

# Atlantis Restored

## Natural Knowledge and Political Economy in Early Modern Sweden

According to a famous Paracelsian prophecy, peace would return to Europe only once a lion from the land of the midnight sun united all righteous believers. As the Swedish king Gustavus Adolphus (1594–1632) continued his victorious campaign in the Thirty Years' War, he declared himself to be the lion destined to defeat the eagle, symbol of the Holy Roman Empire and the papacy, and thereby establish an eternal peace.<sup>1</sup> From a position of geopolitical insignificance at the start of the seventeenth century, Sweden had by midcentury, through military conquests, acquired a sprawling empire, devised credible plans for turning the Baltic into a *mare nostrum*, and begun an effort to colonize America and Africa.<sup>2</sup> This era, usually designated by Swedish historians as the Age of Greatness (1611–1721), was characterized by a deep-seated aspiration for geopolitical prominence. Sweden was intent on challenging the other two emerging northern European powers, England and the Dutch Republic. Yet despite what one historian calls a “rampant and somewhat crazy optimism,” Swedish elites were rightly anxious that the nation was too poor to sustain its newfound status as a world power.<sup>3</sup> Sweden had to find a way to generate greater amounts of wealth.

To that end, elites promoted the formation of a new intellectual culture, one that could provide direction for and confidence in future progress. A prominent quartet

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1 Johan Nordström, *De yverbornes o* (Stockholm, 1934).

2 Kerstin Abukhanfusa, ed., *Mare Nostrum: Om Westfaliska freden och Östersjön som ett svenskt maktcentrum* (Stockholm, 1999); Magdalena Naum and Jonas M. Nordin, eds., *Scandinavian Colonialism and the Rise of Modernity: Small Time Agents in a Global Arena* (New York, 2013); Leos Müller, Göran Rydén, and Holger Weiss, eds., *Global historia från periferin* (Lund, 2009). For a discussion of Sweden's military success, see Peter H. Wilson, *The Thirty Years War: Europe's Tragedy* (Cambridge, MA, 2009), 186–87.

3 Karin Johannisson, *Det mätbara sambället: Statistik och samhällsdröm i 1700-talets Europa* (Stockholm, 1988), 111.

consisting of Queen Christina (1626–89), Lord High Chancellor Axel Oxenstierna (1583–1654), Uppsala University chancellor Johan Skytte (1577–1645), and the prosperous merchant, industrialist, and financier Louis De Geer (1587–1652) launched a major initiative to develop a new culture of improvement.<sup>4</sup> Foreign intellectual authorities were invited to Sweden to overhaul the educational system, books were brought to Uppsala and Stockholm from occupied territories in Germany and Poland, and efforts were made to establish learned societies, many of which consisted of mostly foreign intellectuals and scientists.<sup>5</sup> Their sights were set high. Inspired by the conviction that Sweden constituted the cradle of human civilization, or, in the words of the famous Uppsala professor Olof Rudbeck (1630–1702), that Sweden was the long-lost Atlantis, the improvement writers developed a vision for the restoration of the nation’s mythical glory.<sup>6</sup>

Sweden’s political economy of improvement centered on the use of scientific knowledge to transform nature into usable wealth.<sup>7</sup> Gaining an understanding of matter and motion was the key to economic affluence. Whether physics, alchemy, mechanics, or botany, any form of knowledge with the power to transform nature through mining, agriculture, or manufacturing was considered valuable. Drawing on either Paracelsian spiritual ideas or those of Cartesian materialism, Swedish improvement thinkers sought to penetrate deep into the inner life of nature and thereby unlock the storehouse of wealth that God had placed therein. If those of the general population could be provided with such utilitarian knowledge, they could vastly expand production and thus enhance their standard of living. The resulting prosperity would not only improve people’s health and happiness, but it would also contribute to the nation’s strength. To that end, Swedish reformers were interested in how to best organize society to promote the cultivation and application of scientific knowledge. Property rights, markets, money, and trade had to be firmly in place for prosperity to be possible, but these concerns always ranked below that of the transformation of nature in order of importance.

Sweden’s improvement discourse developed as part of a Pan-European intellectual movement.<sup>8</sup> The shift from the traditional neo-Aristotelian ideal of living in harmony

4 Svante Nordin, *Drottningen och filosofen: Mötet mellan Christina och Descartes* (Stockholm, 2012); Sven Göransson, “Comenius och Sverige, 1642–1648,” *Lychnos* (1957–58): 102–37.

5 Otto Walde, *Storhetstidens litterära krigsbyten: En kulturhistorisk bibliografisk studie* (Uppsala, 1920).

6 Gunnar Eriksson, *The Atlantic Vision: Olaus Rudbeck and Baroque Science* (Canton, MA, 1994). In 1434, long before Rudbeck claimed that Sweden was the long-lost Atlantis, Bishop Nicolaus Ragvaldi had argued that Sweden was the cradle of European civilization. A century later, Archbishop Johannes Magnus asserted that Noah’s grandson Magog disembarked in the Stockholm archipelago after the flood and laid the foundation for a thriving civilization that later spread throughout the rest of Europe. See, for example, Kristoffer Neville, “Gothicism and Early Modern Historical Ethnography,” *Journal of the History of Ideas* 70, no. 2 (2009): 213–34, and Håkan Håkansson, “Alchemy of the Ancient Goths: Johannes Bureus’ Search for the Lost Wisdom of Scandinavia,” *Early Science and Medicine* 17, no. 5 (2012): 500–522.

7 Leif Runefelt, *Dygden som välståndets grund: Dygd, nytta, och egennyttia i frihetstidens ekonomiska tänkande* (Stockholm, 2005); Sven Widmalm and Sverker Sörlin, “Naturvetenskap som ekonomi,” in *Jordpäron: Svensk ekonomihistorisk läsebok*, ed. Anders Björnsson and Lars Magnusson (Stockholm, 2011), 289–354; Richard Swedberg, “Mercantilist-Utopian Projects in Eighteenth-Century Sweden,” in *The Economy of Hope*, ed. Hirokazu Miyazaki and Richard Swedberg (Philadelphia, 2017), 51–76.

8 Sophus A. Reinert, “Wichmann’s *Ökonomisch-politischer Commentarius*,” in *Translating Empire: Emulation and the Origins of Political Economy* (Cambridge, MA, 2011), 233–70. See also Pamela H. Smith,

with nature to the Baconian aspiration of dominating nature occurred throughout Europe during the middle decades of the seventeenth century. Various networks, including most importantly the Hartlib Circle, promoted and widely disseminated scientific knowledge with the capacity to promote economic affluence. The improvement discourse was quite flexible, in that it was compatible with statist and nonstatist agendas, free trade and autarky, external and internal colonization. As such, even though the improvement discourse laid the foundation for many of the writings posterity would label mercantilist or cameralist, it did not fit neatly into either one of these categories.<sup>9</sup>

The Swedish improvement discourse was aimed first and foremost at the enhancement of the welfare of the general population. This set it apart from, for example, the German improvement discourse, which focused more on the empowerment of the state.<sup>10</sup> Yet regardless of how much the Swedish improvers favored national well-being over state empowerment, for the most part, they gladly accepted state funding and refrained from explicitly criticizing the state and its military endeavors.<sup>11</sup> Regarding commerce, the early Swedish improver were mostly in favor of open trade. Many of them opposed state-sanctioned monopolies and state-imposed trade regulations. After the loss of its Baltic empire in 1721, however, the focus shifted from open trade to isolationism. The sense was that Sweden could prosper only if it could escape foreign political influence and avoid costly wars, which could be accomplished only by severely limiting the nation's dependence on foreign trade. The loss of empire did not mean that Sweden gave up on colonization. While it would take until 1784 until Sweden regained its foothold in the Atlantic world (Saint Barthélemy), the nation spent much

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*The Business of Alchemy: Science and Culture in the Holy Roman Empire* (Princeton, NJ, 1994); Emma Spary, "Political, Natural, and Bodily Economies," in *Cultures of Natural History*, ed. Nicholas Jardine, James A. Secord, and Emma Spary (Cambridge, 1996), 178–96; Richard Drayton, *Nature's Government: Science, Imperial Britain, and the "Improvement" of the World* (New Haven, CT, 2000); Walter W. Woodward, *Prospero's America: John Winthrop, Jr., Alchemy, and the Creation of New England Culture, 1606–1676* (Chapel Hill, NC, 2010); Robert Collis, *The Petrine Instauration: Religion, Esotericism and Science at the Court of Peter the Great, 1689–1725* (Leiden, 2011); Jim Livesey, "A Kingdom of Cosmopolitan Improvers: The Dublin Society, 1731–1798," in *The Rise of Economic Societies in the Eighteenth Century: Patriotic Reform in Europe and North America*, ed. Koen Stapelbroek and Jani Marjanen (Basingstoke, 2012), 52–72; Fredrik Albritton Jonsson, *Enlightenment's Frontier: The Scottish Highlands and the Origins of Environmentalism* (New Haven, CT, 2013); Paul Slack, *The Invention of Improvement: Information and Material Progress in Seventeenth-Century England* (Oxford, 2015); and Paola Bertucci, *Artisanal Enlightenment: Science and the Mechanical Arts in Old Regime France* (New Haven, CT, 2017).

9 For a recent discussion of mercantilism, see Steve Pincus, "Rethinking Mercantilism: Political Economy, the British Empire, and the Atlantic World in the Seventeenth and Eighteenth Centuries," *William and Mary Quarterly* 69, no. 1 (2012): 3–34, and Philip J. Stern and Carl Wennerlind, *Mercantilism Reimagined: Political Economy in Early Modern Britain and Its Empire* (Oxford, 2013). For cameralism, see Keith Tribe, "Cameralism and the Science of Government," *Journal of Modern History* 56, no. 2 (1984): 263–84, and Andre Wakefield, *The Disordered Police State: German Cameralism as Science and Practice* (Chicago, 2009), as well as the essays in Marten Seppel and Keith Tribe, eds., *Cameralism in Practice: State Administration and Economy in Early Modern Europe* (Woodbridge, UK, 2017).

10 Lars Magnusson, "Comparing Cameralisms: The Case of Sweden and Prussia," in Seppel and Tribe, *Cameralism in Practice*, 17–38.

11 For an example of an improvement writer vehemently opposed to Sweden's "warmongering" state, see Carl Wennerlind, "The Magnificent Spruce: Anders Kempe and Anarcho-cameralism in Sweden," *History of Political Economy* 53, no. 3 (2021): 425–41.

of the eighteenth century in pursuit of the internal colonization of Sápmi (Lapland), home of the Sami.<sup>12</sup> Swedish reformers did not believe that the Indigenous population had to be conquered by arms; the benign force of science would transform the northern provinces into thriving communities.<sup>13</sup> Carl Linnaeus, for example, saw Sápmi as a repository of new and exotic knowledge and resources, all of which ought to be fully exploited through settler colonialism.<sup>14</sup>

With its central focus on natural knowledge, the political economy of improvement differed in kind from the humanist jurisprudential tradition of political economy, promoted by, among others, Hugo Grotius, Thomas Hobbes, John Locke, Montesquieu, David Hume, and Adam Smith.<sup>15</sup> Building on Locke's famous statement that human labor is responsible for 99 percent of the value of commodities, the humanist jurisprudential political economy focused primarily on labor as the source of capital accumulation and prosperity.<sup>16</sup> Property, exchange, and monetary relations had to be properly ordered to incentivize labor, as well as to promote justice, virtue, and liberty in a secular society. Religion was often hidden or excluded in this discourse, which set it further apart from the improvement discourse. In the latter, religion and spirituality were considered important not only to the deciphering of nature's secrets but also for ethical and moral guidance.<sup>17</sup> The humanist jurisprudential discourse and the improvement discourse both embraced the notion that trade played a pivotal role in mediating the balance of power between nations, but they differed in how they conceived of

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12 Sarah Irving, *Natural Science and the Origins of the British Empire* (London, 2008); Fredrik Thomasson, *Svarta Saint-Barthélemy: Människoöden i en svensk koloni, 1785–1847* (Stockholm, 2022).

