

## SPECIAL ISSUE

# Sustainable Gains: Dutch Investment and Bureaucratic Rationality in Eighteenth-Century Saxon Mines

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A late-eighteenth-century encounter between Dutch merchants and cameralist Saxon officials is used to argue two related points. First, the history of knowledge can help us rethink hierarchical power structures like the Saxon mining bureaucracy. Mine owners had a right to information and could not be forced to pay contributions, which meant that mining officials were solicitous in sharing knowledge, fretted about investors' favor, and took their desire for revenue into consideration. These observations directly challenge the traditional absolutist image of the Saxon mining bureaucracy. Second, the history of knowledge can help explain how certain rationalities (that is, combinations of means, ends, and values) came into being. Saxon officials sought to situate short-term income and expense in a success story that spanned decades and centuries. Informed by the concept of *Nachhalt* (sustainability), Saxon officials saw profit even in mines that lost money. This kind of sustainability thinking is best explained via the archival practices of the mining bureaucracy: officials collected information from yield sheets and local lore in order to calculate long-term outputs, to speculate about untapped deposits, and to disburse as little profit as possible. When the Dutch eventually understood this rationality, they withdrew. Saxony's early modern mining bureaucracy was dismantled by liberal reforms in 1850s, but its peculiar brand of sustainability, aiming to extract resources at almost all costs, likely survived the dawn of industrial capitalism as young engineers and administrators became versed in it at the Freiberg Mining Academy.

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In 1768, the aristocrat Heinrich von Trebra (1740–1819) traveled from the German land of Saxony to the "strange Republican people" of Holland to sell shares in a mining project.<sup>1</sup> He had just been appointed *Bergmeister* (district director) of the small town of Marienberg, whose recent mining output was paltry compared to the phenomenal yields it had enjoyed in the sixteenth century. A young and committed bureaucrat in the service of the local prince, the Elector of Saxony, he wanted "to push deeper even in places where our ancestors had already been mining deep; and thus push our mines, our silver extraction, up to a height that has never been reached."<sup>2</sup> To acquire the necessary funds, he came to Amsterdam to win over investors. His local middlemen set up legal entities called *sociëteiten* (societies) that resembled investment schemes for whalers, windmills, and plantations. In the following years, Dutch capital traveled up the slopes of the Ore Mountains, while reports and occasional profits found their way to Holland. By 1777, however, the investors had become displeased by the small yields from Saxony and divested themselves of the mines. In hindsight, Marienberg appeared to have been a fantastical scheme, of which they had seen many. Trebra, in turn, remarked sourly in his memoirs that it had been foolish to expect that a Dutch merchant would

<sup>1</sup> Trebra, *Bergmeister-Leben*, 132. All translations are mine.

<sup>2</sup> *Ibid.*, 109. The context of this statement is the introduction of a new drainage machine.

lend money “over many years, even half a century, before reaping any yields (which in some cases might be obtained only by his descendants), as it is common among Saxon shareholders.”<sup>3</sup> The Dutch had learned much about Saxon mining, for Trebra had sent them maps, reports, and even a mechanical model. But, he claimed, they never understood it.

Trebra’s experience with Dutch investors can help us rethink hierarchical power structures like the mining bureaucracy of the Elector of Saxony. Unlike their counterparts in Spain, France, and especially Britain, representatives of the Saxon prince claimed full authority to direct (and not just supervise and tax) mining activities.<sup>4</sup> This has prompted historians to argue that Saxon mining was organized along “feudal-absolutist” lines, which diminished the influence of capitalist investors and empowered state officials. This arrangement was in fact functional, they argue, as it allowed mining to continue during the economic crises of the seventeenth and eighteenth centuries.<sup>5</sup> In this article, I challenge this narrative of heroic officials and emasculated investors. I argue that the concentration of authority in the hands of Saxon bureaucrats actually empowered capitalists in a way that is overlooked by most historians: officials confronted with investors’ desires felt obliged to satisfy them. A fruitful analysis of this paradoxical interaction considers how officials shared information with (prospective) investors. In a stimulating recent polemic, Andre Wakefield has portrayed officials like Trebra as brokers that spun “a noble lie” for investors.<sup>6</sup> While the charge of duplicity is probably misplaced in Trebra’s case, Wakefield points to an interesting dynamic between cameralists mobilizing knowledge to generate profits and capitalists eager to hear about their schemes.<sup>7</sup> This article aims to unpack this dynamic by examining the epistemic practices of Saxon mining officials and a number of Dutch investors around 1770.

In the first section of this article, I uncover the deeper roots of this dynamic by analyzing the legal institutions, that is, the “rules of the game,” of Saxon mining from the fifteenth century.<sup>8</sup> To provide accountability, officials produced information by inspecting, reporting, map-making, collecting, and collating, and in doing so, they became responsive to investors’ desires. Investors had legal claims to money and information, which some of them used to pursue their own agenda through the structures of the princely mining bureaucracy. Section 2 shows that the episode of the Dutch investors follows this pattern of Saxon officials making themselves responsive to capitalist desires. This section also takes a first step towards a global history of Saxon mining by highlighting its financial entanglement with the Caribbean plantation economy: The Saxon-Dutch mining companies were modeled on investment funds for plantations, and when many investors lost money in a crisis that hit the Dutch colony of Suriname, contribution payments to Saxony also stalled.<sup>9</sup>

Section 3 shows that the companies failed not simply because a business cycle had come to an end, but rather because the Dutch investors rejected a specific rationality espoused by Saxon officials. Saxony’s mining bureaucracy was set up in response to recurring crises of hard-rock silver mining and therefore possessed conceptual and organizational resources to weather unproductive periods. Section 3 describes the peculiar rationality (that is, combinations of means, ends, and values) that allowed officials to see profit in small gains and even in losses.<sup>10</sup> This rationality was infused by ideals and practices of *Nachhalt*, or sustainability, a notion best explicated via the associated “tools of knowledge”: officials collected information from yield registers and local lore to construct time series, to calculate total output, and to speculate about untapped deposits.<sup>11</sup> Despite Trebra’s efforts to share this rationality, however, his Dutch investors judged Marienberg according to their own business ideals, and withdrew their funds.

<sup>3</sup> Ibid., 145.

<sup>4</sup> See Glied, “Minensektor,” 314–16; Flores Clair, “Colegio”; Gauché, “Formation”; Brianta, *Europa*, 52–55; Burt, “Transformations.”

