represent that as Folly and Madness, which is in truth a most noble kind of Public Spirit”—the kind which invariably opened up new spheres of commercial opportunity for the nation.³³ As a result, the period witnessed a proliferation of ambitious schemes which championed exploration as a way to extend the frontiers of both knowledge and imperial trade. The excitement even swept Parliament in 1745, when it issued a £20,000 reward to anyone discovering a Northwest Passage, along with subsequent prizes for navigators who reached certain polar latitudes—a conspicuous endorsement of the aspirations of scientific projectors like Dobbs and his associates.³⁴

Throughout the empire, groups vied to launch similar expeditions to the subarctic during this period. In the American colonies, for example, Benjamin Franklin helped organize a subscription campaign in Philadelphia, Boston, and New York to send a schooner, the *Argo*, in search of a northern passage in 1753, demonstrating the “public spirit of this people.”³⁵ Yet like a competing scheme backed by London investors, Franklin’s expedition also sought to produce more tangible, and private, gain by exploring the coast of Labrador to stake out potential sites for fishing, whaling, mining, or trade with the indigenous population.³⁶ As one authority noted, Labrador had recently yielded £50,000 of such commodities in a single season—striking “proof...[that] it is not always the Beauty or the Fertility of a distant Country that should recommend it to a trading Nation” like Britain.³⁷

Exploration and discovery, however, required significant amounts of financial and intellectual capital that the growing authority of scientific improvement helped underwrite. Even short expeditions could cost thousands of pounds, given the need for proper ships along with the skilled captains, crews, and scientific observers necessary for such journeys. A burgeoning culture of exploration also required access to key information and intelligence. Before launching their expedition, for example, Franklin and his associates were busy acquiring a rich collection of maps, sea charts, and traveler’s accounts, including material from Dobbs’ recent expedition.³⁸ The mobilization of these transatlantic networks of science turned Philadelphia into a “center of calculation” where knowledge about distant places could be transcribed and aggregated in ways that encouraged scientific projecting.³⁹ And when the *Argo* returned after failing to locate a passage to the Pacific, Franklin and his associates took comfort in the fact that its crew managed to create “a very good Chart, and have a better Account of the Country, its

Soil, Produce, &c than has hitherto been published”—information which Franklin promised to dutifully transmit to other scientists and gentlemen back in England.⁴⁰

Zeal for northern exploration also reflected a growing suspicion of the Hudson’s Bay Company (HBC) and its gloomy portrayal of the region. Critics complained that the common image of the North as an icy and desolate landscape was really a self-serving canard that the HBC encouraged to protect its monopoly over vast territories that it had little appetite to explore, develop, or improve.⁴¹ The respected commercial writer Malachy Postlethwayt was part of a growing chorus of observers who wondered how this company could control an entire continent and yet only employ 3 ships a year and 300 men, all to “enrich 9 or 10 merchants at their country’s expense.”⁴² Knowing that it had many enemies, the company’s directors had insisted on absolute secrecy among its employees, preventing anyone from keeping personal records, journals, maps, or collections. Detractors never tired of using this secrecy, along with damaging “revelations” from disgruntled employees, to turn public opinion against the HBC and its depiction of the region’s commercial prospects.⁴³ It would be fair to say, in fact, that a major reason why Arthur Dobbs and his associates were able to raise thousands of pounds to finance their expedition was that a large community of merchants and gentlemanly capitalists were interested in demonstrating the true potentials of the region, with an eye towards breaking up the HBC’s monopoly. The role of Henry Ellis, the scientific observer attached to the Dobbs expedition, was seen as crucial in this respect since he was charged with making detailed maps, tidal records, meteorological observations, and an analysis of “the different natures of the soil.” Moreover, the sponsors insisted that Ellis spare no effort in collecting “metals, minerals, and all kinds of natural curiosities,” which could document the region’s potential for mining, especially with regards to copper which seemed to be abundant in the northern reaches of the Bay.⁴⁴ Thus, even if explorers failed to find the Northwest Passage, they might still discover valuable evidence of the untapped resources waiting to be cultivated by private enterprise. Indeed, the popular campaign to divest the Hudson’s Bay Company of its monopoly privileges reached its zenith only two years after the ships returned in the summer of 1747, when Parliament ordered a full-scale investigation of the matter in response to an outburst of petitions—drawn from nearly 30 different manufacturing towns and ports—stressing the need to open the imperial playing field to worthy improvers.⁴⁵ For their part, Dobbs’ circle insisted that the voyage had already revealed the true potential of “these Countries for Furs, Peltry, Fish, Whale-fin, and oil; as well as for Minerals, Pitch, Tar, and other Valuable commodities.”⁴⁶

Henry Ellis emerged as one of the most articulate champions of this

emerging cult of exploration as his popular work *A Voyage to Hudson's-Bay* (1748) made its way through multiple editions and excerpts in the press.⁴⁷ Part travel account, part adventure tale, and part enlightenment manifesto, Ellis's work made the case for a robust program of exploration that would "awaken us from that slothful and drowsy State into which...we are visibly fallen." Geographic and scientific discovery, he argued, would provide the means by which "the Exportation of our commodities and Manufactures may be vastly increased, that several branches of Foreign Trade may be highly improved, that Navigation in general...be greatly extended, and our Shipping increased." To skeptics who doubted the commercial opportunities of the icy North Atlantic, Ellis responded that a similar lack of vision could be found in earlier periods, when naysayers belittled the possible benefits of colonization in tropical climes. Experience had proven them wrong. And with the proper encouragement, Ellis declared, future Britons would one day celebrate the great wealth and power generated by "these Northern Indies."⁴⁸

