6 The Burned Archive

A Diary

On a sunny spring morning in 1900, the industrialist Yasukawa Keiichirō (1849–1934) left his company headquarters in Wakamatsu, northern Kyushu, for a business trip east:

> [Meiji 33] March 27. Fine. Departure. At half-past eight, I departed on a small tug and then headed up to Osaka on the *Yamashiro-maru*.

The next day, the weather again fine, Yasukawa records that he arrived in Osaka, via the port of Kobe, in the late morning. Spending the afternoon with one of his key associates, the two men discussed the division of profits from their recent sale of the Tagawa coal mines, in northern Kyushu, to the Mitsui Mining Company.[1]

I happen to find this reference to the *Yamashiro-maru* in the first of four published but as yet undigitized volumes of Yasukawa's private diary. (When I say, 'happen to find', what I mean is: a kind colleague who has studied the diaries told me he seemed to remember a mention of the ship sometime around 1900.) Yasukawa kept twenty notebooks of his daily activities; thirteen have survived, dating from October 1898 to his death in November 1934. They offer a ringside view of Japan's early twentieth-century transformations by a man who, from the chaos of Kyushu's anti-Meiji uprisings in the early 1870s, established a coal-selling business in 1877 and went on to become a key figure in what

[1] Yasukawa Keiichirō 安川敬一郎, *Yasukawa Keiichirō nikki: Daiikkan* 安川敬一郎日記：第一巻 [Yasukawa Keiichirō's diary: Volume 1] (Kitakyushu: Kitakyūshū shiritsu shizenshi/rekishi hakubutsukan, 2007), p. 140. I am very grateful to Nakamura Naofumi for introducing me to Yasukawa's diary in 2012. On the sale of the Tagawa mines to Mitsui, for 1.65 million yen, see Nakamura Naofumi 中村尚史, *Chihō kara no sangyō kakumei: Nihon ni okeru kigyō bokkō no gendōryoku* 地方からの産業革命：日本における企業勃興の原動力 [The industrial revolution from the regions: The driving force behind the rise of business in Japan] (Nagoya: Nagoya daigaku shuppankai, 2010), p. 214.

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has been called Japan's 'industrial revolution from the regions'.[2] In later years, Yasukawa founded many other companies, in fields ranging from cotton spinning to electricity; he was also elected a member of the House of Representatives in 1914 and joined the House of Peers in 1924. The period at the turn of 1900, therefore, was a crucial one in the expansion of Yasukawa's business activities from the regional to the national stage. As Hibino Toshinobu's close reading of the diary has shown, Yasukawa spent approximately a third of each year in Osaka or Tokyo between 1899 and 1902, and the opening of the San'yō Railway between Kobe and Shimonoseki in 1901 would further facilitate the expansion of his networks in central and eastern Japan – this in an age when face-to-face meetings still lay at the heart of the business relationship.[3]

Such a reading of Yasukawa's diary implicitly looks forward: it posits his overnight journey on the *Yamashiro-maru* as a fin-de-siècle moment in the gradual usurpation of the ship by the train. But it would be equally possible to read the 27 March entry with a backward glance. If Yasukawa had made the same journey, say, 100 years earlier, he would not have arrived in Osaka until a week or even three after departing Wakamatsu, as his ship negotiated the weather and waters of the Inland Sea. That it took him only twenty-four hours to do so in 1900 was therefore due to a technological innovation whose uptake in many ways epitomized the global transformations of the nineteenth century: the invention of the rotating steam engine, patented by James Watt in 1784, and its subsequent application to riverboats, lake ferries, coastal freight ships and oceanic vessels across the world.[4] By the time of the *Yamashiro-maru*'s launch in 1884, the advent of steamships, along with the introduction of the telegraph, had already begun to transform the economies of some of the Inland Sea ports through which Yasukawa passed on the morning of 27 March. For example, the *Yamashiro-maru* did not stop in Fuyuki Sakazō's home town of Murotsu, in eastern Yamaguchi prefecture (see Chapter 3). For centuries, ships had anchored here, or just across the straits in Kaminoseki, to restock ahead of the next day's sailing and, if

[2] Nakamura, *Chihō kara no sangyō kakumei*. On Yasukawa's background see pp. 202–6: one of his brothers was executed as a rebel in the Fukuoka uprising (1871); another died fighting on the government side in the Saga rebellion (1874).

[3] Hibino Toshinobu 日比野利信, 'Nisshin/Nichiro senkanki ni okeru Yasukawa Keiichirō' 日清・日露戦間期における安川敬一郎, in Arima Manabu 有馬学, ed., *Kindai Nihon no kigyōka to seiji: Yasukawa Keiichirō to sono jidai* 近代日本の企業家と政治：安川敬一郎とその時代 [Politics and the entrepreneur in modern Japan: Yasukawa Keiichirō and his age] (Tokyo: Yoshikawa kōbunkan, 2009), pp. 12–39, here p. 16.