<sup>5</sup> For the older tradition, see Köhler, *Keime*; Schlechte, *Staatsreform*; and Baumgärtel, *Bergbau*. For recent statements to this effect, see Fessner and Bartels, “Krise,” for example, 483.

<sup>6</sup> Wakefield, *Disordered Police State*, 48.

<sup>7</sup> Trebra distanced himself from the role of a projector in *Bergmeister-Leben*, 246–51. This boundary work was important as the most successful salaried cameralists often shared the boundless ambition of earlier itinerant projectors. See Smith, *Business*; Fors, *Limits*, chap. 3; Klein, “Chemical Expertise,” 281; Vogel, “Wirtschafts- und Sozialgeschichte,” 19 and 26.

<sup>8</sup> North, *Institutions*. In this I follow economic historians who have made important observations about how legal institutions that defined ownership and accountability also shaped information flows. See Greif, “Fundamental Problem”; and Gelderblom, *Cities*, 42–101.

<sup>9</sup> Economic historians have documented the broad outlines of how silver flowed through the early modern world, often via the Dutch Republic, but have paid less attention to the question of who funded its extraction. See Flynn, Giraldez, and Von Glahn, *Global Connections*; and De Vries and Van der Woude, *First Modern Economy*, 159–92.

<sup>10</sup> For a methodology for analyzing historical rationalities, see D’Avray, *Rationalities*.

<sup>11</sup> For “tools of knowledge,” see Becker and Clark, *Little Tools*; and Felten and von Oertzen, “Bureaucracy as Knowledge,” in this issue.

## Knowledge and Accountability

Since its inception in the fifteenth century, the Saxon mining bureaucracy thrived on shrinking margins, mopping up the management of mines in which urban merchants had lost interest.<sup>12</sup> Mining became more complicated and expensive in the second half of the sixteenth century, but local princes wanted to preserve the activity nonetheless. Income drawn from minting (seignorage) and taxation of silver yields (tithe), however small, gave these princes political independence and influence. Initially mere tax collectors, princely officials expanded their sphere of influence to managerial control over ailing mines, which many owners accepted in return for subsidies.<sup>13</sup> In other words, shrinking profits and growing bureaucracy were “two sides of the same coin.”<sup>14</sup> Mining shares were still freely tradable, but any change of ownership had to be registered with officials.

Within this structure, the rhythm of information creation and processing was tied to the organization of labor and the flow of capital. Four times a year, the performance of mines in terms of yield was publicly announced, contributions were collected, dividends paid, and tax demands issued.<sup>15</sup> And since 1710, this exchange of information and money revolved around the “pivot” of a central smelting authority (*Generalschmelzadministration*), where dues were calculated before they were collected directly from the source.<sup>16</sup> Accountability occasioned much bureaucratic writing, from the foremen’s weekly reports about how they had spent their budget, to the Central Mining Bureau’s annual report to the government in Dresden.<sup>17</sup>

These reports were, in fact, hybrid texts in the sense that they combined different types of knowledge. Recent studies have shown that mining provided a socioeconomic niche in which unusual types of knowledge thrived: technical (such as assaying), scholarly-scientific (such as chemistry), and practical (such as skills to work the rock).<sup>18</sup> Like elsewhere in Europe and America, a milestone in the reorganization of “state-related” mining knowledge was the foundation of a mining academy in Freiberg (f. 1765).<sup>19</sup> Building on a local tradition of apprenticeship-like training, this school prepared young men for civil service by teaching them metallurgical chemistry, physical geography, and geognosy (today: geology) as well as a syncretic “mining science” which codified technical experience in textbooks.<sup>20</sup>

Here, I want to draw attention to the ability of the officials to reorganize knowledge specifically through bureaucratic protocol. In mining, this included the cycle of inspecting mines, organizing notes in the office, and returning to mining sites with instructions for the workers.<sup>21</sup> By the eighteenth century, the inspection of mines was a well-developed procedure.<sup>22</sup> Before a visit, officials consulted previous reports about the allocation of labor, the quality of the rock, and the location of ores. During a visit, they tapped into the local knowledge of workers and foremen. Trebra, for example, was explicit about input from the lower stations and considered scholarship, technical expertise, and practical experience alike when he made decisions, often during or after an on-site inspection.<sup>23</sup> Officials above the level of district director would not usually go on inspections, but compiled, compared, and vetted knowledge claims made in reports from the comfort

<sup>12</sup> Jeromin, *Förderung*.

<sup>13</sup> The archives of the mining bureaucracy recorded the voices of owners only sporadically in the form of complaints or irregular correspondence. This may be why there is little work on the capitalization of Saxony’s mines. Why many owners paid contributions for mines that offered small dividends in return is a matter of debate. See Jeromin, *Förderung*, 13–19; Wellmer and Lampe, “Spekulation”; Spree, “Spekulationen.” We know somewhat more about other German regions: Bartels, *Montangewerbe*, 283–300; Markl, *Bergbau*, 86–91; Fessner, “Steinkohlenbergbau.”

<sup>14</sup> Jeromin, *Förderung*, 49.

<sup>15</sup> By the eighteenth century, the Saxon mining bureaucracy had four tiers of knowledge production and decision-making. Sworn-in managers (*Schichtmeister*) and foremen (*Steiger*) organized the everyday exploration and extraction in individual mines. At the top of the hierarchy, a council in Dresden reported to the prince (*Bergkollegium*, in 1782 merged into the *Geheimes Finanzkollegium*). Plying back and forth between the reality of the court and the reality in the mines, the Central Mining Bureau (*Oberbergamt*) in Freiberg and a number of district bureaus (*Bergämter*) made technical decisions about local and regional infrastructure. Lorenz, *Kursachsen*; Klein, “Kursachsen”; Wagenbreth and Wächtler, *Bergbau*.

<sup>16</sup> Baumgärtel, *Bergbau*, 35.

<sup>17</sup> Wähler, *Bergwerksverfassung*, 1–9.

<sup>18</sup> Klein, “Hybrid Experts”; Long, *Artisan/Practitioners*, 107–12; Felten, “Wie fest.”

<sup>19</sup> Schilling and Vogel, “State-Related Knowledge”; Baumgärtel, *Bergbüchlein*; Flores Clair, “Colegio”; Konečný, “Ausbildung”; Laboulais, *Maïson*; and Brianta, *Europa*.