If the particulars of Ellis' prophecy seem fanciful in hindsight, his broader vision of a British Empire that embraced scientific exploration as a tool of commercial and imperial expansion did become a reality in the nineteenth century.⁴⁹ And here, I argue, lies the deeper historical significance of the mid-century quest for the Northwest Passage, which sparked a formative public dialogue about the nature of discovery, the merits of expansion, the management of resources, and even the value of "projecting" itself. The proponents of northern exploration also had to forge support among and across the various communities of scientists, navigators, merchants, and state officials who were drawn into these campaigns. Through such efforts, they helped make exploration a cornerstone of the growing alliance among science, empire, and enterprise that flourished in the nineteenth century.

The Rise of the Extractive Economy

In making the case for the Northern Indies, proponents also articulated a vision of empire that revolved around the single-minded extraction of resources, a policy that diverged markedly from existing forms of colonialism. The economic climate of the mid-eighteenth century was pivotal in shaping these new ideas about the political economy of empire. In particular, the rising tide of aggressive mercantilism on the continent, combined with the disruptive effects of frequent warfare, had made British access to European markets and raw materials increasingly precarious.⁵⁰ One of the more glaring examples centered on the Baltic Trade, where British merchants ran up a trade deficit of a million and a half pounds a year purchasing timber, naval stores,

ores, and chemicals that were central to British industry and navigation.⁵¹ In response, scientific improvers sought to transform the northern reaches of the empire into a focused zone of extraction, where key resources and commodities could be harvested to fuel the imperial economy.

The dramatic rise of the Society of Arts in 1754 exemplified this new spirit of resource “mining.” Members of the London-based organization (officially entitled the Society for the Encouragement of Arts, Manufactures, and Commerce) met in specialized committees that created annual lists of premiums to encourage experimentation and production of key staples, commodities, or industrial techniques that would free the imperial economy from reliance upon foreign markets.⁵² Within a decade, the society had expanded enormously, drawing more than two thousand members from diverse professions, and building a vast network of correspondents throughout the empire that allowed it to function as an effective sounding board for the nation’s mercantilist needs.⁵³ Indeed, the society’s annual schedule of premiums often reads like an industrial shopping list, singling out items such as cobalt, borax, copperas, alum, vitriol (sulphates), bismuth, madder, alkalis (in both mineral and vegetable forms), bleaching chemicals, colorful dyes, edulcorated train oil, saltpeter, and various metal ores. In addition to identifying these resources, and providing monetary incentives, the society offered crucial technical advice that improved the chances of actually discovering such items.⁵⁴ Part of this effort centered on publishing inexpensive books or manuals that instructed non-specialists on how to identify particular resources, how to assess their quality, and how to process them (according to the latest scientific understanding). In the case of cobalt and alkalis—to highlight two prominent examples—the standing committee on chemistry oversaw the creation and publication of manuals for the would-be prospector or improver working with these key industrial materials.⁵⁵ Yet the society also provided more tailored advice by agreeing to analyze specimens that correspondents sent to London. One of their early initiatives, in fact, was to build a sophisticated “assaying furnace” to conduct metallurgical and chemical analysis of samples—a service that helped northern improvers determine the value of particular deposits of minerals they discovered.⁵⁶ These tools were also used to evaluate new industrial techniques, such as the analysis the society conducted during the late 1750s of iron samples that had been smelted with northern energy sources (peat turf and coal) instead of the traditional, but increasingly scarce, charcoal.⁵⁷

Armed with their lists of priorities, imperial projectors fostered a regime of single-minded extraction in the North that sought to harvest key mineral and marine resources rather than creating cohesive societies overseas. Proponents of the fisheries and whaling, for instance, often emphasized the

fact that these industries did not require permanent settlements along with the expensive infrastructure and administrative burdens they entailed. Seen from this perspective, a desolate colony like Newfoundland had not failed to evolve into a mature, populous society; rather it represented a successful example of an extractive zone that yielded valuable commodities with few responsibilities or costs.⁵⁸ Such attitudes cast the Northern Indies in a very different light, as boosters of commercial expansion argued that the inhospitable landscape of places like Labrador, Greenland, or Hudson's Bay should not prevent British crews from harvesting their resources.⁵⁹ This theme resurfaced again and again in the Parliamentary hearings over the Hudson's Bay Company, as rival British merchants attacked the company's languid management while still embracing the "factory" model of imperial commerce associated with it. Indeed, what they found objectionable was not the HBC's failure to develop settler colonies, which they too rejected, but its failure to develop an expanding chain of small trading houses and factories that could exploit the region's fishing, whaling, and mining potentials.⁶⁰ Like similar proposals for Greenland, these ventures emphasized a light "footprint," with temporary crews extracting commodities from the sea and land, while relying on the hunting prowess of indigenous populations whenever possible.⁶¹