13 Sverker Sörlin, "Ordering the World for Europe: Science as Intelligence and Information as Seen from the Northern Periphery," *Osiris* 15 (2000): 51–69; Linda Andersson Burnett, "Translating Swedish Colonialism: Johannes Schefferus's *Lapponia* in Britain c. 1674–1800," *Scandinavian Studies* 91, nos. 1–2 (2019): 134–62.

14 As Richard Drayton points out, improvement was the sustaining force behind "imperialism of settlement." Drayton, *Nature's Government*, 57.

15 For classic statements on the humanist jurisprudential tradition, see J. G. A. Pocock, *The Machiavellian Moment: Florentine Political Thought and the Atlantic Republican Tradition* (Princeton, NJ, 1975), and Istvan Hont, *Jealousy of Trade: International Competition and the Nation-State in Historical Perspective* (Cambridge, MA, 2005). There were examples of productive cross-fertilization between the humanist jurisprudential and natural-knowledge traditions of political economy throughout Europe. In England, for example, William Petty worked in the 1640s as an assistant to Thomas Hobbes, who had previously served as the amanuensis of Francis Bacon. Petty soon formed close intellectual bonds with members of the Hartlib Circle, for whom Bacon had served as the main inspiration. Ted McCormick, *William Petty and the Ambitions of Political Arithmetic* (Oxford, 2009). As Michel Foucault noted, Petty developed his version of political arithmetic as part of an interest in biopower, exploring both the qualitative and quantitative control of human bodies. This consideration became an integral part of both the improvement discourse and the humanist jurisprudential tradition. In Sweden, this manifested itself in the creation of *Tabellverket*, compilers of the world's oldest regular national population statistics. Nathalie Le Bouteillec, *Académie royale des sciences et l'arithmétique politique suédoise: A propos de la naissance du Tabellverket et du développement de la statistique des populations (de 1730 à la fin du siècle)* (Amiens, 2014).

16 John Locke, *Two Treatises of Government*, ed. Peter Laslett (Cambridge, 1967), 296. Locke built on an existing tradition of emphasizing labor, which was later developed by Hume, Smith, and Ricardo into the labor theory of value.

17 Most Swedish improvement writers were inspired by either the universal reformation movement or physicotheology. As such, they subscribed to the idea that knowledge of nature brought people closer to God, allowing them to celebrate the divine omnipotence and enjoy material abundance far greater than earlier generations. Tore Frängsmyr, "Den gudomliga ekonomin: Religion och hushållning i 1700-talets Sverige," *Lychnos* (1971–72): 217–44.

international relations. While the former was reluctant to endorse imperial pursuits (at least by the sword), the latter viewed humanity's mastery over nature in alignment with the quest for empire. Finally, while the advancement of science was also considered important to many of the humanist jurisprudential writers—some even engaged in scientific pursuits or wrote about the epistemology of science—their writings did not foreground the advancement of natural knowledge as the foundation of riches.<sup>18</sup>

As part of charting the development of the Swedish improvement discourse, this article reveals reasons for why Sweden ought to enjoy a more prominent place in the historiography of early modern European history. Sweden often figures in military and diplomatic histories, but its role in the development of the Pan-European improvement discourse also warrants its inclusion in the scholarly debate on the history of early modern political economy and the history of capitalism. Reform-minded Swedish intellectuals initially drew extensively on foreign debates, but they soon began to take an active role in the development of economically useful scientific ideas. Gradually, Sweden forged its own version of the natural-knowledge-based improvement discourse, which provided the foundation for the development of Carl Linnaeus's paradigm. The Linnaean version of the Swedish improvement discourse was then reexported to the rest of Europe and across the globe, where it informed efforts to establish control over nature.<sup>19</sup> The Linnaean agenda for botanical refinement and transmutation joined with the broader improvement discourse to promote knowledge with the capacity to activate nature's dormant riches.

Yet as the improvement discourse swept the world, ironically it soon lost its place of prominence in the domain of political economy. Increasingly the humanist jurisprudential tradition came to define the content of political economy. While it would still take many more decades before the Humean and Smithian discourse coalesced into a dominant school of political economy, from the 1740s onward, it was clear that the humanist jurisprudential framework would supplant that of the improvement discourse.<sup>20</sup> This, too, was the case in Sweden. While the humanist jurisprudential approach had had a strong presence in Sweden since the second half of the seventeenth century through Samuel Pufendorf, who spent more than two decades at Lund University, it was only in the 1760s that a new generation of thinkers began to investigate economic phenomena within the frameworks developed by Hume, Smith, and other liberal thinkers.<sup>21</sup>

The marginalization of natural knowledge in the realm of political economy toward the end of the eighteenth century made it appear as though one school of thought had

18 Hume, for example, viewed the arts and sciences, along with industry and commerce, as the cornerstones of prosperity but did not, despite a genuine interest in natural knowledge, spend much time exploring the specific knowledge required to make agriculture, manufacturing, and mining productive. Adam Smith, although he discussed agriculture, climate, and soil more frequently, tended to be brief on these topics.

19 Fredrik Albritton Jonsson, "Rival Ecologies of Global Commerce: Adam Smith and the Natural Historians," *American Historical Review* 115, no. 5 (2010): 1342–63, here 1343.

20 Kirk Willis, "The Role in Parliament of the Economic Ideas of Adam Smith, 1776–1800," *History of Political Economy* 11, no. 4 (1979): 505–44.

21 Arild Saether, *Natural Law and the Origin of Political Economy: Samuel Pufendorf and the History of Economics* (London, 2017). Hugo Grotius was also embraced by Swedish elites, serving as Queen Christina's ambassador to the French court, before he died in a shipwreck on his way from Sweden.

simply prevailed over the other. But this was far from the case. The humanist jurisprudential tradition may have won the battle over the content of political economy, but the improvement discourse won the war in terms of shaping the development of capitalism around the globe. An ever more intensive and extensive transformation of nature—whether plants, minerals, metals, molecules, atoms, or energy—successfully generated a culture of seemingly endless economic growth.<sup>22</sup> As one of the principal ideologies of capitalism, the improvement discourse did not vanish, but rather took center stage in the larger project of modernization.<sup>23</sup> In the case of Sweden, while the natural-knowledge-based improvement discourse did not succeed in restoring Atlantis, it eventually contributed to Sweden reaching a far greater level of prosperity than the protagonists of this article—Johan Risingh, Urban Hiärne, Christopher Polhem, and Carl Linnaeus—could have imagined.

As Sweden entered the seventeenth century, the literate public was exposed mostly to Lutheran writings and early modern neo-Aristotelianism. Although there were few, if any, explicitly economic writings in circulation, numerous well-known texts touched on economic themes. Their focus was soundly on maintaining stability and autarky. In addition to Martin Luther's catechism, offering instructions on how to live both a pious and a prosperous life, a series of treatises, all of which had the term *Oeconomia* in the title, were published by Laurentius Petri (1499–1573), Per Brahe (1520–90), Schering Rosenhane (1609–63), and Åke Rålamb (1651–1718).<sup>24</sup> These publications explored a similar set of topics, meticulously describing how people and societies should best manage their resources to preserve the social order.<sup>25</sup> The Lutheran archbishop Laurentius

22 The economic application of science is the salient idea running through the works of many prominent economic historians, including W. W. Rostow, *The Stages of Economic Growth: A Non-Communist Manifesto* (Cambridge, 1960); David S. Landes, *The Unbound Prometheus: Technological Change and Industrial Development in Western Europe from 1750 to the Present* (Cambridge, 1969); Margaret C. Jacob, *Scientific Culture and the Making of the Industrial West* (Oxford, 1997); Joyce Appleby, *The Relentless Revolution: A History of Capitalism* (New York, 2010); and Joel Mokyr, *A Culture of Growth: The Origins of the Modern Economy* (Princeton, NJ, 2017).

23 Instead of seeing classical political economy as grounded first and foremost in the long-standing humanist jurisprudential tradition, Margaret Schabas argues that it emerged out of the natural-knowledge-based improvement discourse. In her account, the improvement discourse thus became subsumed into classical political economy and did not, as this article argues, transcend political economy and become part of a broader ideology of modernity. Margaret Schabas, *The Natural Origins of Economics* (Chicago, 2005), 10–11.

24 Margaret Schabas shows that it was not until the nineteenth century that economic theorists began to “posit and identify an economy as a distinct entity and maintain that it was subject ... to the operation of human laws and agency.” Schabas, *The Natural Origins of Economics*, 2. Prior to that, the concept of oeconomy had enjoyed a long and multifaceted history. Lissa Roberts suggests that the proper way of understanding oeconomy is “not as a concept, but as a variegated form of imagineering which operated in a hybrid field of material and moral concerns.” Lissa Roberts, “Practicing Oeconomy during the Second Half of the Long Eighteenth Century: An Introduction,” *History and Technology* 30, no. 3 (2014): 133–48, here 140. See also the discussion in Germano Maifreda, *From Oikonomia to Political Economy: Constructing Economic Knowledge from the Renaissance to the Scientific Revolution* (Farnham, UK, 2012).

25 Lars Magnusson points out that the *Oeconomia* publications constituted a Swedish version of the German *Hausväter* literature. See Lars Magnusson, *Äran, korruptionen, och den borgerliga ordningen: Essäer från svensk ekonomisk historia* (Stockholm, 2001), 20. Leif Runefelt recognizes the lack of diversity and limited

Petri, for example, declared, “it is written in *oeconomia* how each and every household should be governed in a Christian way, how each and every one who belongs to the household, master, wife, children, and servants, should keep to their station and engage with the other members in a manner that is compatible with God’s commandments and the well-being of the household.”<sup>26</sup> Traditional social bonds constituted the very glue that kept society intact, which meant that there was a genuine fear of individuals and groups who refused to accept their designated roles. They were seen as a threat to the balance necessary for the stability and cohesiveness of the body politic.

To guide the decision-making of the master of the manor or the household, the prominent statesman Per Brahe offered a taxonomy of priorities. The first concern of every landowner ought to be to set aside enough money to pay for his share of the nation’s military expenses. Next, he must save enough resources to pay for food and nourishment, as well as clothing and shelter. The master also had to budget enough wealth to furnish fine garments for ceremonial occasions, proper for each person’s station, and to appropriately host guests and visitors. Next on the list of priorities were resources earmarked for baptisms, education, and marriages of children. The penultimate category of expenditures included charity, good works, and entertainment. Last on the list was a surplus to be used to mitigate the hardship associated with unforeseen events, such as bad harvests, fire, war, illness, old age, and imprisonment.<sup>27</sup>

Success in the art of householding was key to prosperity and stability in both the “*oeconomia privata*” and the “*oeconomia publica*.”<sup>28</sup> Insofar as every member of the household was responsible for a specific task and occupied a certain place in the internal hierarchy, so, too, did every segment, class, and estate have a unique role in the greater social hierarchy. If any of the estates failed to carry out its respective responsibilities, the body politic would soon show signs of internal decay. A number of writers offered colorful depictions of the social hierarchy, echoing similar descriptions made by the German *Hausväter* writers and the British neo-Aristotelians, such as Gerard Malynes. In one version, the king was described as the head of the body politic, coordinating the rest of the body, making sure that harmony and balance were maintained. The nobility represented the heart, lungs, and stomach; the priesthood the thighs; while commoners, including guild members, merchants, and farmers, constituted the tibia and feet, holding up and providing motion to the entire body.<sup>29</sup> Each person and estate served an indispensable role, one that could not be performed by anyone else.<sup>30</sup>

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originality of this Swedish discourse, which he attributes to a broadly shared European worldview. Leif Runefelt, *Hushållningens dygder: Affektlära, hushållningslära och ekonomiskt tänkande under svensk stormaktstid* (Stockholm, 2001), 93–96.