<sup>20</sup> Klein, *Nützliches Wissen*; Klein, “Savant Officials,” 369–70; Felten, “Wie fest.”

<sup>21</sup> Felten, “History.”

<sup>22</sup> Freiesleben, *Handbuch*, 60–63; Trebra, *Merkwürdigkeiten*, 54–56; Beyer, *Unterricht*, preface; Beyer and Lempe, *Unterricht*, preface; BAF, 40001, no. 2797.

<sup>23</sup> Trebra, *Bergmeister-Leben*, 186.

of their office. Through bureaucratic procedure, officials extracted knowledge from workers and technical staff and used it to account to their superiors and to mine owners.

Paying attention to knowledge and accountability can help us rethink hierarchical power structures like the Saxon mining bureaucracy. Like in other regions of Central and Northern Europe, officials were very involved in the day-to-day organization of the work.<sup>24</sup> They maintained registers of shareholders in order to collect contributions, paid workers and technical staff, and, importantly, decided how much of a mine's yield was paid out as dividends or reinvested.<sup>25</sup> Investors could assert only little formal influence over how the money would be spent. An important principle in the region's mining law was that people could decide whether or not to pay contributions for mines they owned. Shareholders were asked to pay a certain contribution every quarter of the year, but they could refuse. Their refusal would be noted in a register, and eventually they risked forfeiting their share. But they could "not be forced to mine" that is, to pay for the operation of a mine.<sup>26</sup> This meant that mines could quickly run short of funds if shareholders felt that they did not merit a contribution. This in turn put pressure on the officials who needed to keep the shareholders motivated to pay up. Ensuring prompt payment became an acute problem whenever shareholders lost trust in those who managed their mines. The fact that officials were concerned about trust gave shareholders a power that was not spelled out in law.

A good example of the informal power of investors over officials is the case of a sworn-in money courier, who collected contributions and distributed dividends but, around 1777, set up a fraudulent scheme to channel funds into his own pockets.<sup>27</sup> Officials in Dresden reasoned that many investors were already slow to pay contributions, which meant that an escalation of the affair by time-consuming and public litigation might dissipate their "Baulust" completely. For mining, "one of the country's most precious treasures," this could cause "irreversible damage."<sup>28</sup> The term *Baulust*, literally "desire to mine," captured uncertainty about shareholders' willingness to invest. Officials in charge of the mines felt watched and wondered how their actions might affect the payment of contributions. Absentee investors thus wielded informal power as mining officials chose to make *Baulust* a factor in their decision-making. Unlike other Central German mining regions, where many shares were held by officials, the Saxon mining bureaucracy remained more dependent on external investment and therefore fretted about public impressions.<sup>29</sup> In the case of the corrupt courier, the Central Mining Bureau argued for prompt compensation to maintain the "good credit, necessary for mining," which had been weakened by his fraud.

Officials were particularly concerned about foreign investors who had less of a stake in the country. After the Seven Years' War, a member of a commission charged with rebuilding the country informed prime minister Heinrich Count Brühl (1700–1763) that trust in mining had been lost. Locals would be easier to convince, the commission argued, but additional measures needed to be taken to "make it suitably known among foreigners that we are worthy of their trust, that there is much hope, and they can trust that the administration, strictly supervised by the prince, will do its best and remove all justified suspicion."<sup>30</sup> An earlier law handbook spelled out how the behavior of officials affected the *Baulust* of shareholders:

All officials and clerks [... should] see that active investors are sustained in their desire and enthusiasm for mining. That is the case when they are precise, faithful, and honest housekeepers, when they help everyone to obtain what is rightfully theirs as quickly as possible, when they give friendly and complete information to those who seek to know, and when they observe everything else that can sustain a good *fama*, especially among foreign investors.<sup>31</sup>

Shareholders made their absence felt when they stopped paying contributions, in which case there was little officials could do, other than to try to improve their *fama*, or reputation. Saxon officials used a range of practices to detect and assess ore deposits (such as map-making, divination, and assaying), and were increasingly interested in monitoring workers, too. Obtaining reliable information about investors proved

<sup>24</sup> Bartels, *Montangewerbe*; Markl, *Bergbau*; Fessner, "Steinkohlenbergbau"; Fors, *Limits*.

<sup>25</sup> Lorenz, "Bergverwaltung."

<sup>26</sup> Span, *BergkUrthel*, fol. 112v.

<sup>27</sup> HStA, 10026, no. 01398/01.

<sup>28</sup> *Ibid.*

<sup>29</sup> Bartels, *Montangewerbe*, 295–300.

<sup>30</sup> Thomas von Fritsch to Heinrich von Brühl, 29 March 1762, published in Schlechte, *Staatsreform*, 218–20.

<sup>31</sup> Hertwig, *Bergbuch*, 47–48.

more difficult. Incoming payments were carefully recorded, but the motivations that prompted shareholders to provide or withhold funds remained a blind spot in their archive.

Shareholders, in contrast, could tap into the information technology of the mining bureaucracy to understand how their property was being managed. Mining law comprised local customs, princely mandates about specific questions, a general rule book (*Bergordnung*) that was valid for the entire territory, and the decisions of a special law court in Freiberg (*Urtheln*) that clarified ambiguous rules and mediated between the different sources of law.<sup>32</sup> As a whole, this corpus defined channels through which shareholders could obtain information and voice opinions. They had the right to inquire about the state of their mines and could visit mines and smelting works in person. They could hold assemblies in order “to deliberate useful plans” and to suggest who the Bureau should appoint as managers and foremen.<sup>33</sup> The managers invited shareholders to audit the accounts of their mines, during which occasion they had the chance to make suggestions “with modesty.”<sup>34</sup> Importantly, however, neither the decision about the level of contributions they were asked to pay nor about how much of the yield would be paid out as a dividend was theirs. This decision was made by the *Bergmeister* and his assessor and communicated by means of paper slips. Shareholders could ignore such requests but, after a number of years, ran the risk of forfeiting their share.