This northern vision of empire and its political economy would revolve around sailors and fleets, rather than settlers or plantations, and would prioritize the kind of bulky commodities that sustained a merchant marine. The commercial authority Malachy Postlethwayt insisted that too much attention had been paid to luxury staples at the expense of "those gross and bulky commodities that are the chief and principle sources of navigation," and consequently "more profitable to a nation than the mines of Mexico and Peru."⁶² While no one suggested that Britain give up its sugar colonies or its share of valuable goods like tobacco, wine and silks, they argued that bulky northern commodities such as fish, timber, hemp, iron, and coal could generate as much benefit as tropical luxuries—but this wealth and power would be measured in terms of fleets and sailors rather than the private balance sheets of planters. In other words, developing the Northern Indies was particularly suited to the kind of maritime empire that Britain aspired to be.⁶³ As one poet of northern expansion succinctly put it, "While our great Monarch doubling his Command,/ Shall count more Subjects on the Waves than Land."⁶⁴

The British economy's growing appetite for key resources helped sharpen this vision of northern extraction. If industry needed vast quantities of alkalis, then scientific improvers would find the necessary kelp beds, forests, or mineral deposits in the North Atlantic that could supply the requisite chemical

ashes. As sulphuric acid became the workhorse of industry—due in part to Scottish improvement societies, which had promoted its use as a bleaching agent in the textile trades—improvers looked to the volcanic islands of the North Atlantic to replace Italian sulphur. By the 1780s, for example, imperial boosters were demanding that Britain annex Iceland, or purchase it from the Danes, so that its rich sulphur deposits could be incorporated into the British fold.⁶⁵ To some contemporaries, it seemed like a *fait accompli*, with Londoners quizzing one bemused gentleman about whether the island had indeed become a British colony already, while Sir Joseph Banks was lecturing cabinet officials on Iceland's destiny (along with the Faeroe islands) as part of the greater British "archipelago...eminently fitted for the establishment of a Naval Empire."⁶⁶ As contemporaries catalogued the rich deposits of iron, copper, lead, and minerals scattered throughout the North Atlantic basin, it seemed to confirm "the design of providence," as John Campbell put it, that "every Island, Holm [i.e. inlet], and Rock" in these icy waters "would be applied to some useful purpose."⁶⁷ But it was the expanding British economy, more than providential design, that determined what "useful purpose" these distant shores would serve.⁶⁸

This point is underscored by the heavy emphasis that contemporaries placed on the rich energy sources of the North Atlantic world, reflecting the more prominent role they were assuming in the British economy and consciousness. Marine oils, derived largely from whales and seals, were high on the wish-list of British projectors who valued them as an important lighting fuel as well as industrial ingredient. But it was the immense coal reserves of the Northern Indies—stretching from Scotland through the Faeroe Islands and Greenland to Canada's Maritime Provinces—that transformed the region's economic potential in the eyes of many Britons. The "rich coal mines of *Newfoundland* as well as *Cape Breton*," Captain Cook boasted, "would be sufficient to supply all Europe and America abundantly with this commodity."⁶⁹ Some of this northern coal might be imported into Britain because of special properties—such as the anthracite coal found on the Faeroe Islands, which was tried in Scotland because its chemical composition seemed ideal for smelting metals.⁷⁰ But given Britain's own abundance of coal, most contemporaries perceived the fossil fuels of the North Atlantic as a necessary foundation for establishing extractive industries in these northern zones. Coal deposits, for example, would allow mining operations to smelt iron, lead, and copper ores on-site, before sending these metals off to Britain. The energy from coal was also needed to fuel salt-works for fisheries, try-works for marine oils, and many forms of chemical manufacturing, including the production of valuable coal tar. And as British observers pointed out, the French had already demonstrated how these northern coal fields could

supply the energy needs of colonial industries to the south, by sending coal from Cape Breton to the Caribbean where it fueled sugar production.⁷¹ Not unlike today, the “Northern Indies” of the eighteenth century was to be a fundamentally extractive zone where minerals, energy, and supplies were mined to feed the growing appetites of distant economies.

Coda: Lessons from the North

British trade and colonization evolved in markedly different ways throughout the globe, as recent scholarship has shown. Engagement with different cultures, commercial systems, and environmental realities forged distinct modes of imperialism that reflected the unique dynamics of their time and place.⁷² Nowhere was this point more evident than in the mid-century campaigns to expand imperial trade and development throughout the northern reaches of the Atlantic world. Previous patterns of empire—whether from North America, the Caribbean, or the East Indies—were set aside as projectors embraced a world of fleets, factories and transient workers who targeted resources with the tools and efficiency of the industrial enlightenment. Indeed, looking back at these northern schemes from our current vantage point, we can see how they embodied a fundamental transition taking place in Great Britain, as the nation shifted from an economy based upon organic energy and materials to a “mineral-intensive industrialization” that staked out a key path on the road to our modern world (both in terms of ecology and economy).⁷³