26 Laurentius Petri, *Oeconomia christiana*, reprinted in Björnsson and Magnusson, *Jordpäron*, 85.

27 Per Brahe, *Oeconomia eller Hushållsbok för ungt adelsfolk*, reprinted in Björnsson and Magnusson, *Jordpäron*, 95–96.

28 György Nováky, “Den ansvarsfulle handelsmannen,” in *Makt och vardag: Hur man styrde, levde och tänkte under svensk stormaktstid*, ed. Stellan Dahlgren, Anders Florén, and Åsa Karlsson (Stockholm, 1993), 215–232, here 215.

29 Nováky, “Den ansvarsfulle handelsmannen,” 216.

30 Although merchants were not at the center of the neo-Aristotelian worldview, they were regarded as valued members of society, as long as they exhibited proper expertise and honesty and engaged in what was considered fair trade. Nováky, “Den ansvarsfulle handelsmannen,” 216–21.

Historian Peter Englund described each person and estate as serving as a brick in an arch.<sup>31</sup>

Along with suggestions for how to manage people and their relationships within the household, community, and nation, the instructional literature also offered advice on how to best organize production, including what kinds of tools, techniques, and technologies to employ. Traditional forms of knowledge and practices were recorded in print, with examples of how, for example, to best restore the nutrients of the soil, plow the fields, plant seeds, fertilize, protect crops from weather and vermin, prune, harvest, package, and store the products from the land. The *Oeconomia* books also offered guidance on a vast array of other topics, from how to build barns and how to care for sick animals to the placement of beehives and the construction of the most effective scarecrows. The emphasis was on collecting and compiling best practices passed down through generations.

Nature was considered God's perfect creation, and humanity's primary responsibility was to honor the creator by living in harmony with nature. The point was not, as it soon would become, to transmute and transform nature for the purposes of generating as much wealth as possible. As clergyman Olaus Petri pointed out, inasmuch as humanity is unable to change "winter, summer, the sun's natural trajectory in the sky," so, too, is it impossible for people to change or improve on the rest of God's creation.<sup>32</sup> Nature presented humanity with a certain amount of material wealth, for which people ought to be grateful. In the same spirit, governor Schering Rosenhane instructed that farmers should listen to "the advice that the old wise famers have given, namely that one should not try to cultivate too much land, but rather be content with a smaller plot and care for it all the better."<sup>33</sup> The aim was to produce the appropriate amount of wealth, enough to fulfill the moderate needs of the household. Self-sufficiency constituted the overarching goal for both the individual household and the nation.<sup>34</sup>

Sweden was by all accounts a poor, undeveloped, and underpopulated country at the start of the seventeenth century. While it possessed vast forests, rich mines, and ample access to fishing, most of the population was engaged in subsistence farming, in which persistently low yields often led to food shortages, poverty, and disease.<sup>35</sup> The so-called Little Ice Age certainly did not help Sweden's economic well-being. Incidentally, however, it may have contributed to one of Sweden's most consequential military victories, as the uncommonly thick ice during the winter of 1658 enabled the Swedish cavalry and artillery to cross from Jutland to Zealand and thereby force Denmark to accept

31 Peter Englund, *Det hotade huset: Adliga föreställningar om sambället under stormaktstiden* (Stockholm, 1989), chap. 2.

32 Petri, *Oeconomia christiana*, 86.

33 Schering Rosenhane, *Oeconomia*, reprinted in Björnsson and Magnusson, *Jordpären*, 133.

34 Runefelt, *Hushållningens dygder*, 98. Göran Rydén reminds us that the idea of *hushållning* did not disappear overnight. Göran Rydén, "Balancing the Divine with the Private: The Practices of *Hushållning* in Eighteenth-Century Sweden," in Seppel and Tribe, *Cameralism in Practice*, 179–202.

35 Nils Erik Villstrand, *Sveriges historia: 1600–1721* (Stockholm, 2011), 381.



the Treaty of Roskilde, which transferred Scania, Blekinge, and Halland to Sweden.<sup>36</sup> Sweden was now at the pinnacle of its imperial power. While celebrating their successful military strategies, the nation's elites were well aware that Sweden would retain its geopolitical prominence only if it could develop its economic muscle. Sweden would be well advised to honor the maxim established by Italian political theorist Giovanni Botero that empires can be sustained only through internal development.<sup>37</sup> To assist in the formation of a new improvement culture, a number of international scholars, philosophers, and scientists were invited to Stockholm, turning a provincial town in the frozen north into a bustling intellectual metropolis, albeit only for a brief moment.<sup>38</sup>

Queen Christina invited philosophers and scholars from Catholic Europe, most notably René Descartes, who died under mysterious circumstances after spending four frigid months in a wintry Stockholm.<sup>39</sup> Oxenstierna, meanwhile, welcomed a number of radical Protestants affiliated with the universal reformation movement. After Christina abdicated the throne in dramatic fashion, converted to Catholicism, and emigrated to Rome, the Protestant universal reformation project became the intellectual lode-star. Scholars and scientists affiliated with the Hartlib Circle were particularly influential.<sup>40</sup> By launching an ambitious effort to gather all existing knowledge and develop new empirical and experimental methods, they hoped to decipher nature's source code and thereby gain access to nature's abundant treasures. A number of scholars affiliated with Hartlib's network, including the Scottish irenist John Dury and the Moravian polymath John Comenius, traveled to Sweden to consult on educational and religious reform, while numerous Swedish students were sent abroad to study with leading Hartlibians.<sup>41</sup> Johan Skytte's son, Bengt, for example, not only studied with Comenius on the continent but also collaborated with Cressy Dymock, Frederick Clodius, and Robert Boyle while residing in London in the 1650s.<sup>42</sup> He had also studied with the Dutch scholar Isaac Vossius and met with Gottfried Wilhelm Leibniz in Frankfurt in 1667. Skytte was also involved in discussions about how to organize the Royal Society in London, to which many members of the Hartlib Circle were later invited to join.

36 Geoffrey Parker, *Global Crisis: War, Climate Change and Catastrophe in the Seventeenth Century* (New Haven, CT, 2013).

37 Vera Keller, *Knowledge and the Public Interest, 1575–1725* (Cambridge, 2015), 38–45.

38 For a discussion of the mid-seventeenth-century intellectual atmosphere in Stockholm, see Håkan Håkansson, *Vid tidens ände: Om stormaktstidens vidunderliga drömvärld och en profet vid dess yttersta rand* (Gothenburg, 2014).

39 Nordin, *Drottningen och filosofen*, 127–38.

40 For an overview of the Hartlib Circle, see Charles Webster, *The Great Instauration: Science, Medicine, and Reform, 1626–1660*, 2nd ed. (New York, 2002); Mark Greengrass, Michael Leslie, and Timothy Raylor, eds., *Samuel Hartlib and Universal Reformation: Studies in Intellectual Communication* (Cambridge, 1994); and Slack, *The Invention of Improvement*. While there was a great deal of intellectual diversity among Hartlib's associates and there were limits to how much they interacted with one another, it is nevertheless the case that most of them shared the vision that a deeper understanding of matter, motion, and spirit was essential for the improvement of human life.

41 Comenius turned down offers from Harvard College and Cardinal Richelieu in Paris and instead journeyed to Sweden. Susanna Åkerman, *Queen Christina of Sweden and Her Circle: The Transformation of a Seventeenth-Century Philosophical Libertine* (Leiden, 1991), 131.

42 Carl Wennerlind, "The Political Economy of Sweden's Age of Greatness: Johan Risingh and the Hartlib Circle," in *Economic Growth and the Origins of Modern Political Economy: Economic Reasons of State, 1500–2000*, ed. Philipp R. Rössner (New York, 2016), 156–86.

Other prominent Hartlib affiliates who collaborated with Swedish reform writers included Johann Becher and Henry Oldenburg. As students returned to Sweden from their travels abroad, they contributed to the formulation of an ambitious plan for the improvement of Sweden, a process that continued for a century, reaching its apogee with Carl Linnaeus.

It did not take long for Queen Christina and Axel Oxenstierna's initiatives to bear fruit. While the Lutheran clergy jealously protected its hard-fought doctrinal authority, a maelstrom of new intellectual currents converged on Uppsala and Stockholm.<sup>43</sup> These currents included Ramism, Baconianism, Paracelsianism, Rosicrucianism, Cartesian materialism, and the domestically developed Gothicism.<sup>44</sup> The confluence of such a diverse set of intellectual strands created a vibrant atmosphere in which thinkers enjoyed the liberty to eclectically combine ideas that they perceived applicable to Sweden's circumstances and challenges. One of the students who came of age in this milieu was Johan Classon Risingh (1617–72).<sup>45</sup> After completing a dissertation in natural philosophy at Uppsala University in 1640, he moved to Stockholm, where Georg Stiernhielm, who together with Olof Rudbeck and Johannes Bureus was one of the main architects of Gothicism, introduced him to the intellectual networks surrounding Queen Christina. At court, he befriended some of Sweden's most powerful political figures and interacted with many leading intellectuals. His rise to prominence was quick. During the years 1644–51, he traveled to Holland and England to develop a better understanding of how the Dutch Republic, despite its limited size and resources, managed to become so prosperous. He observed the hustle and bustle of the Amsterdam port, interviewed successful merchants and powerful government officials, and encountered English observers who, like himself, were trying to discover the secrets behind the Dutch Golden Age. While later sojourning in London, he came across the writings of Gerard Malynes and Edward Misselden and developed an interest in the new intellectual currents emerging from the Hartlib Circle, including Gabriel Plattes, William Petty, Benjamin Worsley, and, in particular, Henry Robinson.<sup>46</sup> Reading their proposals for a program for infinite improvement inspired Risingh to begin writing his own treatise on improvement, focused specifically on Sweden.

The queen and her circle coveted practical knowledge that might aid the nation's development, which made it easy for Stiernhielm to convince her to provide Risingh

43 Tore Frängsmyr, *Svensk idéhistoria: Bildning och vetenskap under tusen år*, vol. 1, 1000–1809 (Stockholm, 2000); Sten Lindroth, *Svensk lärdomshistoria: Stormaktstiden* (Stockholm, 1975).

44 See Jenny Ingemarsdotter, *Ramism, Rhetoric and Reform: An Intellectual Biography of Johan Skytte (1577–1645)* (Uppsala, 2011); Sten Lindroth, *Paracelsismen i Sverige, till 1660-talets mitt* (Stockholm, 1943); Åkerman, *Queen Christina of Sweden and Her Circle*; Susanna Åkerman, *Rose Cross over the Baltic: The Spread of Rosicrucianism in Northern Europe* (Leiden, 1998); Leif Åslund, *Att fostra en kung: Om drottning Kristinas utbildning* (Stockholm, 2005); David Dunér, *Tankemaskinen: Polbems huvudverk och andra studier i tänkandets historia* (Nora, SE, 2012); and Hjalmar Fors, *The Limits of Matter: Chemistry, Mining, and Enlightenment* (Chicago, 2015).