These channels allowed shareholders to insert their agenda into the procedures of the mining bureaucracy. A loosely organized group in Hamburg had a simple and effective way of collective decision-making: they signed off on the report and proposal that the Bureau circulated among them. This allowed them to make their approval conditional on certain amendments and to quickly see who else had endorsed the plan.<sup>35</sup> The council of Leipzig, in contrast, intervened more directly. In 1747, for example, the council had received, as the owner of 68 of the 128 shares of the Sankt Georg mine near Marienberg, a written report from the assessor at the local Mining Bureau. The report detailed the location and quality of known ore deposits, the number of workers employed, the materials consumed, and all the ongoing works as well as plans for the following quarter. The councilors were clearly not satisfied by how things were going and decided to have their own agent, named Lindemann, inspect the mine. Lindemann arrived with a diviner and was joined by the assessor as well as the manager and foreman of the mine. Lindemann inspected the mine and produced a report just like princely officials would have done. In fact, he referred to the Bureau’s last report and thus created a place for his document in their genealogy of files. Based on this evidence, the council made a proposal to build a costly drainage machine, which the Bureau quickly endorsed. In other words, the council intervened in the management of a mine without undermining the legal responsibility of the Bureau. Having been actively involved in Ore Mountain mining since at least the late fifteenth century, the council had enough practical understanding of the procedures to have their plan executed through the structure of the mining bureaucracy.<sup>36</sup>

Paying attention to these knowledge processes can help us rethink the power dynamics in Central European mining. The Saxon mining bureaucracy produced and corroborated knowledge claims through inspecting, reporting, map-making, collecting, and collating. Most, if not all, of these practices were exercised in cycles of accountability as defined by local law. Officials owed money and information—to each other and to external stakeholders. Central European mining officials are conventionally described as having great power while investors are relegated to marginal roles. However, a closer look at knowledge practices shows that investors exercised informal power. Officials worried that the fraud of a money courier might dampen investors’ desire to mine and therefore offered compensation, and by staging their own inspection, the council of Leipzig persuaded officials to build an expensive drainage machine. In other words, investors could tap into the information technology of the mining bureaucracy to understand how their property was being managed, insert their agenda into its procedures, or influence officials by ceasing to pay contributions. The next section shows that the Dutch episode follows this pattern.

## Saxon-Dutch Mining Incorporated

The sense of crisis, pervasive in Saxon silver mining since at least the sixteenth century, was heightened during the Seven Years’ War (1756–1763) when Saxony was devastated by military campaigns and by an expensive Prussian occupation. Plans by the government in Dresden to rebuild the country were based on

<sup>32</sup> Hertwig, *Bergbuch*; Span, *BergkUrthel*; Schönberg, *Berg-Information*; Freiesleben, *Handbuch*.

<sup>33</sup> Schönberg, *Berg-Information*, 80.

<sup>34</sup> *Ibid.*, 81.

<sup>35</sup> BAF, 40168, no. 839.

<sup>36</sup> Kroker, “Leipzig”; BAF, 40168, no. 366.

cameralist thought, in which the holistic idea of a “common good” was prominent.<sup>37</sup> The cameralist Anton von Heynitz (1725–1802), who had been managing mines for the duke of Braunschweig-Lüneburg, arrived in Saxony in 1763 with a clear vision of how mining should be reformed. Heynitz preferred a strict, almost martial hierarchy headed by a single official—himself—but his repeated requests for more executive power were met with resistance by his colleagues in the *Bergkollegium* (where he was just one of four councilors), the Central Mining Bureau in Freiberg, and mine-owners in Leipzig.<sup>38</sup> He managed, however, to convince the prince to found a mining academy in Freiberg (which went on to have a lasting impact on administrative culture in Saxony, Europe, America, and Asia).<sup>39</sup> Heynitz was also patron to a number of talented young aristocrats, in whom he instilled his ideals; Trebra, one of the first students at the academy, was one of them.<sup>40</sup> Heynitz asked Trebra to assist in a committee, the so-called *Revisionskommission*, which had no executive power but proved to be a useful vehicle for carrying out a detailed survey of the country’s mining districts.<sup>41</sup> In 1767, Trebra was promoted and sent to Marienberg, where he was intent on bringing about another age of prosperity. “Everybody was waiting to see whether the new *Bergmeister* had a lucky hand in this,” he later wrote in his memoirs; the watchful observers included his mentor Heynitz.<sup>42</sup>

Finding local investors proved difficult for Trebra as the country was still recovering from war. Marienberg’s courier Johann Cornelius Donner, who had managed to mobilize funds from Hamburg and Copenhagen, therefore suggested advertising the business in Holland.<sup>43</sup> The Dutch Republic was awash with cash, not least thanks to healthy levels of public debt. The federation, the provinces, and towns hoovered up cash from a broad tax base and put it into the hands of bondholders who were eager to reinvest.<sup>44</sup> Dutch trade and manufacturing were shrinking throughout the eighteenth century, leaving fewer domestic outlets for capital that accumulated fast in the accounts and money chests of bondholders.<sup>45</sup> During the Seven Years’ War, the Dutch had bought bonds from foreign powers (including Saxony) that funded armies and navies; after 1763, much of that capital was returned. In other words, Donner’s suggestion to finance Marienberg’s mines in Amsterdam showed good business acumen.

Donner’s idea travelled to Amsterdam along a chain of personal trust.<sup>46</sup> Trebra contacted Christian Gottlob Frege (1715–1781), a merchant-banker in Leipzig who controlled the exchange business during the fairs and traded with Holland, Spain, and Portugal. Frege was already engaged in various mining enterprises in central Germany and owned an entire mine in Marienberg.<sup>47</sup> He was also a city councilor and a member of the Leipziger oekonomische Societät, a civic association for social and economic reform. In other words, Frege belonged to a circle of civic reformers who endorsed Heynitz’ efforts and were sympathetic to his protégé. Serving private and public interest, Frege supported Trebra’s project and mentioned it favorably to his business contacts in Holland. Another city councilor and mine-owning merchant, Ludolph Hansen, happened to have a brother in Amsterdam, Carl Wilhelm Hansen, who began to float the idea among local acquaintances. In Amsterdam, Carl Wilhelm Hansen recruited Johannes Vergeel, son and companion of the bond broker Lucas Vergeel.<sup>48</sup> Trebra assumed that mining was an unknown business in Holland, unaware of a long history of Dutch investment and trade in mining products.<sup>49</sup>

Trebra’s agents devised a way to parse the Saxon *Gewerkschaft* (the totality of shareholders of a given mine) into an institution that was common in Holland, the *sociëteit*. The Dutch had used joint ownership since at least the sixteenth century to finance herring fisheries (dubbed the “silver of the sea”), in which crews of up to thirty men gutted and pickled fish onboard factory-ships.<sup>50</sup> Joint ownership, set up by private contract,

<sup>37</sup> Schlechte, *Staatsreform*; Tribe, “Cameralism.”