In other parts of the world, British experiences could lead to strikingly different outcomes and outlooks. On tropical islands, for example, many scientists and officials came to embrace an *ethos* of conservation in response to the rapid environmental deterioration at the hands of European trade and settlement—a phenomenon particularly visible in such confined settings.⁷⁴ Likewise, Scottish improvers working to transform the agriculture and economy of the Highlands began to develop new ideas about the carrying capacity of the land, emphasizing the concrete limits of nature to support larger settlements or growth.⁷⁵ In each case, the convergence of science, improvement and empire led to dramatically different lessons than the ones northern projectors had drawn from their experiences, which tended to celebrate nature’s abundance and the virtues of extracting a “useful purpose” from every island and rock, as John Campbell had put it. Such differences help underscore the fact that there was nothing inevitable about the worldview that emerged from these northern campaigns. Their ideological vision, in other words, was not the expression of some general

zeitgeist, but instead represented a new amalgam of ideas about science, natural resources, energy, and global development that were forged in this northern crucible of trial and debate. It was with good reason, therefore, that Mary Shelley's famous tale of the dangers of scientific hubris and the drive to dominate nature revolved so centrally around characters, scenery, and dialogue pertaining to arctic exploration. This backdrop provides the perfect foil for Shelly's critique in *Frankenstein* precisely because it was the advocates of northern imperialism who had worked so tirelessly to link scientific discovery, the control of nature, and the quest for imperial glory in the minds of the public.⁷⁶

Beyond ideology, however, these northern campaigns helped forge institutional relationships and careers that would influence the patterns of imperial and economic expansion in the decades to come. One important example can be seen in the cluster of lasting ties that formed among scientists, navigators, and officials during these formative years when projects for northern exploration created partnerships among key figures such as Sir Joseph Banks, Capt. James Cook, Constantine Phipps, the Earl of Sandwich, Sir John Barrow, and Daines Barrington.⁷⁷ Over time, these shared interests would lead to a tightly-knit "Arctic Lobby," as one historian has called it, which carried the banner of science, improvement and imperial expansion throughout much of the nineteenth century.⁷⁸ Other parts of the empire would feel these impacts too. Sir John Barrow, for instance, was not only a powerful advocate of Arctic exploration but also promoted numerous campaigns linking scientific discovery and commercial expansion throughout Africa and Asia during his nearly half-century term as Secretary of the Admiralty and founding member of the Royal Geographic Society.⁷⁹ Joseph Bank's role in cultivating imperial botany around the world is perhaps well known, although the link between this career and his formative experiences in the world of northern improvement are less so.⁸⁰ In a similar vein, Sir Roderick Murchison—dubbed the "scientist of empire," for making geology central to the way British industry mined resources on nearly every continent in the nineteenth century—actually received his training in geology alongside the explorers John Franklin, John Richardson, and George Bach as these men prepared for their arctic expeditions in 1818. It is fitting that the man who systematically inventoried the mineral and energy resources of the empire, was himself schooled in such practices as they were being honed in the northern reaches of the Atlantic.⁸¹

Ironically, nothing would have pleased these men more than our current notions of an Anthropocene, vindicating their prophecies in the power of science, innovation, and global markets to utterly transform the natural world.⁸² Yet looking back at this forgotten eighteenth-century moment,

with its schemes for imperial power and wealth in the subarctic, can help illuminate the emerging relationship between science, industrial capitalism, imperial expansion, and environmental change that came to define our modern world. In many ways, we are still reckoning with the consequences today.

NOTES

1. A. M. Lysaght, *Joseph Banks in Newfoundland and Labrador; 1766: his diary, manuscripts and collections* (Berkeley, Calif.: University of California Press, 1971); and Victor Suthren, *To Go Upon Discovery: James Cook and Canada, 1758–1767* (London: Dundurn Press Ltd., 1999).

2. Stephen J. Hornsby, *Surveyors of Empire: Samuel Holland, J.W.F. Des Barres, and the making of the Atlantic Neptune* (Canada: McGill-Queen's Univ. Press, 2011); Glyndwr Williams, *Voyages of Delusion: The Quest for the Northwest Passage* (New Haven: Yale Univ. Press, 2003).

3. Anna Agnarsdóttir, "Iceland in the Eighteenth Century: An Island Outpost of Europe?" *Sjuttonhundratatal* 10 (2013): 19–22.

4. On the "Northern Indies" trope, see for example Henry Ellis, *A Voyage to Hudson's-Bay, by the Dobbs Galley and California, in the years 1746 and 1747, for Discovering a North West Passage...* (Dublin: George and Alexander Ewing, 1749), ix; John Harris, ed., *Navigantium atque Itinerantium Bibliotheca...*, revised and enlarged by John Campbell, 2 vols. (London: T. Woodward, et al., 1744–8), II:398; James Sterling, *An Epistle to Arthur Dobbs...* (London: R. Dodsley, 1752), 28; and William Doyle's discussion (and map) in *Some Account of the British Dominions Beyond the Atlantic...* (London: J. Browne, 1770).

5. While the literature in this field is vast, David Mackay's *In the Wake of Cook: Exploration, Science, and Empire, 1780–1801* (Wellington: Victoria Univ. Press, 1985), provides a focused entrée into this view of the Pacific voyages as a watershed moment in the relationship between science and empire.