45 Stellan Dahlgren and Hans Norman, *The Rise and Fall of New Sweden: Governor Johan Risingh's Journal, 1654–1655 in Its Historical Context* (Stockholm, 1988); Stellan Dahlgren, "Johan Classon Risingh," in *Svenskt biografiskt lexikon*, vol. 30, ed. Göran Nilzén (Stockholm, 2000), 231–35.

46 Although he does not elaborate, Eli Heckscher pointed out that Risingh was particularly inspired by Henry Robinson. Eli Heckscher, *Mercantilism*, vol. 2 (New York, 1935), 295.

with a stipend so that he could complete his treatise.<sup>47</sup> His writings had to be put on hold, however, when Oxenstierna selected him to serve as the secretary of the newly formed Board of Commerce (Kommerskollegium) in 1651. He wanted Risingh to oversee Sweden's commercial affairs in the Baltic to make sure that the conquest of strategically important regions would yield maximum economic benefits to the nation. Not long thereafter, he was offered an even more prestigious position, with even greater opportunities to turn his vision of improvement into practice. He was now appointed governor of New Sweden, the nation's sole North American colonial possession, located in Delaware. Consonant with his own improvement writings and those of other Hartlibians, including his gubernatorial colleague in Connecticut, John Winthrop Jr., Risingh sought to extend humanity's empire over nature by encouraging the application of science.<sup>48</sup> He emphasized the importance of providing the settlers with the liberty to transform the foreign landscape according to the latest scientific ideals, even if it necessitated the eradication of the native population's autonomy and the destruction of their way of life. Risingh, however, did not see his form of colonization as conquest, but like many of the other improvement writers, he viewed the settlers as bringing the gift of both science and religion to the locals, enabling them to live better. There were no good reasons, he thought, why the Indigenous people, whether Sami or Lenape, should resist improvement. Yet despite Risingh's best efforts, his reform plans never came to fruition, as Peter Stuyvesant's forces soon reconquered the colony, thereby putting an end to Sweden's colonial presence in North America.<sup>49</sup>

Although Risingh is best remembered for his writings on commerce, his vision of improvement was centered on the transmutation of nature.<sup>50</sup> Like many of his fellow improvement writers, he praised God for blessing Sweden with a uniquely bountiful nature, and he subscribed to the Paracelsian view of nature's malleability and perfectibility.<sup>51</sup> Yet since nature did not share its gifts freely, people had to engage in a systematic quest for knowledge to realize nature's abundance. Only through study, experimentation, and application of new knowledge in agriculture, horticulture, and mining would it become possible to launch a new era of prosperity, whereby "the nation will be improved multiple times over and poverty, which so heavily weighs on us, will be alleviated."<sup>52</sup> Although he advocated balanced growth among different sectors, he stated unequivocally that "agriculture constitutes the basis of wealth in every province," providing the basis for clothes, food, shelter, and commercial prosperity.

47 Dahlgren, "Johan Classon Risingh," 231.

48 Drayton, *Nature's Government*, 56–59; Woodward, *Prospero's America*.

49 Dahlgren and Norman, *The Rise and Fall of New Sweden*, 26–28. See also Lennart Pehrson, *Utvandringen till Amerika*, vol. 1, *Den nya världen* (Stockholm, 2014).

50 Dahlgren and Norman disregard Risingh's writings on agriculture as separate from his writings on commerce. Eli Heckscher also based his assessment of Risingh exclusively on his writings on commerce. Dahlgren and Norman, *The Rise and Fall of New Sweden*, 28; Eli Heckscher, "Anders Berch och den ekonomiska vetenskapens första steg i Sverige," *Lychnos* (1942): 33–64, here 36.

51 While the Paracelsian influence is present throughout his discussion of the malleability of nature, it is most prominent in his treatment of the mineral kingdom in Johan Risingh, *Ett Utthogh om Kiöp-Handelen eller Commercierna* (Stockholm, 1669).

52 Johan Risingh, *Een Land-Book eller Några Upsatzer til Wärt Käre Fädernes-Lands Nytt och Förkofring wälmeente om Land-Bruuk och Land Lefwerne* (Wästeråhs, 1671), 4.

By increasing the productivity of nature, it became less expensive to feed the population, which not only improved standards of living but also made it possible for the nation to manufacture commodities more competitively. “All wise people,” he added, know that “the most flourishing nations of Europe have through prosperous agriculture and horticulture reached such a high point in terms of money and commodities, and handicraft, that city after city filled with rich burghers have been built and fortified ... enabling them to live free from the violence of foreign potentates.”<sup>53</sup> Advances in scientific knowledge (*wetenskap*) made it possible, he asserted in the spirit of the Hartlib Circle, to multiply the nation’s wealth many times over, leading to the king-dom’s “remarkable enrichment,” “improvement,” and “refinement.”<sup>54</sup>

Commerce and shipping were also indispensable to the improvement of Sweden.<sup>55</sup> Without it, Risingh wrote in 1669, knowledge would not be properly developed, disseminated, and implemented. At the moment he was writing, however, Sweden’s trade was perceived to be under the dominion of foreign merchants. While German merchants from Lübeck had governed the Baltic trade for centuries, Low Country merchants had recently taken over control. Because foreign merchants had made sure that the terms of trade were always in their favor and rarely reinvested their profits in Sweden, Risingh argued that Sweden’s international trade was not as beneficial as it otherwise might have been. He also took aim at the monopolies violating the freedom on which commerce was predicated—no single person, he argued, “whether superior, equal, or inferior, out of envy, jealousy, or greed, should be able to obstruct the course of trade.”<sup>56</sup> In addition to robbing people of their liberty and sustenance, monopolies undermined the nation’s economic vibrancy. “Because a guaranteed profit makes people both stupid and lazy,” monopolies promoted a spirit directly destructive of both knowledge and commerce.<sup>57</sup> As a result, both country and town fell into ruin and abounded with “poverty, distress, dearth, debt, sloth and laziness.”<sup>58</sup>

Risingh’s advocacy of liberty extended to government restrictions and duties. It was necessary to eliminate exorbitant customs and excise, which functioned as “a noose around the neck of trade,” to create an environment in which “trade and shipping can multiply many times over.”<sup>59</sup> Indeed, the only crucial responsibility of the state was to maintain a legal system protecting property and profits. Anyone who experienced success in their productive pursuits should feel entirely confident that their wealth was safe in their hands. That way, Risingh insisted, “rich *capitalists* [*capitalister*]” would

53 Risingh, *Een Land-Book eller Några Upsatter til Wårt Käre Fädernes-Lands Nytt och Förkofring wälmeente om Land-Bruuk och Land Lefwerne*, 4–5.

54 Risingh, *Een Land-Book eller Några Upsatter til Wårt Käre Fädernes-Lands Nytt och Förkofring wälmeente om Land-Bruuk och Land Lefwerne*, 6–7.

55 Risingh offered the following ranking, starting with the most important: Christian worship, military, agriculture, mining, manufacturing, fishing, commerce, shipping, and shipbuilding. Risingh, *Een Land-Book eller Några Upsatter til Wårt Käre Fädernes-Lands Nytt och Förkofring wälmeente om Land-Bruuk och Land Lefwerne*, 8.

56 Risingh, *Ett Utthogh om Kiöp-Handelen eller Commercierne*, 18.

57 Risingh, *Ett Utthogh om Kiöp-Handelen eller Commercierne*, 99.

58 Risingh, *Ett Utthogh om Kiöp-Handelen eller Commercierne*, 10.

59 Risingh, *Ett Utthogh om Kiöp-Handelen eller Commercierne*, 18, 21.

feel safe keeping their wealth in Sweden, putting it to work in projects that benefited both themselves and society.<sup>60</sup>

Writing during the ascent of Sweden's imperial glory, Risingh expressed confidence in the nation's capacity to improve, as long as its people were given the liberty to engage in productive ventures. If commerce were left open to all and people dedicated themselves to the application and implementation of new knowledge in agriculture, horticulture, mining, and manufacturing, Sweden would be able to multiply its wealth many times over and thus maintain its geopolitical standing. Sweden had the capacity to become, in his projection, an empire of knowledge and liberty.

Risingh played a crucial role in seventeenth-century Sweden, both intellectually and politically. Embracing the Hartlib Circle's new thinking on natural philosophy and political economy, he laid the foundation for the new improvement thinking. His books continued to be popular long after his passing, frequently republished, quoted, and referenced.<sup>61</sup> Additionally, in serving, however briefly, as secretary of the Board of Commerce and governor of New Sweden, he played an important role in translating ideas into practice. Risingh was thus unique in having a hand in the authorship, transmission, popularization, and implementation of Sweden's political economy of improvement.

The Swedish version of the natural-knowledge-based political economy was now starting to take shape. Aided by the new political leadership of Charles XI (1655–97) and the Lord High Chancellor Magnus Gabriel de la Gardie (1622–86), who governed with improvement in mind, power and prosperity were perceived to be within the nation's grasp. The next generation of improvement writers fully subscribed to the notion that to unlock nature's storehouse of riches, it was necessary to thoroughly investigate all its hidden secrets. It was essential not only to create an inventory of plants, soils, animals, minerals, and metals but also to examine the material and spiritual composition of all things in nature. For guidance in this pursuit, Swedish improvers embraced Paracelsian philosophy—a combination of alchemy, medicine, spirituality, and astrology. Anders Kempe, the eccentric Swedish reformer, exemplified this shift, claiming that the Aristotelian understanding of nature no longer had much to offer, that it contained solely “words, empty air, and shells without kernels.”<sup>62</sup> One of the most celebrated Swedish improvers to work within the Paracelsian paradigm was Urban Hiärne (1641–1724).<sup>63</sup> Born on the periphery of the Swedish Empire, in Ingermanland (reconquered by Russia in 1721), Hiärne made a name for himself as the court physician to Charles

60 Risingh, *Ett Utthogh om Kiöp-Handelen eller Commercierna*, 22.

61 Dahlgren, “Johan Classon Risingh,” 234.

62 Anders Kempe, preface to *Den anatomerade Graanen* (Hamburg, 1675). For a discussion of Kempe's role in the development of the Swedish improvement discourse, see Ronny Ambjörnsson, *Det okända landet: Tre studier om svenska utopister* (Stockholm, 1981), and Wennerlind, “The Magnificent Spruce.”

63 For a recent discussion of the centrality of alchemy/chemistry to Hiärne's improvement discourse, see Fors, *The Limits of Matter*. See also Stig Örjan Ohlsson and Siiri Tomingas-Joandi, eds., *Den otidsenlige Urban Hiärne: Föredrag från det internationella Hiärne-symposiet i Saadjärve, 31 augusti–4 september 2005* (Tartu, EST, 2008).

XI, the founder of Sweden's first mineral spa (Medevi Brunn), the director of the nation's first state-sponsored chemical laboratory, and the designer of Sweden's first systematic inventory of natural resources.<sup>64</sup> As a student of Rudbeck at Uppsala University, Hiärne wholeheartedly embraced the idea of Swedish exceptionalism, which for him meant first and foremost that Sweden had been blessed with a uniquely abundant nature. As long as natural knowledge was developed steadily, Sweden could parlay this abundance into economic wealth and geopolitical influence. Hiärne's optimism was bolstered by the pacific and progressive agenda of the nation's new political leadership, in what turned out to be a brief respite from war before Charles XII (1682–1718) plunged the nation into a two-decade-long military endeavor, which eventually put an end to Sweden's imperial aspirations.