<sup>38</sup> Weber, *Innovationen*, 116–34. He later moved on to reorganize mining in Prussia. See Klein, *Humboldts Preußen*. For the *Bergkollegium*, see above note 15.

<sup>39</sup> Vogel, “Wirtschafts- und Sozialgeschichte,” 19–23; Schleiff and Konečný, *Staat*.

<sup>40</sup> Vogel, “Wirtschafts- und Sozialgeschichte,” 26–28; Trebra, *Bergmeister-Leben*, 8–9.

<sup>41</sup> Trebra, *Bergmeister-Leben*, 5–7; Baumgärtel, *Bergbau*, 87.

<sup>42</sup> Trebra, *Bergmeister-Leben*, 24.

<sup>43</sup> BAF, 40168, no. 503 and 839; Trebra, *Bergmeister-Leben*, 54 and 93. Approaching Dutch investors was part of a broader attempt by Heynitz to acquire foreign capital. See Weber, *Innovationen*, 134–37. The preference for foreign merchant capital was not self-evident. In other regions, capital came from local aristocrats, abbey, farmers, and workers. See Fessner, “Steinkohlenbergbau,” 111 and 119; Vogel, “Wirtschafts- und Sozialgeschichte,” 54–55; and Markl, *Bergbau*, 90–91.

<sup>44</sup> Dormans, *Staatsschuld*.

<sup>45</sup> De Vries and Van der Woude, *First Modern Economy*, 113–47.

<sup>46</sup> Trebra, *Bergmeister-Leben*, 93–94.

<sup>47</sup> Weber, *Handels- und Bankhaus Frege*.

<sup>48</sup> Trebra, *Bergmeister-Leben*, 97–99.

<sup>49</sup> *Ibid.*, 96–97. Elias, *Vroedschap*, 2:1046–50 on the Deutz family and Jonker and Sluyterman, *At Home*, 58–59 on the Trip family.

<sup>50</sup> Davids, *Rise*, 1:89–101.

was also common in whaling and industrial milling.<sup>51</sup> Following this tradition, Hansen created a society that co-owned ten mines in Marienberg and was given the name *Labore et gratia faustus* (fortunate through work and grace).<sup>52</sup> On Trebra's suggestion, Vergeel set up another society that acquired shares forfeited by other investors in Saxony and thus spread its risk across a larger number of mines. As a name, Vergeel chose *Concordia res parvae crescunt* (harmony makes small things grow), the inscription on Dutch ducats and a nod to Trebra's hope that "some of them would find their way from full purses in Holland to Saxony."<sup>53</sup> At the Marienberg Mining Bureau, shares were registered in the names of these societies, while a notarized contract in the Netherlands specified the individual shareholders who were collectively responsible for the payment of contributions and collectively entitled to any dividends. Associates who failed to pay in time were fined two guilders for the local poor—a common penalty in the Netherlands. Associates who failed to pay over nine consecutive months forfeited their share to the society, as customary in a *Gewerkschaft*. The contract was protected by the legal institutions of Amsterdam and members of the society were required to refrain from appeals to Saxon law and customs.<sup>54</sup>

Set up as independent entities, the societies had practices of knowledge production, collective reasoning, and resource distribution that complemented, and competed with, those of the mining bureaucracy. Hansen, Johannes Vergeel, and Lucas Vergeel were made "correspondents," which meant that the associates authorized them to correspond with Trebra in their name, to collect and transfer contributions, and to receive and distribute dividends. (For these efforts, they retained a generous 4 percent of all monies sent to Marienberg, and 2 percent of any monies flowing back.) The power of the correspondents was checked by three "commissioners" who were elected by the shareholders and received bi-annual reports, summary accounts, and original receipts upon request. They met with the correspondents four times per year in order "to examine [the reports]; to express their opinions about them; and to do all that was necessary for the benefit of the society." Commissioners and correspondents together made decisions and signed resolutions that were sent to Marienberg. Shareholders were kept informed through a printed report that contained a description of the mines, yield calculations, accounts, and plans for future work. These reports were discussed at shareholders' meetings, where the accounts were audited and shareholders had an opportunity to voice opinions.<sup>55</sup> In other words, knowledge production in the Dutch societies was in sync with the rhythm of the Saxon mining bureaucracy where important decisions were made in a quarterly and annual cycle.

The societies received information generated by the mining bureaucracy but also created archives of their own. The correspondents kept letters and reports for scrutiny by the commissioners and at shareholders' meetings, and the notary Engelbertus Marinus Dorper kept copies of contracts and declarations by shareholders and officials. There is evidence that commissioners compared reports to find contradictions, and they also kept an eye on the value of shares at public auctions to complement what they heard and read from Trebra. In 1778, for example, the commissioners questioned whether the Mining Bureau was truly unable to pay greater dividends (as it claimed) after examining production figures obtained at an investors' meeting the previous year, but also noticed that some shares had recently been sold for next to nothing.<sup>56</sup> The prices were published in newspapers, reflecting the collective judgement of the market, that is, brokers, investors, and informants who frequented the Amsterdam Exchange and nearby coffee houses.<sup>57</sup> In short, the societies complemented information obtained from the mining bureaucracy with market information.

Willingly or not, Trebra had ushered into existence a parallel bureaucracy operating according to a logic of its own. This was good news for him, as money flowed more predictably through channels dug and diked in by notarial deeds. But it could also be bad news because the group dynamics were stronger and could precipitate in the form of collective pressure and walkouts. Already in 1772, Heynitz wrote to Trebra "your investors have become nervous," and urged him to talk to them in person. "What would happen to the district," Trebra mused anxiously as he prepared for the meeting, "if we lose the Amsterdam investors whose mines have only just taken up their work and are full of hope?"<sup>58</sup>

<sup>51</sup> See De Vries and Van der Woude, *First Modern Economy*, 138–39, 243–69 and 311–18; and Savary, *Volmaakte koopman*, chap. 40.

<sup>52</sup> GAA, 5075, no. 15714, 20 Aug 1778.

<sup>53</sup> Ibid.; Trebra, *Bergmeister-Leben*, 144.