6. Bob Harris, *Politics and the Nation: Britain in the Mid-Eighteenth Century* (Oxford: Oxford Univ. Press, 2002); Kathleen Wilson, *The Sense of the People: Politics, Culture and Imperialism in England, 1715–1785* (Cambridge: Cambridge Univ. Press, 1995).

7. Forster, *History of the Voyages and Discoveries Made in the North* (London: J. Robinson, 1786), 488–9.

8. "An Historical Memoir Concerning a Genus of Plants Called Lichen, by Micheli, Haller, and Linnaeus....," *Philosophical Transactions* 50 (1757): 687–8.

9. Sterling, *Epistle to Arthur Dobbs*, 27–8.

10. Lisbet Koerner, *Linnaeus: Nature and Nation* (Cambridge, MA: Harvard Univ. Press, 1999), esp. ch. 3. See also the positive coverage of Linnaeus' northern "prospecting" in [Anon.], Article XII, *Literary Journal* 1746): 192–7.

11. Larry Stewart, *The Rise of Public Science: Rhetoric, Technology, and Natural Philosophy in Newtonian Britain, 1660–1750* (Cambridge: Cambridge Univ. Press, 1992); Richard Drayton, *Nature's Government: Science, Imperial Britain, and the 'Improvement' of the World* (New Haven: Yale Univ. Press, 2000); Jan Golinski, *Science as Public Culture: Chemistry and Enlightenment in Britain, 1760–1820* (Cambridge: Cambridge Univ. Press, 1992); John Gascoigne, *Joseph Banks and the English Enlightenment: Useful Knowledge and Polite Culture* (Cambridge: Cambridge Univ. Press, 1994).

12. D.C.G. Allan, "The Society of Arts and Government, 1754–1800: Public Encouragement of Arts, Manufactures, and Commerce in Eighteenth-Century England," *Eighteenth-Century Studies* 7 (1974): 434–52; D.G.C. Allan and J. L. Abbott, eds., *'The Virtuoso Tribe of Arts and Sciences': Studies in the eighteenth century work and membership of the London Society of Arts* (London: Univ. of Georgia Press, 1992); James Livesey, "The Dublin Society in Eighteenth-Century Irish Political Thought," *The Historical Journal* 47 (2004): 615–640; Fredrik Albritton Jonsson, *Enlightenment's Frontier: The Scottish Highlands and the Origins of Environmentalism* (New Haven: Yale Univ. Press, 2013); Roy Porter, "Science, Provincial Culture and Public Opinion in Enlightenment England," *British Journal for Eighteenth-Century Studies* 3 (1980): 20–46.

13. Arthur Dobbs, *An Essay on the Trade and Improvement of Ireland* (Dublin: A. Rhames, 1729); Gerard Boate, *A Natural History of Ireland in Three Parts. By Several Hands...* (Dublin: G. Ewing, 1726); Samuel Madden, *Reflections and Resolutions proper for the Gentlemen of Ireland...* (Dublin: G. Ewing, 1738); Henry Fitz-Patrick Berry, *A History of the Royal Dublin Society* (London: Longmans, Green and Co., 1915), 8–9.

14. For their wide ranging interests—which included such diverse fields as hydraulics, bee keeping, industrial chemicals, forestry, fishing, and linen production—see *The Dublin Society's Weekly Observations* (Dublin: R. Reilly, 1739); *Essays and Observations on the Following Subjects. Viz. On Trade...* (Dublin & London: C. Corbett, 1740); Samuel Madden, *A Letter to the Dublin-Society...* (Dublin: G. Ewing, 1739).

15. Joel Mokyr, *The Gifts of Athena: Historical Origins of the Knowledge Economy* (Princeton: Princeton Univ. Press, 2002); and Mokyr, *The Enlightened Economy: An Economic History of Britain 1700–1850* (New Haven: Yale Univ. Press, 2010).

16. Dobbs, *An Essay on Trade and Improvement*, 28; William Doyle, *A Letter to every Well-Wisher of Trade and Navigation...* (Dublin: R. Reilly, 1739), 1–2. [Anon.], *The Wealth of Great Britain in the Ocean Exemplified...* (London: M. Cooper, 1749); [Anon.], *Some Considerations on the British Fisheries...* (Dublin: P. Wilson, 1750); Edward Vernon, *Considerations upon the White Herring and Cod Fisheries...* (London: M. Cooper, 1749). See also Bob Harris, "Patriotic Commerce and National Revival: The Free British Fishery Society and British Politics, c. 1749–58," *English*

Historical Review 114 (1999): 285–313.

17. Harris & Campbell, *Navigantium Bibliotheca*, II: 389–90.

18. See, however, John Campbell's spirited defense of this kind of arm-chair "projecting" in *Navigantium Bibliotheca*, II: 397. Following in the footsteps of Defoe's *A Tour through the Whole Island of Great Britain* (1727), many improvers were inspired to create detailed geographic surveys that would catalogue the numerous projects for improvement waiting to be implemented in particular places.