Hiärne was exposed to Paracelsian philosophy from an early age. As a teenager, he studied with the well-known Paracelsian scholar Laurentius Peringer.<sup>65</sup> He was also, however, trained in Cartesian materialism. At Uppsala University, under the tutelage of Rudbeck and Petrus Hoffwenius, two pioneers of Cartesianism in Sweden, Hiärne studied medicine and botany. His mentors were deeply committed to the Cartesian idea that there was a radical separation between matter and spirit and that corpuscular particles filled every space of the universe, implying that there was no such thing as a vacuum. They found applications of Descartes's materialism in numerous areas of research, including medicine, botany, mechanics, and engineering.<sup>66</sup> Despite the seeming impossibility, Hiärne was able to reconcile his Paracelsian spirituality with Cartesian materialism.<sup>67</sup> He found Cartesianism useful in explaining all kinds of observable natural phenomena and Paracelsianism helpful in investigating nature's hidden essence. Armed with these powerful analytical apparatuses, Hiärne set out on a *peregrinatio academica*. He studied spas and mineral water in Germany; medicine at Leiden; engaged in joint research with prominent members of the Académie des Sciences in Paris; and attended meetings of the Royal Society in London, where he encountered former affiliates of the Hartlib Circle.<sup>68</sup> His journey brought him into contact with some of the finest European minds, including Elias Ashmole, John Locke, Christopher Wren, Robert Boyle, Joseph-Guichard Du Verney, Jean Baptiste Denis, and Christopher Glaser, which enabled him to return to Sweden armed with new ideas.

After experiencing success with his medical practice and health spa, Hiärne embarked on a more ambitious and far-reaching scientific agenda.<sup>69</sup> He was recruited by the Board of Mines (Bergskollegium) to serve as director of its newly founded chemical laboratory.<sup>70</sup> The board was primarily concerned with making the nation's mines

64 Sten Lindroth, "Urban Hiärne," in *Svenskt biografiskt lexikon*, vol. 19, ed. Erik Grill (Stockholm, 1971), 141–50.

65 Lindroth, *Paracelsismen i Sverige, till 1660-talets mitt*, 495.

66 Gunnar Eriksson, *Rudbeck 1630–1702: Liv, lärdom, dröm i barockens Sverige* (Stockholm, 2002).

67 Fors, *The Limits of Matter*, chap. 2.

68 Lindroth, "Urban Hiärne."

69 Elizabeth Mansen, "Urban Hiärne och kurortskulturen," in Ohlsson and Tomingas-Joandi, *Den otidsenlige Urban Hiärne*; Per Dockson, *Kring Medevi Brunn och Urban Hiärne* (Hishult, SE, 1997), 5–10.

70 Hjalmar Fors, "Kemi, paracelsism, och mekanisk filosofi: Bergskollegium och Uppsala cirka 1680–1770," *Lychmos* (2007): 172–73.

safer and more productive, but with Hiärne as director of the laboratory, the group's ambitions expanded in new directions. Inspired by Johann Becher's laboratory at the Habsburg Court, Hiärne's aimed to "penetrate further into nature's mineralogical secrets to discover the hitherto hidden economic potential of the nation's ores and metals."<sup>71</sup> The goals of the laboratory included (1) the examination of minerals and metals in order to find out what practical uses they may have, (2) the investigation of the hidden chemical and physical features of matter in order to advance knowledge of natural philosophy, (3) the search for useful inventions that improve the general standard of living, (4) the production of better medicines from Swedish ingredients, (5) the provisioning of the poor with medicines at no cost, (6) the supply of medicaments to Sweden's armed forces, and (7) the publication of laboratory findings to bring honor to the king and the kingdom.<sup>72</sup> In short, Hiärne fused theoretical and practical research, economic and military goals, the well-being of the population, and the power of the state.

Sweden's "foremost Paracelsian," Hiärne was careful to point out that even though Paracelsus mastered the art of *Chrysopoeia*, or gold making, it was "not the principle aim or highest cause of alchemy."<sup>73</sup> Instead, he noted, the main purpose of alchemy was "the great enlightenment made possible and the sharpening of our understanding of the highest things, which opens the door to the most hidden and profitable secrets of nature."<sup>74</sup> Indeed, Hiärne credited Paracelsus with having taught him almost everything he knew about nature and most of what he knew about medicine.<sup>75</sup> Hiärne subscribed to the Paracelsian idea that all matter consists of salt, sulfur, and mercury. Through distillation, calcination, and sublimation, it was possible to separate these components. But, much like Kempe before him, who had sought to discover the "magico-magnetic virtues" of things in nature, Hiärne could not satisfy his curiosity with simple laboratory experiments. He was intent on finding the spiritual kernel of matter, the God-given energy that gives all things life and existence. He argued that this energy came from the fire and light emanating from the sun. This spiritual force became more material as it approached the earth, finally uniting with the four elements—earth, water, fire, and air—to give rise to the principles of salt, sulfur, and mercury.<sup>76</sup> While this process was profoundly complex, it was nevertheless accessible to human comprehension. Contrary to the study of politics, which was subject to all kinds of vagaries, often in "violation of God's holy will," in nature, "everything proceeds orderly, well, without intrigues, without violence, injustice, according to the creator's will and holy prescriptions, all of which are in a harmonic and pleasant symmetry."<sup>77</sup>

71 Sten Lindroth, "Urban Hiärne och Laboratorium Chymicum," *Lychmos* (1946–47): 51–116, here 53, 75. For a discussion of Becher, see Smith, *The Business of Alchemy*.

72 Urban Hiärne, *Een kort Berättelse Om det Konungl:ca Laboratorij* (Stockholm, 1685).

73 Lindroth, *SBL*, 146. Hjalmar Fors concurs with Lindroth's assessment and calls Hiärne Sweden's "perhaps finest Paracelsian." Fors, "Kemi, paracelsism, och mekanisk filosofi," 169.

74 Urban Hiärne, *Defensionis Paracelsicæ Prodromus* (Stockholm, 1709), 3. See, for example, Lawrence M. Principe, *The Secrets of Alchemy* (Chicago, 2013).

75 He added that Paracelsus, along with Pythagoras and Plato, was the greatest philosopher ever. Hiärne, *Defensionis Paracelsicæ Prodromus*, 2, 10.

76 Lindroth, *Svensk lärdomshistoria*, 522.

77 Hiärne quoted in Lindroth, "Urban Hiärne och Laboratorium Chymicum," 51.

In addition to studying the invisible composition of matter, it was also necessary to excavate the treasures hidden in nature. “Here in the Nordic realm,” Hiärne wrote, “underneath and mixed in with the bedrock, nature has hidden many wonderful objects and remarkable things.”<sup>78</sup> Centuries of ignorance had left these gifts untouched. But now, learned men were discovering things “in front of their eyes and under their feet that before had to be imported with great difficulty from foreign lands.”<sup>79</sup> He highlighted rocks, such as marble, jasper, crystals, pearls, topaz, agate, porphyry, touchstone, and magnets, but also mentioned that Sweden was full of “wonderful vegetables, animals, minerals, and mineral waters.”<sup>80</sup> In addition to sending out students to collect information, Hiärne launched an initiative to create an inventory of Sweden’s natural resources. This was a common endeavor in countries influenced by the Pan-European improvement discourse. While the initial plan called for three questionnaires—one for minerals, one for animals, and one for plants—only the first materialized. He sent it to bishops and priests, as well as governors and mayors throughout Sweden, Finland, Estland, Letland, and Ingermanland, and instructed them to reach out to locals in their communities. He assured everyone who participated in the survey that the king would be most grateful for their service and that they would bring honor and esteem to the kingdom.<sup>81</sup> He asked, “Who would not want to bring such honor to his name and be the one who discovers the gifts God hid in the earth for the benefit of mankind?”<sup>82</sup>

Active during the zenith of the Age of Greatness, Hiärne’s optimistic vision for Sweden shaped the way he and others understood the intersection between natural philosophy, spirituality, and political economy. Intent on uncovering nature’s secrets, Hiärne was constantly looking for ways to enhance the understanding and utility of nature. His chemical laboratory served as an inspiration for Christopher Polhem’s mechanical laboratory, and his efforts to create an inventory of nature paved the way for Linnaeus’s more famous surveys some fifty years later. In offering insights into how nature could be transformed in ways that would augment the economic affluence of the nation, Hiärne’s projects and writings made critical contributions to the Swedish political economy of improvement.

While Hiärne did not spend much time investigating the world of commerce, Christopher Polhem (1661–1751) wrote voluminously on both natural knowledge and political economy. Famous throughout Europe for his mechanical and engineering expertise,

78 Urban Hiärne, *Een kort Anledning till åtskillige Malm och Bergarters/Mineraliers Wäxters/ och Jordeslags/ samt flere sällsamme Tings effterspöriande och angifwande* (Stockholm, 1694), 1.

79 Hiärne, *Een kort Anledning till åtskillige Malm och Bergarters/Mineraliers Wäxters/ och Jordeslags/ samt flere sällsamme Tings effterspöriande och angifwande*, 1.

80 Hiärne, *Een kort Anledning till åtskillige Malm och Bergarters/Mineraliers Wäxters/ och Jordeslags/ samt flere sällsamme Tings effterspöriande och angifwande*, 1.

81 Hiärne, *Een kort Anledning till åtskillige Malm och Bergarters/Mineraliers Wäxters/ och Jordeslags/ samt flere sällsamme Tings effterspöriande och angifwande*, 3.

82 Hiärne, *Een kort Anledning till åtskillige Malm och Bergarters/Mineraliers Wäxters/ och Jordeslags/ samt flere sällsamme Tings effterspöriande och angifwand*, 23; Björn Sundquist, “Urban Hiärnes geologiska frågesamling,” in Ohlsson and Tomingas-Joandi, *Den otidsenlige Urban Hiärne*.



earning him the sobriquet of Sweden's Leonardo, as well as the Archimedes or Daedalus of the North, Polhem made important contributions to the areas of engineering, physics, chemistry, mathematics, geology, education, linguistics, philosophy, and political economy. By exploring the intersection between natural philosophy and political economy, Polhem offered a practical program for Sweden to escape the clutches of agricultural backwardness and embark on a trajectory of industrialization.<sup>83</sup> Similar to his predecessors, Polhem insisted that the key was to study, explore, and experiment with nature, to discern how nature's powers could be harnessed for human betterment.

To explain the interconnections between natural philosophy and political economy at the center of the improvement discourse, Polhem employed the metaphor of the human body. He wrote, "A kingdom without *oeconomy*, *commerce*, and *manufacturing* is like a person without body, feet, and hands; and, these without *mechanics*, *physics*, and *mathematics* are like a person without life, memory, and understanding."<sup>84</sup> Good *oeconomy*, Polhem explained, meant that the nation maintained a proper balance between its imports and exports. The key was to make sure that the nation made use of its own natural resources and produced as much as possible of its own needs. Extracting and refining the nation's natural resources at home yielded a long list of benefits to society, he argued. In addition to providing goods to consumers, profits to the entrepreneurs, and wages to the workers, as the commodities passed through the value-added chain, they generated wealth for a number of other constituencies, including those involved in transportation, insurance, retail and sales, and the customhouse.<sup>85</sup> A thriving commerce meant that the nation conducted its trade in places around the world where the terms of trade were favorable and ensured that the nation's carrying trade was conducted in domestic ships.<sup>86</sup>

Polhem, not unlike Risingh, was fiercely opposed to monopolies, suggesting that they were to the nation what "gangrene is to a person."<sup>87</sup> Monopolies constituted a violation of the very liberty on which a commercial society was based. For knowledge to be systematically applied for utilitarian purposes, farmers, craftspeople, manufacturers,

83 Georg Schauman, *Studier i Frihetstidens nationalekonomiska litteratur: Idéer och strömningar 1718–40 in Bidrag till kännedom af Finlands Natur och Folk Vol. 73* (Helsinki, 1912), 11. Polhem left behind an expansive number of tracts on political economic issues, a selection of which has been published in Gösta Lindeberg, *Christopher Polhems efterlämnade skrifter II: Nationalekonomiska och politiska skrifter* (Uppsala, 1951).