<sup>54</sup> Copies of the contract are preserved in a letter to an investor (GAA, 231, no. 65) and in the papers of the Marienberg Mining Bureau (BAF, 40013, no. 1443, fols. 90–93). The following description is taken from there.

<sup>55</sup> This occasion was thus similar to an *Aufrechnung* in Saxony, where *Gewerken* audited a mine's accounts and had the chance to make suggestions about the future course of the work.

<sup>56</sup> GAA, 5075, no. 15714, 20 Aug 1778.

<sup>57</sup> Lesger, *Rise*.

<sup>58</sup> Trebra, *Bergmeister-Leben*, 124.

Just how volatile and harmful consolidated capital could be in relation to projects like Trebra's that struggled for survival became apparent in the Suriname plantation economy. In the 1740s and 1750s, some 150 coffee plantations (a new and speculative commodity) were added to existing sugar farms, fueling the long-term need for enslaved labor and, consequently, money. This need was met through a new financial instrument, the *negotiatie*, the first of which was set up in 1753 by Gideon Deutz (1697–1757), a mayor, merchant-banker, and Maria Theresia's quicksilver agent.<sup>59</sup> These investment funds soon became very popular, funneling more than 62 million guilders to the colony.<sup>60</sup> Following a drought in 1769 and continual attacks by maroon communities, it became clear that the productive capacity of many Suriname plantations had been overestimated, and many investors pulled out after 1771. Uninformed generosity (on the part of the investors) and predation (on the part of planters and fund directors) destroyed or jeopardized the long-term survival of many plantations.<sup>61</sup> And some of Trebra's main shareholders were financially very exposed to the colony: The merchant-banker and insurer Arent van Staphorst co-owned a society that funded seven plantations, but sold his shares in 1777. The broker Jan Wils, who also traded in silver, copper, and ores, owned cotton, cacao, and coffee plantations in Berbice.<sup>62</sup> Bartholomeus van Santheuvel, the only investor named in Trebra's memoirs ("respected as an honest, hardworking city councilor but not as a merchant") owned a plantation called Mariënborg, for which he set up an investment fund.<sup>63</sup> When, by 1777, some of his speculative ventures had failed, he absconded to Suriname—to put his affairs in order (as he claimed when he applied for safe passage) and to escape from his creditors in Amsterdam.<sup>64</sup>

With van Santheuvel, Trebra's societies lost one of their most prominent backers and in fact one of their commissioners. The remaining shareholders reshuffled ranks at the following meeting, but also recorded their belief that the two societies had become unviable (*onbestaanbaar*) and perhaps had always been so. The fact that the societies had been set up in the first place, they contended, "must be ascribed solely to the indefatigable efforts of Lucas Vergeel and Sons, who went to unusual lengths to sniff out potential members ..., whom they persuaded by strong advice, based on the favorable expectations with which Vergeel and Sons were flattered by the mining bureaus in Saxony."<sup>65</sup> A surviving letter from 1776 shows Vergeel at work, assuring an investor that shares were being sold at a price in excess of the money invested, that some of the mines were evidently making a profit, that more investors would join, that the mines might reach as yet untapped deposits, and that other gentlemen were also buying.<sup>66</sup> Trebra, too, describes Vergeel as an "aged, unfortunate, miserable, anxious swindler."<sup>67</sup> But the investors also understood that the Vergeels peddled "favorable expectations" that originated in Marienberg. So, was the upright Trebra indeed spinning "a noble lie for Dutch investors"?<sup>68</sup>

## Paper Tools for Long-Term Thinking

I propose a different reading of this encounter of cameralists and capitalists: Despite Trebra's best efforts, Dutch investors chose not to see the world through the eyes of Saxon mining officials. For the Dutch, mining was one risky enterprise like many others floated at the bourse, in the coffee houses, and newspapers. They owned *portiën* (shares) and were careful to limit their *bylagen* (payments) to "at the most three, four, or five years (not longer)," and to keep them at four ducats for the first two quarters and at two ducats for the rest of their projected investment period, "never more, but less in the case that one or more mines produce a dividend, as we hope that they do."<sup>69</sup> This was very different from the sense of time written into the institutions of Saxon mining. Ownership of *Kuxen* (shares) was unlimited, and *Zubußen* (payments) could be adjusted every quarter, according to the needs of the mine. For the Dutch, the mines produced *interest* (interest) and were simply a means to increase their capital stock. For the officials, they produced *Ausbeuten* (yields), which sustained workers, contributed cash to the princely coffers, and, of course, paid for the administration itself. These differences are important because they show that while the Dutch bought mining shares, they did not buy into the rationality that kept the mines running over centuries.

<sup>59</sup> Van de Voort, *Westindische plantages*, 91, 254–59; Schutte, *Repertorium*, 179–89.

<sup>60</sup> Van de Voort, *Westindische plantages*, 101–2; NL-HaNA, 1.05.03, no. 509.

<sup>61</sup> Van Stipriaan, *Surinaams contrast*.

<sup>62</sup> See their index cards in GAA, 30452.

<sup>63</sup> Trebra, *Bergmeister-Leben*, 131.

<sup>64</sup> NL-HaNA, 1.13.04, no. 2; GAA, 600, no. 730; Elias, *Vroedschap*, 2:949–50.

<sup>65</sup> GAA, 5075, no. 15714, 20 Aug 1778.

<sup>66</sup> GAA, 231, no. 65.

<sup>67</sup> Trebra, *Bergmeister-Leben*, 130.

<sup>68</sup> Wakefield, *Disordered Police State*, 48.

<sup>69</sup> GAA, 231, no. 65. Similar stipulations are found in the copy of the contract in BAF, 40013, no. 1443.

Saxon mining officials made financial decisions with an eye to long-term development. The cash flow tended to be managed to funnel profits back into exploration, infrastructure, and support for auxiliary industries. Dividend payments to investors, and even taxes paid to the prince, were subject to their *bergmännisch* deliberation.<sup>70</sup> This word denoted a mindset that looked to “conserve everything, and think of the descendants.”<sup>71</sup> The line of the officials was that mines should be preserved, even if there was no profit for the shareholders, and that shareholders should give money “to the common good” as though they were giving alms to the poor.<sup>72</sup> Saxon mining officials called this *Nachhalt* (sustainability), derived from *nachhalten*, that is, to hold back immediate profit for long-term benefit.<sup>73</sup> This concept manifested itself in the management of cash flows. Many mining bureaus had their own investment funds (*Gnadengroschenkassen and Schurfgeldkassen*) that were filled by taxing mine owners. When in 1710 smelting was centrally organized through the *Generalschmelzadministration*, this tax was collected as soon as silver was produced.<sup>74</sup> As a concept that informed technical and bureaucratic processes, *Nachhalt* helped officials to run the mines over longer timeframes.