19. See, for example, James Dodd, *An Essay Towards a Natural History of the Herring...* (London: T. Vincent, 1752); Thomas Harmer, "Remarks on the... Fecundity of Fishes, with Fresh Observations on That Subject" *Philosophical Transactions* 57 (1767): 280–292; Arthur Edmonston, ed. *A View of the Ancient and Present State of the Zetland Islands*, 2 vols. (Edinburgh: James Ballantyne & Co., 1809), I: 234; "Instructions sent out with Capt. Phipps on his northern Voyage" in Lysaght, *Joseph Banks in Newfoundland*, 258.

20. John Chamberlayne, *Magnæ Britanniae Notitia: or, the Present state of Great Britain* (London: D. Midwinter, et al., 1735), 362–3; Dobbs, *An Essay on Trade and Improvement*, 123–4; Francis Cawood, *An Essay: or, Scheme Towards Establishing and Improving the Fishery...* (London, 1721), 38; *Wealth of Great Britain in the Ocean*; 53; *The Old England Journal*, 17 Aug. 1745 and 21 Sept. 1745.

21. John Knightley, *Essay toward Proving the Advantages which may Arise from Improvements on Salt Works...* (Dublin: S. Powell, 1733?), n.pag. See also the discussion in *Read's Weekly Journal or British Gazetteer*, 27 Oct. 1750.

22. James Harrison, *Encouraging Innovation in the Eighteenth and Nineteenth Centuries....* (High View: Gunnislake, Cornwall, UK, 2006).

23. William Brownrigg, *The Art of Making Common Salt...* (London: C. Davis, et al., 1748).

24. Watson, "An Account of a Treatise by Wm. Brownrigg....," *Philosophical Transactions* 45 (1748): 371.

25. Berry, *History of the Dublin Society*, 61–2. The Scottish efforts are reviewed in Archibald Cochrane, *The Present State of the Manufacture of Salt Explained...* (London: W. & A. Strahan, et al., 1785), 43–76; Postlethwayt, *Britain's Commercial Interest Explained...* (London: A. Millar, et al., 1757), 59.

26. James C. Anderson, *An Account of the Present State of the Hebrides* (Edinburgh & London: C. Elliot, 1785), 115–117. Although my focus here is on the fisheries, much the same story occurred in whaling, where scientific improvers sponsored research into new harpoon guns, engines, and refining techniques that would boost this flagging industry. Walter M. Stern, "The Society and the Improvement of Whaling," in Allan and Abbott, eds. *Virtuoso Tribe of Arts and Sciences*, 158–181.

27. John H. Appleby, "Ginseng and the Royal Society," *Notes and Records of the Royal Society of London* 37 (1983): 121–45; Brian L. Evans, "Ginseng: Root of Chinese Canadian Relations," *Canadian Historical Review* 66 (1985): 15; Joseph Banks to Humphrey Marshall, 5 April 1786, in William Darlington, ed. *Memorials of John Bartram and Humphrey Marshall...*, (Philadelphia: Lindsay & Blakiston,

1849), 559–60.

28. Martin Rackwitz, *Travels to Terra Incognita: The Scottish Highlands and Hebrides in Early Modern Travelers' Accounts, c. 1600–1800* (Munich: Waxman Munster, 2007), 436–52; Martin Rackwitz and Colin A. Russell, ed., *Chemistry, Society and Environment: A New History of the British Chemical Industry* (Cambridge: Royal Society of Chemistry, 2000), 48–9.

29. *Transactions of the Society of Arts*, 55 vols. (London, 1783–1845), I:174; See also the improvement tracts on the kelp industry by Dr. John Walker, Angus Beaton, and Robert Jameson, reprinted in *Prize Essays and Transactions of the Highland Society*, 1st Ser., 6 vols. (Edinburgh & London: W. Creech, et al., 1799–1824), I:1–49.

30. Paul Robbins, *Political Ecology: A Critical Introduction*, 2nd ed. (London: Wiley-Blackwell, 2012); Noel Castree, *Making Sense of Nature* (New York: Routledge, 2014). On the political ecology of improvement, more specifically, see Michael Guenther, “Tapping Nature’s Bounty: Science and Sugar Maples in the Age of Improvement,” in Laura Auricchio, Elizabeth Heckendorn Cook and Giulia Pacini, eds. *Invaluable Trees: Cultures of Nature, 1660–1830*, (Oxford: Voltaire Foundation, 2012), 145–9.

31. Michael Guenther, “Enlightened Pursuits: Science and Civic Culture in Anglo-America, 1730–1760 (Ph.D diss., Northwestern University, 2008), ch. 1–2.

32. [Arthur Dobbs?], *A Short Narrative and Justification...of the Adventurers, to Prosecute the Discovery of the Passage...* (London, 1749). The historian, Glyndwr Williams, who (for good reason) is dismissive of many of Dobbs’ schemes, nevertheless admits that he was quite successful in persuading officials, opinion makers, and the public to embrace his perspective. Williams, *Voyages of Delusion*, ch. 3–5.

33. Harris & Campbell, *Navigantium Bibliotheca*, II: 198.

34. 18 George II. c. 17; *Gentlemen’s Magazine* 15 (1745): 51. Henry Beaufoy, F.R.S., emphasized the interwoven strands of scientific, commercial, and imperial aspirations driving this push “for northern discoveries” in his recollections printed in the *Annals of Philosophy, Or, Magazine of Chemistry, Mineralogy, Mechanics...*, 10 (1817): 424–5.