84 Christopher Polhem, *Twenne betänkande/Det förra angående Oeconomien och Commercen uti Sverige* (Stockholm, 1721), 32. Emphasis added.

85 Polhem, *Twenne betänkande/Det förra angående Oeconomien och Commercen uti Sverige*, 25–26.

86 Trade is most beneficial when it involves the exportation of goods to places where people are willing to pay high prices and where merchants, in turn, are able to purchase at a favorable price commodities that are in high demand back home. Trade is not so beneficial when commodities are brought to neighboring countries where prices are low and from where merchants can bring back only expensive manufactured goods that could have been produced at home. Polhem, *Twenne betänkande/Det förra angående Oeconomien och Commercen uti Sverige*, 34–35.

87 Christopher Polhem, *Tankar, huru Inrijkes Monopolier kunna afskaffas utan någons skada och Prejudice* (Stockholm, 1726), 13. Lars Magnusson has explored Polhem's discussion of monopolies in "Mercantilism and 'Reform' Mercantilism: The Rise of Economic Discourse in Sweden during the Eighteenth Century," *History of Political Economy* 19, no. 3 (1987): 415–33, and "Economic Thought and Group Interests: Adam Smith, Christopher Polhem, Lars Salvius, and Classical Political Economy," *Scandinavian Journal of History* 2 (1977): 243–64.

and merchants had to enjoy the liberty to engage in whatever enterprise they judged worthy of their time, capital, and energy. Nothing would injure a kingdom more than having a small number of rich people live off a trade that otherwise could have employed and enriched thousands.<sup>88</sup> Monopolies also contributed to an unfavorable balance of trade. Because monopolies skewed the distribution of wealth, they triggered an importation of goods to please the vanity and greed of the wealthy, in particular their fashion-conscious wives and daughters.<sup>89</sup> Money was thus spent in a way that benefited foreign nations, companies, and workers at the expense of domestic interests.

The other main obstacle to Sweden's commerce, according to Polhem, was the domination exercised by foreign merchants. They purchased large amounts of cheap Swedish metals and then transported it all to their home countries—where it was manufactured into finished articles—only to sell it back to Sweden at a premium. The only employment opportunities and value-adding activities in Sweden were thus in the mining industry. Sweden's willingness to engage in such unfavorable trade led foreigners to "consider us Swedes morons [*dumbufvuden*] of the worst kind."<sup>90</sup> Polhem noted that "as long as Sweden was still in its barbarous phase, it was not surprising that cultivated nations profited at the expense of Sweden."<sup>91</sup> But now that Sweden was emerging from its infancy, it was time for Swedish merchants to liberate themselves from foreign domination.<sup>92</sup> Charles XII could not agree more with Polhem's reasoning and appointed him to the Board of Commerce.

While a thriving commerce was no doubt necessary, Polhem insisted that it was knowledge of mechanics and metals that constituted the essence of prosperity.<sup>93</sup> Polhem illustrated his point by comparing Spain and the Dutch Republic. While Spain had plenty of trade in raw materials, it was barely richer than Sweden because it had no manufacturing base. The Dutch, on the other hand, possessed very little raw materials but had created such a favorable symbiosis between commerce and manufacturing that they had become the richest nation of Europe. "Commerce without Manufacturers," Polhem summed up, paraphrasing Johann Becher, "is no Commerce, but only a privileged defeat."<sup>94</sup>

Crucial to the development of a successful manufacturing industry was a culture of scientific advancement. For Polhem, drawing on his Cartesian education at Uppsala, nature was inherently mechanical and could best be explained in the language of

88 Polhem, *Tankar, huru Inrijkes Monopolier kunna afskaffas utan någons skada och Prejudice*, 15

89 Polhem, *Tankar, huru Inrijkes Monopolier kunna afskaffas utan någons skada och Prejudice*, 16.

90 Polhem quoted in S. E. Bring, "Bidrag till Christopher Polhem's lefnadsteckning," in *Christopher Polhem: Minnesskrift* (Stockholm, 1911), 1–119, here 102.

91 Polhem, *Tvenne betänkande/Det förra angående Oeconomien och Commercen uti Sverige*, 32.

92 The unfavorable terms of trade meant that foreign powers were able to "give laws," thus curtailing Sweden's liberties. See Reinert, *Translating Empire*.

93 Erik S. Reinert argues that Botero's vision of manufacturing-led economic growth may have implicitly informed Polhem's thinking. Erik S. Reinert, "Giovanni Botero (1588) and Antonio Serra (1613): Italy and the Birth of Development Economics," in *Handbook of Alternative Theories of Economic Development*, ed. Erik S. Reinert, Jayati Ghosh, and Rainer Kattel (Cheltenham, UK, 2016), 3–41, here 16.

94 *Tvenne betänkande/Det förra angående Oeconomien och Commercen uti Sverige*, 26.

mathematics, physics, and mechanics.<sup>95</sup> All matter was composed of small round particles, the shape, position, weight, and movement of which determined the form of a body. The shape of the particles must be round, as this was the shape most conducive to movement, both in the celestial sphere and in the vacuum surrounding matter in the microcosm.<sup>96</sup> Even something as *immaterial* as thoughts and dreams could be explained by these particles. In the same way that sound could penetrate a wall and light could shine through the hardest diamond, nothing could prevent the free movement of thought particles.<sup>97</sup> For example, he explained sympathy between people by referring to thought particles moving through space. This meant that good friends, parents, and children could sense each other's pain and joy, even over vast distances. Hence, even though Polhem is often regarded as a strict adherent of Cartesian materialism, his inquiries reached farther than just the physical universe—or, phrased differently, Polhem believed that everything was material, even that which others considered immaterial. To him, a materialistic understanding of nature made nature intelligible and thus provided humanity with methods to harness nature's powers, opening up new horizons for improvement.<sup>98</sup>

Advancements in natural knowledge were essential, and so were their thorough dissemination through education. Polhem petitioned the Board of Mines to establish a mechanical laboratory, which would include a mechanical academy for gifted students, a laboratory for scientific experiments, and a permanent exhibit featuring prominent inventions.<sup>99</sup> He also insisted that the government establish trade schools in which young men could acquire, free of charge, the skills necessary to set up their own manufacturing businesses. For such initiatives to bear fruit, students needed to be provided with enough time to explore both “theory and praxis.”<sup>100</sup> Even more time was required for theory and praxis to yield “inventions.” Polhem thus instructed students to spend less time on “Latin and other scholastic learning” and instead explore “more useful” knowledge.<sup>101</sup> This echoed the sentiments of improvers from Kempe to Linnaeus, who

95 By the time Polhem arrived at Uppsala, he had already developed a deep understanding of mechanical forces and machines. He put this knowledge to use in repairing the intricately designed astronomical clock at Uppsala Cathedral, which had been out of order for decades. This extremely complicated machine required mechanical, mathematical, and astronomical expertise to comprehend, much less repair. Rudbeck, who had by now obtained legendary status at the university, was so impressed with Polhem's technological and mathematical proficiency that he arranged for Polhem to enroll at the university to further his education in natural philosophy. Michael H. Lindgren, *Christopher Polhems testamente: Berättelsen om ingenjören, entreprenören och pedagogen som ville förändra Sverige* (Stockholm, 2011), 25–45. For a discussion of Polhem's mechanical philosophy, see Dunér, *Tankemaskinen*.

96 David Dunér, “Polhems huvudvärk,” *Sjuttonhundratals* 2 (2005): 8–10.

97 Bring, “Bidrag till Christopher Polhem's lefnadsteckning,” 67.

98 Polhem's assistant during the years 1716–18, Emanuel Swedenborg, who would later go on to found a new spiritual movement, did not appreciate how Polhem conflated the material and immaterial. He accused Polhem of erasing the distinction between the material and immaterial worlds, thus denying the existence of the spiritual realm. Polhem remained unfazed by this criticism. David Dunér, *The Natural Philosophy of Emanuel Swedenborg: A Study in the Conceptual Metaphors of the Mechanistic World-View* (New York, 2012).

99 Lindgren, *Christopher Polhems testamente*, 91.

100 Polhem, *Tvenne betänkande/Det förra angående Oeconomien och Commercen uti Sverige*, 36.

101 Polhem, *Tvenne betänkande/Det förra angående Oeconomien och Commercen uti Sverige*, 36. Perhaps the most ambitious educational effort was undertaken by Sweden's first professor of *oeconomie*, Anders Berch

insisted that students put book learning aside and instead go out in nature and read God's own language. For them, woods, not books, were the best source of learning. Contrary to the humanist jurisprudential tradition, which often explicitly drew on the classical canon, the improvement discourse was much less concerned with establishing an air of antique respectability through the display of classical learning.

Natural-knowledge-centered political economy required a culture of invention, an educational system that could disseminate new knowledge, and a government willing to support the promotion of modern agriculture, mining, and manufacturing. To Polhem, the latter was particularly important as it was impossible to "turn a child into a man in one year."<sup>102</sup> Although infant-industry protection would prevent domestic consumers from enjoying the cheapest and best goods for some time, Polhem urged Swedes to endure the inconvenience until domestic production caught up with the foreign competition. It was better, he insisted, to suffer for a short while, than to suffer forever.<sup>103</sup>

Once the population reached a certain level of education and commerce was sufficiently liberated, Polhem believed that people would start establishing their own manufacturing enterprises—as he himself had done in Stjärnsund, mass-producing everyday household items. As new manufacturers were established, existing monopolies would soon evaporate. Moreover, by encouraging domestic manufacturers to produce commodities previously imported from abroad, the nation would see the power of foreign merchants gradually fade away. As part of the infant-industry/import-substitution policy, Polhem suggested that foreign merchants should no longer be allowed to buy Swedish raw materials—iron, steel, copper, and brass—as cheaply as before. The solution was to create a company—or association—through which all foreign trade was conducted. This would not be a monopoly in the traditional sense but rather an association in which any Swedish merchant had the right to join. By guaranteeing advantageous terms of trade, the association would promote domestic manufacturing, which would eventually allow Swedish producers to develop enough experience to put their own resources to proper use and thus undersell the foreign competition.<sup>104</sup>

Polhem's life spanned a decade short of a century, during which he experienced both the peak of Sweden's imperial powers and its rapid disintegration after the defeat in

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(1711–74), who established *Theatrum Oeconomicum* at Uppsala University in 1754. Convinced that useful knowledge could not be taught by words alone, or even by illustrations, Berch spent years assembling a vast collection of materials, commodities, and mechanical devices to be used in his teaching. By staging the life cycle of commodities, Berch's students became spectators in a performance of knowledge, much like the medical students lining the bleachers of the recently built surgical theater at Uppsala University. See Sven-Eric Liedman, *Den synliga banden: Anders Berch och ekonomiännena vid 1700-talets svenska universitet* (Stockholm, 1986), and Carl Wennerlind, "Theatrum Oeconomicum: Anders Berch and the Dramatization of the Swedish Improvement Discourse," in *New Perspectives on the History of Political Economy*, ed. Robert Fredona and Sophus A. Reinert (Basingstoke, 2017), 103–30.