This Saxon brand of sustainability emerged from the archival practices of mining officials.<sup>75</sup> While they mostly organized labor for the short term and planned expenses for the next quarter, they also engaged in long-term thinking. The most powerful paper tool that facilitated this was a type of document that originally served short-term accountability, but was later repurposed for long-term analysis. The Central Mining Bureau in Freiberg collected broadsheets with yields and contribution payments (*Ausbeutbögen*) and bound them into large folios.<sup>76</sup> In 1732, the surveyor and high-ranking mining official August Beyer used this compilation to calculate the yield for each year since 1529, thus condensing two hundred years of history into a single list.<sup>77</sup> The publication was likely aimed at (potential) shareholders, providing evidence both of God’s providence, by blessing Saxony with hidden minerals, and the technical competence of mining officials, who were able to find and extract them. Another instrument that enabled long-term analysis was the collection of “Nachrichten” (notes, or bits of information) from various archives and informants. The mining bureau in Schneeberg produced such a collection in the 1720s.<sup>78</sup> Trebra, too, collected information from old documents and hearsay and considered the resulting seven bound volumes “sacred objects” in the Marienberg archive.<sup>79</sup>

Backed by this wealth of historical data, officials were able to put both low and high yield figures in perspective and arrive at unusual conclusions. For example, based on long-term thinking it could be perfectly rational to dismiss good figures as bad news. While Trebra was in Amsterdam, ores from one of his mines were found to contain an enormous amount of silver. This would have excited Dutch investors, but Trebra was wary and suppressed the news. Rightly so, as he pointed out in hindsight, since the rich ore turned out to be restricted to one local pocket. On the other hand, long-term thinking made it possible to justify investments that would mostly benefit the next generation, albeit such judgements were difficult to convey to investors, especially foreigners. In an imploring personal address at an investors’ meeting, Trebra tried to explain the rationality of Saxon mining to this audience. He argued that the competence of mining officials was a necessary condition for God’s providence to materialize as they allowed mining to continue for a long time.<sup>80</sup>

While this speech was recorded in Trebra’s memoirs only long after the event, a map he mentioned by Johann Friedrich Wilhelm von Charpentier (1738–1805) uses the same rhetoric of long-term prosperity and bureaucratic competence. District maps like these were an increasingly important tool for infrastructure planning but must be placed in the context of early modern resource economics.<sup>81</sup> Trebra’s commentary included a detailed description of Marienberg’s silver production over the centuries and provided reasons for the relative abundance or lack of revenue.<sup>82</sup> Hansen translated this work to give potential investors “an

<sup>70</sup> Minerophilus, *Bergwercks-Lexicon*, 50.

<sup>71</sup> *Ibid.*, 85.

<sup>72</sup> Quotation in Schönberg, *Berg-Information*, 80. See also Herttwig, *Bergbuch*, 183; Minerophilus, *Bergwercks-Lexicon*, 86.

<sup>73</sup> Grober, “Nachhaltigkeit.” More generally, Warde, *Invention*.

<sup>74</sup> Baumgärtel, *Bergbau*, 33–34 and 89–90. See also Bartels, *Montangewerbe*, 295–300; and Weber, *Innovationen*, 136.

<sup>75</sup> See also Appuhn, *Forest*, chap. 5; and more generally, Corens et al., *Archives*.

<sup>76</sup> BAF, 40165, no. 30. See finding aid for the history of the compilation.

<sup>77</sup> Beyer, *Marckgrafenthum*, preface. The copy in the Bergarchiv Freiberg is bound into a bigger volume that contains manuscript continuations of Beyer’s list. BAF, 40165, no. 30.

<sup>78</sup> BAF, 40015, no. Ü 1526.

<sup>79</sup> Trebra, *Bergmeister-Leben*, 87.

<sup>80</sup> *Ibid.*, 137–38.

<sup>81</sup> Neubert and Stein, *Plan- und Risikunde*, 11–38; Cooper, “Possibilities”; Westermann, “Inventuren.”

<sup>82</sup> Trebra, *Erklärungen*.

idea of the previous prosperity of these mountains, how your contributions can now be usefully applied to your benefit, and what can be expected from this investment in the future.”<sup>83</sup> Accordingly, the title of the booklet was changed to reflect that shift of emphasis, from an “explanation” to a “history.”

Such long-term analysis was, in principle, very compatible with merchant capitalism and profit-seeking, as the following three examples show. In the small Black Forest principality of Fürstenstein, silver yields were extremely irregular: they could be spectacular in years when pockets of rich ores were exploited but next to nil in others. Here, a merchant family from Calw mobilized investors when yields were high and otherwise combined silver mining with more reliable cobalt processing. Gregor Markl has argued that the firm’s prudent management stabilized profits so that continual exploration of new deposits could take place.<sup>84</sup> A better known example is the Dutch East India Company (VOC), which from the 1660s used historical data to determine adequate prices for pepper, resulting in an elaborate set of time series constructed by the merchant and mathematician Johannes Hudde. The VOC’s techniques were imitated by merchant houses and the Dutch West India Company, which operated in the Caribbean.<sup>85</sup> The third example of capitalist long-term analysis derives from the most speculative phase of the Suriname plantation economy. In 1778, the planters and colonial officers Cornelis Graafland and Adriaan Gootenaar suggested that a “Generaale negotiatie” be set up under the purview of the Suriname Company, which would pool capital and impose stricter control on how funds would be spent. To make this argument persuasive, they recapitulated the history of the plantations since the beginning of the century, pointing out that the first *negotiatie* of 1753 was an instrument of development, not of short-term gain. Gootenaar suggested elsewhere that White farmers should be relocated from marginal regions of the Republic in order to permanently improve what he perceived as a dangerous majority of Black and mixed-race enslaved peoples and maroons in the colony.<sup>86</sup> These three examples suggest that long-term analysis was an important aspect of merchant capitalism, although it seems to have come more naturally to family firms or companies with large archives than to individual merchants, and to colonial officers than to the individual planter fending for himself.<sup>87</sup>