35. Franklin to Jared Eliot, 19 December 1752, *Papers of Benjamin Franklin*, ed. Leonard W. Labaree, 35 vols. (New Haven: Yale University Press, 1959–), 4:389; The goals and details of the voyage were covered in lengthy pieces in the *Pennsylvania Gazette*, 10 May 1753; 15 and 29 Nov. 1753.

36. Philadelphia Committee of Merchants, “Petition against patent exclusive rights of trade to Labrador,” (Ms) in the Benjamin Franklin Papers, American Philosophical Society Archives, Philadelphia, B F85.96. On the competing schemes of this period, see Bertha Solis-Cohen, “Philadelphia’s Expeditions to Labrador,” *Pennsylvania History* 19 (1952): 148–162; Edwin Swift Balch, “Arctic Expeditions Sent from the American Colonies,” *Pennsylvania Magazine of History and Biography* 31 (1907): 419–28. Captain Swaine, who headed the Philadelphia expedition, recorded that a “Draughtsman & Mineralist” was included as part of the crew, but unfortunately the extant documents do not name who filled these posts.

37. John Campbell, *A Political Survey of Great Britain*, 2 vols. (London: Richardson and Urquhart, et al., 1774), II: 638.

38. James Logan to Franklin, 7 & 9 Nov. 1748; Franklin to Jared Eliot, 19 Dec. 1752, 12 Apr. 1753, *Papers of Benjamin Franklin*, 3:325, 329; 4:387–89; 4:465; Franklin was also asking his colleagues to send “any queries to make concerning that Country, its Productions, &c. or would have any particular observations made there” which he would pass along to the Captain and crew (3:389).

39. Bruno Latour, *Science in Action: How to Follow Scientists and Engineers through Society* (Cambridge: Harvard Univ. Press, 1987), ch. 6.

40. *Pennsylvania Gazette*, 15 Nov. 1753; Peter Collinson to Franklin, 26 Jan. 1754; Franklin to Sir John Pringle, 27 May 1762; and Franklin to Richard Jackson, 6 Dec. 1753, in *Papers of Benjamin Franklin*, 5:190–3; 14:352; 4: 148.

41. Arthur Dobbs, *An Account of the Countries Adjoining to Hudson’s Bay* (London: J. Robinson, 1744).

42. Postlethwayt, *Universal Dictionary of Trade and Commerce...*, 2 vols. (London: W. Strahan, et al., 1773), I: lii. For the broader contexts of these attacks, see Glyndwr Williams, “The Hudson’s Bay Company and its critics in the eighteenth century,” *Transactions of the Royal Historical Society*, 5th Ser., 20 (1970): 149–171.

43. Anon. *A Short State of the Countries and Trade of North America Claimed by the Hudson’s Bay Company* (London: J. Robinson, 1749), 5, 9–10, 28–43.

44. Henry Ellis, *A Voyage to Hudson’s-Bay*, 50. On the interest in copper mining, see the “Report from the Committee Appointed to Enquire into Hudson’s Bay” reprinted in *Reports from Committees of the House of Commons*, 16 vols. (London, 1803–06), II: 213–86.

45. *Gentlemen’s Magazine*, 19 (1749): 100; Williams, *Voyages of Delusion*, ch. 6.

46. Privy Council petition printed in Dobbs, *A Short Narrative and Justification*, 24.

47. On the spread and influence of this work, see Guenther, “Enlightened Pursuits,” 175.

48. Ellis, *Voyage to Hudson’s Bay*, x: vii, ix.

49. Robert A. Stafford, ‘Scientific Exploration and Empire’, in Andrew Porter, ed. *The Oxford History of the British Empire, Vol. 3, The Nineteenth Century* (Oxford: Oxford Univ. Press, 1999), 294–319.

50. Harris, *Politics and the Nation*, ch. 6.

51. Postlethwayt, *Universal Dictionary of Trade and Commerce*, 1: xxvi.

52. The discussion in this section about premium lists is based upon research in the Society of Arts archives, which contain not only their own lists but also those from societies in Ireland, Scotland, and the American colonies. Archives of the Royal Society of Arts, London, RSA/PR/GE/110/30/163; RSA/PR/GE/110/12/106; RSA/PR/GE/110/30/145; RSA/PR/GE/110/30/144; RSA/PR/GE/110/12/106; RSA/SC/IM/701/S985; RSA/PR/GE/110/30/156; RSA/PR/GE/110/18/127; and RSA/PR/GE/112/13/6.

53. The weekly lists of elected members, contained in the (ms.) minutes, usually indicate the profession or trade of individuals. RSA Archive, Templeman’s Transactions, Vol 1–2; Minutes of the Society, RSA/AD/MA/100/12/01/01–07.

54. On the society's key role as a source of technical advice, see Harrison, *Encouraging Innovation*, esp. xix–xii, 38.

55. Templeman's Transactions, II: f.27–50, 66, 88–9.

56. Templeman's Transactions, II: f. 79. For public discussion of the furnace's potential benefits, see George Cockings, *Arts, Manufactures, and Commerce: A Poem* (London: J. Cooke, et al., 1766), 23.