102 Lindeberg, *Christopher Polhems efterlämnade skrifter II*, 45.

103 Lindeberg, *Christopher Polhems efterlämnade skrifter II*, 32.

104 Christopher Polhem, "En discours emellan oeconomien och commercien uti Sverige af assessoren H. Chr. Pollheimer författat uti 7bris oc Octobris Månader Åhr 1716," in Lindeberg, *Christopher Polhems efterlämnade skrifter II*, 45–53.

the Great Northern War (1700–1721). The loss of empire profoundly shaped his worldview; indeed, many of his later economic writings were dedicated to restoring Sweden’s fading greatness.<sup>105</sup> Eventually, however, he abandoned hope that Sweden would reemerge as a powerful player in world politics and international trade. He suggested in an address to the Royal Swedish Academy of Sciences in 1745 that Sweden should look inward and focus on its own resources, people, and knowledge, as well as its own culture, traditions, and customs. He emphasized what he regarded to be quintessentially Swedish traits, such as industriousness, diligence, and thrift, and decried toxic foreign vices, like vanity, greed, and pride. He reiterated that manufacturing had to be at the center of economic growth. Even though he acknowledged that agriculture was the most important sector, he argued that its capacity for productivity improvements was rather limited and therefore could not be the basis of sustainable economic growth. The mining industry, the most important export sector in Sweden, also suffered from limitations on its capacity for growth. Mines were “uncertain gifts of good fortune,” he wrote. Because there was only so much ore in the mountain and only so much surrounding forest to fuel the smelting process, there was only so much room for expansion.<sup>106</sup> The only viable option for Sweden was therefore to develop and spread new mechanical knowledge and put its own superior resources to productive use in its own manufacturing facilities. Sweden thus possessed, Polhem argued, “the master key to its own affluence.”<sup>107</sup>

Like Risingh, Polhem envisioned a knowledge-based economic liberalism. For the improvement process to properly take hold, people had to be freed from monopolies and liberated from the power of foreign merchants, as well as unencumbered by an invasive government. Polhem’s writings suggest that there was a significant continuity in the Swedish discourse on political economy between the Age of Greatness (1632–1721) and the Age of Liberty (1721–72). A deep understanding of nature and a commitment to commercial liberty remained central to the discourse in both eras. Similar to the Hartlib Circle, the Swedish improvement writers were quite protean in their perspective, promoting the pursuit of any scientific advancement that had the power to turn nature into wealth, whether in agriculture, mining, or manufacturing.<sup>108</sup>

Frustration with the power of foreign merchants controlling Sweden’s overseas trade also carried over from one era to the next, with one crucial difference. Earlier Swedish

105 Georg Schauman suggests that Polhem’s turn toward political economy was motivated by the desperate conditions that prevailed in Sweden after the nation had been impoverished by decades of military expansionism. Schauman, “Studier i Frihetstidens nationalekonomiska litteratur,” 9.

106 Christopher Polhem, *Tal öfver den vigtiga frågan: Hvad som vårt kära fädernesland hafver nu mäst af nöden til sin ständiga förkofring i längden?* (Stockholm, 1745), 11.

107 Polhem, *Tal öfver den vigtiga frågan*, 18.

108 Compare, for example, with the French agronomists or physiocrats, who trained their focus solely on agriculture. See, for example, John Shovlin, *The Political Economy of Virtue: Luxury, Patriotism, and the Origins of the French Revolution* (Ithaca, NY, 2006). While the physiocrats would eventually have some influence on the Northern Enlightenment, Sophus A. Reinert has shown that the influence of the physiocrats was rather limited. Sophus A. Reinert, “Northern Lights: Political Economy and the *Terroir* of the Norwegian Enlightenment,” *Journal of Modern History* 92, no. 1 (2020): 76–115.

improvement writers were supremely confident that Sweden could gain command over the Baltic trade and use it as the foundation for its continued imperial expansion. After the Age of Greatness came to an end, however, the emphasis shifted toward freeing the nation from its dependency on foreigners by making the nation economically self-sufficient. Polhem embraced the ideal of autarky as he aged, yet he was never quite as discouraged as Linnaeus, who advocated that Sweden ought to distance itself from both the global economy and international politics, setting its sights on national independence. The idea of improvement thus remained largely the same with regard to the importance of natural knowledge and free economic enterprise, but it changed markedly in terms of the nation's ties to the surrounding world.

Sweden's most influential improvement writer, Carl Linnaeus (1707–78), had a profound impact on Enlightenment thinking and modernization projects throughout Europe and the world.<sup>109</sup> Linnaeus developed his classification system and botanical transmutation project as part of an interest in uncovering nature's most well-guarded secrets and promoting Sweden's enrichment and independence.<sup>110</sup> He followed in Hiärne's footsteps in ambitiously documenting nature's three kingdoms: plants, animals, and minerals. As part of this initiative, he traveled widely throughout Sweden.<sup>111</sup> His most formative journey was to Sápmi in 1732, where he was struck by the abundance of natural resources and inspired by the way the Indigenous population lived.<sup>112</sup> Like many of his contemporary Swedish explorers, he saw Sápmi as a “new frontier” and “a new world on the threshold of old Europe.”<sup>113</sup> As a believer in the physicotheological principle that nature's kingdom was created for the benefit of humankind, he thought it was their duty to investigate all of nature. “Yes everything,” he insisted, “whereby humans are nourished, clothed, and adorned, supplied and ... yes everything, that falls under the category of clothes, luxury, wealth, amusements and necessities, have their beginnings and origins in nature's kingdom.”<sup>114</sup> Sea, land, air, and forests thus served as an “infinite larder,” a cornucopia available to humanity to make life on earth not only tolerable but enjoyable and beautiful.<sup>115</sup>

109 Drayton, *Nature's Government*; Fredrik 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 (2015): 99–126, here 103.

110 While Sten Lindroth highlights Linnaeus's blending of science and spirituality, Lisbet Koerner adds an economic and geopolitical dimension to our understanding of Linnaeus's projects. Sten Lindroth, *Svensk lärdoms historia: Frihetstiden* (Stockholm, 1978), 147; Lisbet Koerner, *Linnaeus: Nature and Nation* (Cambridge, 2001).

111 Hanna Hodacs and Kenneth Nyberg, eds., *Naturalhistoria på resande fot: Om att forska, undervisa och göra karriär i 1700-talets Sverige* (Lund, 2007).

112 Eli Heckscher, “Linnes resor—den ekonomiska bakgrunden,” *Svenska Linnésällskapets årsskrift*, 1942.

113 Magdalena Naum, “Between Utopia and Dystopia: Colonial Ambivalence and Early Modern Perception of Sápmi,” *Itinerario* 40, no. 3 (2016): 489–521, here 489–90.

114 Carl Linnaeus, *En fråga, som alltid föreställes de naturkunniga, då det heter: Hwartil duger det? Cui bono?* (Stockholm, 1753), 3.

115 Quoted in Koerner, *Linnaeus*, 92. For a broader discussion about cornucopianism, see Fredrik Albritton Jonsson and Carl Wennerlind, *Scarcity: A History from the Origins of Capitalism to the Climate Crisis* (Cambridge, 2023).

Similar to his predecessors, Linnaeus insisted that practical scientific breakthroughs relied on a systematic quest to uncover the inner secrets of nature. He divided knowledge of nature into two categories: physics and natural science. The former was the study of elements, or simple matter, and the latter was the study of natural bodies, or compound matter. Natural bodies fit in the kingdom of minerals, plants, or animals, and thus natural science fell into three categories: mineralogy, botany, and zoology.<sup>116</sup> An active pursuit of knowledge of both elements *and* natural bodies was therefore required. The branch of science that synthesized all of this, “that teaches us to use natural bodies through the elements for our subsistence, is called *oeconomie*.”<sup>117</sup> To be more exact, he claimed, “no science in the world is more noble, more necessary and useful than *Oeconomie*, since all people’s material well-being is based on it. Hence, this science should be pursued and practiced with the greatest diligence; which means, in effect, that without physics and natural science no *oeconomie* can survive.”<sup>118</sup>

He published these ideas about the interdependence between nature and economy, natural philosophy and political economy, in 1740 in the inaugural volume of the journal of the Royal Swedish Academy of Sciences. The academy, of which Linnaeus was a founding member, was committed from the very start to the development and implementation of Swedish improvement ideas. Initially, the founders wanted to signal its purpose by naming the academy the Economic Society of Science—a telling testament to the centrality of the improvement discourse in Sweden.<sup>119</sup>

Linnaeus lamented the fact that many people did not recognize the utility of his efforts of peering into the inner life of matter. He reported in *A Question (En Fråga)* (1753) that some people insisted that his pursuit was a “mere curiosity, which like a waste of time amuses the lazy and profligate.”<sup>120</sup> He complained that people outside major cities and universities had no foresight or imagination and therefore cared only about things that could be consumed immediately.<sup>121</sup> Linnaeus insultingly referred to these people as “pund-hufwuden,” suffering from “stunted intellects.”<sup>122</sup> Believing

116 Carl Linnaeus, *Doctor Linnaei Tankar om Grunden til Oeconomie genom Naturkunnogbeten och Physiquen* (Stockholm, 1740), 411.

117 Linnaeus, *Doctor Linnaei Tankar om Grunden til Oeconomie genom Naturkunnogbeten och Physiquen*, 412.

118 Linnaeus, *Doctor Linnaei Tankar om Grunden til Oeconomie genom Naturkunnogbeten och Physiquen*, 412. One of Linnaeus’s most prominent disciples, Pehr Kalm, wrote on his way to America in a letter to Linnaeus that “this I know, that Natural History is the foundation to all *Oeconomie*, Commerce, Manufacturer ... because to aspire to make advances in the field of *Oeconomie* without a mature grasp of Natural History, is similar to an attempt to serve as dance teacher with only one leg.” Pehr Kalm quoted in Widmalm and Sörlin, “Naturvetenskap som ekonomi,” 297. Widmalm and Sörlin describe how “theology, economics, and natural science were overlapping fields, and knowledge of nature was often perceived as directly beneficial to the understanding of the divine.” Widmalm and Sörlin, “Naturvetenskap som ekonomi,” 294.

119 Revealing of its purpose, the title selected for the journal was *The Academy of Sciences in Stockholm’s Acts, containing new remarks, inventions, discoveries, and experiments, which will serve the growth and development of useful Sciences, Economy, Trade, Manufactures, and several publicly necessary Arts and Artisanal trades*. Koerner, *Linnaeus*, 106.

120 Linnaeus, *En fråga, som alltid föreställes de naturkunniga, då det heter*, 4.

121 Linnaeus, *En fråga, som alltid föreställes de naturkunniga, då det heter*, 5.

122 Linnaeus, *En fråga, som alltid föreställes de naturkunniga, då det heter*, 4–5.

that God made everything for a reason and everything in nature was a gift from God to humanity, failing to investigate *all* natural bodies for their potential to contribute to the improvement of humanity therefore constituted a violation of God's will.<sup>123</sup> Instead of fixating exclusively on larger animals, trees and herbs, and rocks and metals, people should pay attention to even the smallest bodies, like "crickets and shells, grass and moss, earth particles and pebbles."<sup>124</sup> In addition to creating "you and me, [God] has created on earth a wonderful oeconomie, comprised of an infinitude of bodies, all of which are rather essential, and share certain commonalities, so that everything hangs together like a chain."<sup>125</sup>

Linnaeus was influenced by the Rudbeckian notion that Sweden was blessed by God with exceptional natural abundance and an ideal climate, and just like the other Paracelsian-inspired Swedish reformers, he suggested that every region had ample resources to "feed and satisfy" its population.<sup>126</sup> Had this not been the case, everyone would have migrated to the same region and created an unsustainable imbalance between nature and humanity. Each region had its own advantages, but also its own drawbacks, so on the whole a certain balance was upheld. For example, he acknowledged that some people found that the Swedish "winter is difficult and unkind in that all herbs are hidden and many animals flee from us, while Southerners possess a consistent summer with delightful animals all year long."<sup>127</sup> Yet, he added, because of the steady oscillation between hot and cold, "summers are more pleasant whence it arrives."<sup>128</sup> To emphasize his point, he suggested that the heat in southern Europe had been known to kill many people, while one only rarely "hears of anyone dying from the cold among us."<sup>129</sup> In a famous segment from *Oeconomia Naturae*, he further described the balance of advantages around the globe. He began by comparing the flora in the south to that of the north: "If they have been given more green things, than us, such as Figs, Lemons, Pomegranates, Oranges, &c. then we on the other hand have other things that they do not know about, like Arctic Bramble, Cloudberry, strawberries, Raspberries &c." Next, he compared the northern fauna to that which could be found in the southern parts of the globe: "It is the same way with the animals. If one region is provided with goldfish, then the other has been given Herring and Salmon. If one has sparkling Peacocks or beautiful Turkeys, then the other has Capercaillie, Black Grouse, Hazel Grouse &c; in case we did not receive as many useful Animals as the Southerners, we also were not given that many dangerous snakes, Lions, Tigers, Crocodiles &c."<sup>130</sup>

123 Linnaeus, *En fråga, som alltid föreställes de naturkunniga, då det heter*, 5.

124 Linnaeus, *En fråga, som alltid föreställes de naturkunniga, då det heter*, 10.

125 Linnaeus, *En fråga, som alltid föreställes de naturkunniga, då det heter*, 30–31.

126 Alix Cooper, *Inventing the Indigenous: Local Knowledge and Natural History in Early Modern Europe* (Cambridge, 2007).