Suffused by his vision of a rejuvenated Marienberg, Trebra went to great lengths to get Dutch investors to adopt the peculiar rationality of Saxon mining. He sent reports composed in his own hand to satisfy their demands for information, manuscript maps to show what their money paid for, and even a functioning model of their mines. He traveled to Amsterdam not once but twice, even though being “among all these utterly unfamiliar, Republican people” greatly distressed him.<sup>88</sup> Trebra was successful in the sense that Dutch investors eventually understood how Saxon mining worked. They acknowledged the fact that the mining bureaus were keen to reinvest profits into as yet unprofitable mines “so that Saxon mining can be continued over a long time.”<sup>89</sup> However, they made this statement precisely when they sought a settlement with the prince that included restitution of funds Trebra had used to improve the infrastructure in his district. Trebra’s attempts to make Dutch merchants think like mining officials thus failed. Judged by their business ideals, Marienberg had proved to be hopeless.

## Conclusion

From 1769 until the late 1770s, Saxon mining and Dutch merchant capital were entangled because Holland investors funded mines in the Ore Mountains, just as they funded plantations in the Caribbean. In this article, I have turned to this episode in the global history of resource extraction to make two related points. First, the history of knowledge can help us rethink hierarchical power structures like the Saxon mining bureaucracy. Local law entitled mine owners to information and made officials accountable through regular reporting, which gave investors scope for intervention. Some well-organized groups such as Leipzig city council pursued their own agenda through the structures of the mining bureaucracy by staging their own inspections and reports. The influence of others was more diffuse, resulting as it did from officials being worried that a bad reputation would reduce investors’ willingness to pay contributions (Baulust). The mining bureaucracy was often poorly informed about the motives of investors, and vague concerns about their

<sup>83</sup> Trebra, *Merkwaardigste*, viii. Heynitz was a proponent of this historical approach, and also appears to have suggested that Trebra base the map on Bernt Ripking’s 1715 map of the Harz, which in turn was influenced by Swedish models. Weber, *Innovationen*, 133 and fold-out map.

<sup>84</sup> Markl, *Bergbau*, 87–91, 129–31, 166 and figure 114 on 187.

<sup>85</sup> Smith, “Function,” and Friedrich, “Caveat from the Archives,” in this issue. More generally, see Lesger, *Rise*.

<sup>86</sup> NL-HaNA, 1.05.03, no. 508.

<sup>87</sup> See Smith, “Function,” 999 and 1000.

<sup>88</sup> Trebra, *Bergmeister-Leben*, 132.

<sup>89</sup> GAA, 5075, no. 15714, 20 Aug 1778.

wishes affected the behavior of officials. The Dutch case follows this pattern: mining officials were solicitous in providing information, fretted about *Baulust*, and took investors' desire for revenue into consideration. These observations directly challenge the traditional absolutist image of the Saxon mining bureaucracy, which is invoked even in recent publications.

Second, the history of knowledge can help explain how certain rationalities (that is, combinations of means, ends, and values) came into being. Saxon officials sought to situate quarterly income and expense in a success story that spanned decades and centuries. Informed by the concept of *Nachhalt*, or sustainability, Saxon officials saw profit even in mines that lost money. This kind of sustainability thinking can be best explained via the archival practices of the mining bureaucracy: officials collected information from yield sheets (*Ausbeutbögen*) and local lore in order to calculate outputs over centuries, to speculate about untapped deposits, and to decide how much money should be disbursed to owners in a given quarter. The Dutch investors, in contrast, only contemplated a limited amount of archival documentation and conceptualized profit and loss as occurring within a short timespan from the point of investment.

This is not to argue that paper technology determined what actors considered to be rational. The present story is more interesting: The princes of Saxony had reasons to preserve their domestic source of silver coins (not just generic revenue), which they used to pay for armies and courtly life. Keeping mines in operation at almost all costs became *raison d'être* of an emerging princely mining bureaucracy. Since the fifteenth century, officials dispensed subsidies and acquired the management rights of mines that were in crisis, but which continued to be owned by individuals. Yield sheets were one paper technology that helped to organize the flow of money and information in these complex ownership arrangements. Later on, the sheets were repurposed to create narratives about the long-term productivity of Saxon mines in order to attract investors. However, the same thinking that kept the mines going over centuries was used to ward off claims to profit by investors who were expected to pay their contributions as though they were giving to the poor. Like the ideal of *mesnagement* (good stewardship) in seventeenth-century France that was used as a weapon against the nobility in the province, *Nachhalt* could be used to restrict shareholders' access to revenue from mines they owned.<sup>90</sup> Like other mining officials, Trebra retained yields in order to consolidate new channels for labor and materials. He only distributed as much as absolutely necessary to keep investors from breaking away, and when in doubt, chose the mines over personal gain. Sustainability as it held sway in Saxon mining was an ideology of self-denial, befitting a sector in perennial crisis ever since the richest ores been mined and princely officials stepped in. The Dutch investors seem to have sensed this. They had recourse to similar information as Trebra but chose to interpret it differently. Concerned about the viability of their companies, rather than that of the mines of Marienberg, they assessed the situation according to their own ideals of good business, and withdrew.

*Nachhalt* flourished in the niche provided by the Saxon mining bureaucracy and was kept alive through paperwork and technical systems (such as smelting plants that served as points of taxation). While this system was dismantled during liberal reforms in 1850s, in favor of small companies that were supervised but not directed by the state, its peculiar brand of sustainability, aiming to extract resources at almost all costs, likely survived. The time-tested curriculum and academic culture of Freiberg made it easy for visitors from France, the Netherlands, Great Britain, Italy, Spain, Russia, the USA, Mexico, and Japan to learn the Saxon way of resource extraction and became a stepping stone in the careers of engineers and administrative specialists in the emerging world of industrial capitalism.<sup>91</sup>

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<sup>90</sup> Mukerji, "Great Forestry Survey."

<sup>91</sup> Martin, "Bergverfassung"; *Festschrift*, 223–95; Papperitz, *Gedenkschrift*, appendix. See, for example, the trajectory of the Ashanti "prince" and engineer Kwasi Boakye (1827–1904) who studied in Freiberg in 1847 and 1848 and worked as a colonial mining official in the Dutch East Indies. Arnold, "Fremde Heimat."

## Competing Interests

The author has no competing interests to declare.

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