57. Templeman's Transactions, ff. 94–f.96.

58. Harris & Campbell, *Navigantium Bibliotheca*, II: 198.

59. See, for example, these arguments driving British designs on Iceland during this period, Anna Agnarsdóttir, "Scottish Plans for the Annexation of Iceland, 1785–1813," *Northern Studies* 29 (1992): 86.

60. Their testimony is reprinted in "Report from the Committee Appointed to Enquire into Hudson's Bay," esp. 231–4.

61. Harris & Campbell, *Navigantium Bibliotheca*, II: 385–6, 390.

62. Postlethwayt, *Universal Dictionary of Trade and Commerce*, I: lii.

63. Daniel A. Baugh, "Maritime Strength and Atlantic Commerce: The Uses of 'a Grand Marine Empire'," in Lawrence Stone, ed. *An Imperial State at War: Britain from 1689* (London: Routledge, 1994), 185–223.

64. Sterling, *Epistle to Dobbs*, 47.

65. L. Gittins, "Premiums for Vegetable Alkali: The Society and the Supply of Potash, Barilla and Kelp, 1758–1827," *Journal of the Royal Society of Arts* 63 (1963): 577–581; Archibald Clow and Nan Clow, "Vitriol in the Industrial Revolution," *The Economic History Review* 15 (1945): 44–55; Francis Home, *Experiments on bleaching...* (Edinburgh: Sands, Donaldson, Murray & Cochran, 1756); Agnarsdóttir, "Scottish Plans for the Annexation of Iceland," 84–7.

66. Anecdote and quotation cited in Agnarsdóttir, "Iceland in the Eighteenth Century" 11, 23.

67. Campbell, *Political Survey of Britain*, II: 664.

68. Russell, ed., *A New History of the British Chemical Industry*, ch. 1–5.

69. Cook's assessments were reported in Forster, *Voyages & Discoveries made in the North*, 297. See also, *London Chronicle*, 6 Nov. 1760.

70. These Scottish experiments are recounted in Jørgen Landt, *A Description of the Feroe Islands...* (London: Longman, Hurst, Rees & Orme, 1810), 73. For British interests in acquiring the Faeroe Islands, see Doyle, *British Dominions Beyond the Atlantic*, 16–31.

71. Harris & Campbell, *Navigantium Bibliotheca*, II: 354–5; Postlethwayt, *Universal Dictionary of Trade and Commerce*, I: n.pag ("France: Remarks Before the Last War").

72. See, in particular, Alison Games' study of different models of colonial engagement that arose from British experiences in the Mediterranean, Atlantic, and Pacific in her Alison Games, *The Web of Empire: English Cosmopolitans in an Age of Expansion, 1560–1660* (Oxford: Oxford Univ. Press, 2008).

73. E.A. Wrigley, *Continuity, Chance and Change: The Character of the Industrial Revolution in England* (Cambridge: Cambridge Univ. Press, 1988); and E.A. Wrigley, "Two Kinds of Capitalism, Two Kinds of Growth," in *Poverty*,

Progress, and Population (Cambridge Univ. Press, 2004).

74. Richard H. Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Environmentalism, 1600–1860* (Cambridge: Cambridge Univ. Press, 1996).

75. Jonsson, *Enlightenment's Frontier*.

76. Mary Wollstonecraft Shelley, *Frankenstein; or, The Modern Prometheus*, 3 vols. (London: Lackington, Hughes, Harding, Mavor, & Jones, 1818). For the broader, cultural fascination with the North, see Angela Byrne's *Geographies of the Romantic North: Science, Antiquarianism, and Travel, 1790–1830* (Basingstoke: Palgrave Macmillan, 2013).

77. John Gascoigne, *Science in the Service of Empire: Joseph Banks, the British State and the Uses of Science in the Age of Revolution* (Cambridge: Cambridge Univ. Press, 1998), 36–40.

78. Robert A. Stafford, "Scientist of Empire": Sir Roderick Murchison, *Scientific Exploration and Victorian Imperialism* (Cambridge: Cambridge Univ. Press, 1989), 68.

79. Fergus Fleming, *Barrow's Boys: A Stirring Story of Daring, Fortitude, and Outright Lunacy* (New York: Grove Press, 2001).

80. Drayton, *Nature's Government*; and Gascoigne, *Science in the Service of Empire*. In his early years, Banks not only spent time exploring Newfoundland (1766) and Iceland (1772), but also intended to study northern botany under Linnaeus, and was preparing for a polar expedition he hoped to lead.

81. Stafford, "Scientist of Empire," 68; Stafford, "Geological Surveys, Mineral Discoveries, and British Expansion, 1835–71," *Journal of Imperial and Commonwealth History* 12 (1984): 5–32.

82. Will Steffen, Jacques Grinevald, Paul Crutzen, and John McNeill, "The Anthropocene: conceptual and historical perspectives," *Philosophical Transactions of the Royal Society of London A: Mathematical, Physical and Engineering Sciences* 369 (2011): 842–867. See also the recent collection of essays on the relationship between the Anthropocene and the eighteenth century in "Humans and the Environment," special issue of *Eighteenth-Century Studies* 49 (2016): 117–302.

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