127 Carl Linnaeus, *Oeconomia Naturae* (Stockholm, 1750), 18.

128 Writing around the same time, Johan Fredrik Kryger praised the Swedish summers, suggesting that "had Virgil been here in Sweden, his poetical songs would have been even more delightful." Quoted in Frängsmyr, "Den gudomliga ekonomin," 232.

129 Linnaeus, *Oeconomia Naturae*, 18.

130 Linnaeus, *Oeconomia Naturae*, 18–19.



Along with his appreciation of Sweden's flora and fauna, he spoke in glowing terms about the Sami. He viewed them as the closest living relatives to the Goths, the idealized population of Scandinavia and thus the repository of ancient purity and simplicity. He argued that their diet contained everything appropriate to nourish and strengthen the Scandinavian population. Free from destructive substances, such as "inflaming alcoholic beverages," tobacco, tea, coffee, and sugar, the Sami lived in perfect health, eating bread baked from the bark of native trees, pine needles, moss, dried fish, roots, seaweed, and straw.<sup>131</sup> He added, "When I saw the healthy Lapp in Lapland, I discovered some principles through which man could double his age, without illness, according to natural principles."<sup>132</sup> Sweden should thus try to reverse the effects that foreign cultural influences had had on the way people lived. Embracing a cultural xenophobia similar to that of Polhem, Linnaeus expressed disgust with the "Swedish monkey," copying destructive habits of people from across the world. The average Swede, he complained, now "eats like an Englishman, drinks like a German, dresses like a Frenchman, builds like an Italian, smokes like a Dutchman, takes snuff like a Spaniard, and guzzles vodka like a Russian."<sup>133</sup> Swedes should live like Swedes, the only surviving example of which were the Sami.

Yet as much as Linnaeus praised the Sami as Sweden's "noble savages," he nevertheless classified them as *Homo monstrosus* and referred to them as Alpine dwarves.<sup>134</sup> Linnaeus's hierarchical classification of distinct racial categories laid the foundation for scientific racism. He believed that it was possible, within certain boundaries, to refine and improve the Sami people. To that effect, he supported the efforts of Gabriel Gyllengrip, governor of the county just south of Sápmi, to transform the northern parts of Sweden into a source of abundant wealth. The fishing, mining, and timber industries were viewed as particularly promising, but so were efforts to start large-scale cultivation of crops imported from abroad. Along with these plans for exploration, excavation, and experimentation came efforts to discipline the local population and turn them into tractable workers, as well as plans to encourage immigration.<sup>135</sup> Contemporaries complained that the Sami resisted progress and that their stubborn insistence on retaining their independence trumped any inclination toward bettering their own condition. Linnaeus's improvement program thus aligned with the pursuit of settler colonialism and the racism that underpinned it.

In Linnaeus's opinion, Sweden possessed everything it needed for its population to live comfortably and happily. Therefore, it should reduce its importation of foreign goods, many of which were incompatible with the physiological and psychological constitution of Scandinavians. He insisted that in its misguided effort to become a

131 Koerner, *Linnaeus*, 68.

132 Linnaeus quoted in Koerner, *Linnaeus*, 75.

133 Linnaeus quoted in Lisbet Rausing, "Underwriting the Oeconomy: Linnaeus on Nature and Mind," in *Oeconomies in the Age of Newton* (supplement to vol. 35 of *History of Political Economy*), ed. Margaret Schabas and Neil De Marchi (Durham, NC, 2003), 173–203, here 178.

134 Naum, "Between Utopia and Dystopia," 497.

135 Gunnar Broberg, *Mannen som ordnade naturen: En biografi över Carl von Linné* (Stockholm, 2019), 296–302.

global power, Sweden had become politically and economically dependent on foreign nations. For him, the time was now ripe for putting an end to this subservience by promoting Swedish autarky—to follow in the footsteps of Japan, a nation he admired for successfully guarding its independence by refusing to trade with the surrounding world.<sup>136</sup>

As historian Lisbet Koerner argues, Linnaeus’s botanical projects must be understood in light of Sweden’s loss of geopolitical prominence. Much like Polhem, who wanted to develop mechanical knowledge in Sweden so that foreign commodities could be manufactured domestically, Linnaeus launched a major effort to learn about foreign plants with an eye toward transplanting them into the Swedish flora.<sup>137</sup> If this could be achieved on a broad scale, Swedes could enjoy all kinds of foreign plants, herbs, fruits, and vegetables, without having to suffer the consequences of global trade and foreign domination. Swedes would thus enjoy a thriving knowledge-based society while maintaining its independence.<sup>138</sup>

Linnaeus believed that knowledge could unlock nature’s treasures and enable people to harness the power inherent in nature. He suggested that the “most savage wilderness, where hardly a sparrow can feed itself, can through good economics become the most wonderful land.”<sup>139</sup> Linnaeus combined Hiärne’s project of documenting the nation’s natural resources with Polhem’s project of reducing dependence on foreigners by engaging in an ambitious import-substitution process based on botanical rather than mechanical knowledge. Contrary to historian Staffan Müller-Wille’s claim that Linnaeus’s natural history did not map onto any particular political economy, there is evidence that his ambitious ideas on how to transform nature for the benefit of humanity were strongly grounded in the by now well-established Swedish improvement discourse.<sup>140</sup> He genuinely believed it was possible for Sweden to become wealthy, healthy, moral, and pacific, all at the same time.

The Linnaean version of the Swedish improvement discourse rapidly spread across the globe. Part of this knowledge transfer occurred as Linnaeus’s apostles fanned out across the world in search of specimens that could be brought back and acclimatized to the Swedish climate. Linnaeus’s system also circulated through his many publications, reaching and influencing a wide array of people, including Thomas Jefferson, Joseph Banks, Jean-Jacques Rousseau, Alexander von Humboldt, and Johann Wolfgang von Goethe.

136 Koerner, *Linnaeus*, 98–99.

137 Koerner, *Linnaeus*, 121. Linnaeus was not the first person to launch processes of acclimatization and domestication; it had been ongoing since the early sixteenth century in what Daniel J. Kevles calls the Great Exchange. “Eden and Empire: The Mercantile Making of American Colonial Husbandry,” *Yale Review* 99, no. 1 (2011): 104–26.

138 Linnaeus, *En fråga, som alltid föreställes de naturkunniga, då det beter*, 21. By studying foreign plants, botanists had discovered that saffron, rhubarb, tobacco, potatoes, and tea could thrive outside their original habitats. In a passage highlighted by Sven Widmalm and Sverker Sörlin, Linnaeus suggested that saffron plantations in Lapland could become profitable and employ “young children, crippled, and paraplegic.” Widmalm and Sörlin, “Naturvetenskap som ekonomi,” 294.

139 Linnaeus quoted in Koerner, *Linnaeus*, 102.

140 Staffan Müller-Wille, “Nature as a Marketplace: The Political Economy of Linnaean Botany,” in Schabas and De Marchi, *Oeconomics in the Age of Newton*, 154–72.

The Swedish discourse of improvement continued to gather momentum after the formation of the Royal Swedish Academy of Sciences in 1739.<sup>141</sup> While the improvement discourse continued to have a presence in the domain of political economy for some time, increasingly it was Anders Nordenkrantz, Anders Chydenius, and Pehr Niclas Christiernin, all of whom wrote within the humanist jurisprudential tradition, who came to define Swedish political economy after the 1760s.<sup>142</sup> But the improvement discourse did not disappear or simply transition into natural sciences writ large. Instead, it seeped into the broader intellectual fabric and became a pivotal part of the modern ideology of progress in Sweden and across Europe. While the humanist jurisprudential tradition coalesced into classical economics, laying the foundation for marginalism and ultimately neoclassical economics, the improvement discourse continued to provide the social and economic framework for the human conquest of the natural world. In this way, it became an integral part of the ideologies of modernization, industrialization, and colonization.

Atlantis was never restored, but once Sweden embarked on a trajectory of self-sustaining economic growth in the 1870s, it followed the main principles of the improvement discourse. Sweden was in fact so successful at doing so that the prominent economic historian and development economist W. W. Rostow used it as an example for developing nations to emulate—connecting modernization, industrialization, and (neo)colonialism. In a 1962 essay, “Some Lessons of History for Africa,” Rostow praised Sweden for having “managed to create a rich, mature economy by exploiting to the hilt a few rich natural resources.” Sweden had excellent sources of timber, but “did not rest content with the export of timber, but moved up the chain of technological refinement,” eventually producing anything from “matches to elegant modern furniture.” Sweden also had rich iron deposits, on the basis of which the country developed a “first-class steel industry ... and a first-class engineering industry, including its pioneering effort in ball bearings.” Sweden lacked coal but instead learned “just about all there was to know about the manufacture of electric motors.” Rostow concluded that “as each kind of virtuosity was absorbed, Sweden applied what was learned in processing its raw materials” and in the process became “both technologically mature and rich.”<sup>143</sup> While Britain figured as the paradigmatic case for modernization in Rostow’s more well-known works, in this instance, Sweden served as an example for how poor but resource-rich nations could progress through the stages of economic growth.

141 Along with Polhem and Linnaeus, the mining and mechanical expert Mårten Triewald, professor of natural history Johan Browallius, manufacturer Jonas Alströmer, and surveyor and agricultural reformer Jacob Faggot further promoted the development and application of knowledge to agriculture, mining, and manufacturing. Also contributing to the spirit of the age were Carl Wilhelm Scheele and Anders Celsius, who made lasting contributions to utilitarian science. Claus Blecher Trozelius taught improvement using Berch’s textbook at Uppsala University, and Carl Adolph Agardh was appointed to the chair in “practical economy and botany” at Lund University.

142 For a discussion of how Nordenkrantz and Chydenius followed in the Pufendorf-Hume lineage, see Lars Magnusson, “Corruption and Civic Order—Natural Law and Economic Discourse in Sweden during the Age of Freedom,” *Scandinavian Economic History Review* 37, no. 2 (1989): 78–105.

143 W. W. Rostow, “Some Lessons of History for Africa,” reprinted in *Essays on a Half-Century: Ideas, Policies, and Action* (London, 1988), 72.

The key for Africa, as it had been for Sweden, was to turn nature into a laboratory for exploration, classification, experimentation, and exploitation. Only then would the process of improvement commence and the promise of “progress” materialize.

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