[4] On the early and transformative application of steam engines to riverboats, see Walter Johnson, *River of Dark Dreams: Slavery and Empire in the Cotton Kingdom* (Cambridge, MA: Harvard University Press, 2013), pp. 73–96.

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necessary, await appropriate winds and tides. Local expertise was priceless to ships and their crews. In late March (as Murotsu fishermen could have told Yasukawa), a change in cloud patterns presages a warm southerly wind, the *maji*, which in its wake brings rain; more often than not, a west wind then follows the rain, one favourable for those sailing towards Osaka.[5] Yet the *Yamashiro-maru*'s crew did not need this old knowledge any more than they needed new provisions. Whether the weather was fine or not, the ship would steam on – or so we might imagine.[6]

This image of the steamship cutting serenely through the seas finds apt expression in another of the three (known) surviving photographs of the *Yamashiro-maru*, published in the fifty-year celebration history of the NYK company.[7] The black vessel crosses from left to right across open water (see Figure 6.1). Smoke unfurls at an almost perfect ninety-degree angle from its only funnel, while the two masts stand high both fore and aft. The *Yamashiro-maru* would seem, in this framing, to be apart from space and time: the ship could be anywhere, the moment anytime in the late nineteenth century. Yet readers familiar with one of the most famous literary depictions of steamships in that period would have known such images to be an illusion. In Jules Verne's *Le Tour du Monde en Quatre-Vingts Jours* (1872), Phileas Fogg's passage to India is punctuated by his ship's regular need to call at port, with each stop counted on the clock – four hours in Suez, every second precious, before onward to Aden – and calculated against his apparently foolhardy bet.[8] Thus, the steamship could never be nowhere. The steam which compressed its engine's cylinder(s) was generated by the burning of coal beneath one or more water boilers. The coal, in turn, must be loaded into the ship's holds at ports sufficiently large for the job, be they in Suez or in Aden – or in Wakamatsu, where Yasukawa's eponymous coal-selling business had been based since 1886. In this sense, as Allan Sekula once noted, 'steam tethered ships more firmly to the land, by a line that stretched back to the bowels of the earth'.[9]

[5] I picked up this knowledge from local fishermen during a period of fieldwork in Kaminoseki in May 2004.

[6] For one example of steam not overcoming nature, see Amrith, *Crossing the Bay of Bengal*, pp. 112–14.

[7] Nippon Yusen Kaisha, *Golden Jubilee History of Nippon Yusen Kaisha* (Tokyo: Nippon Yusen Kaisha, 1935), p. 9. For my discussion of another of these photographs, see Chapter 1.

[8] Jules Verne, *Around the World in Eighty Days*, trans. George Makepeace Towle (Boston: James R. Osgood, 1873 [1872]), pp. 34–40. Available through https://archive.org.

[9] Sekula, *Fish Story*, p. 106. The *Yamashiro-maru* had a compound engine with two cylinders, both 54 inches in length: the high-pressure cylinder was 42 inches in diameter, the low-pressure, 78 inches: 'The Yamashiro Maru', *PCA*, 21 July 1885.

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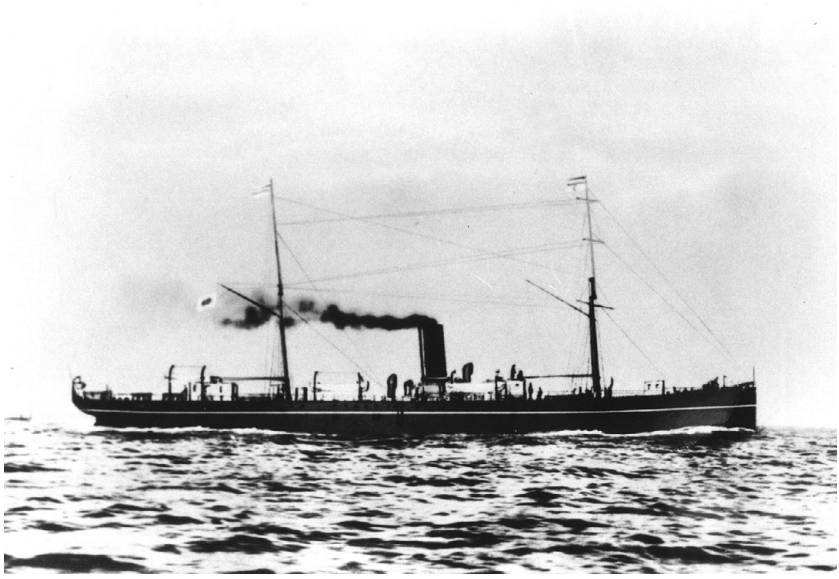


Figure 6.1 The *Yamashiro-maru* (1884–1910). Courtesy of the NYK Maritime Museum.

The black smoke filtering back across the *Yamashiro-maru*'s photograph was one atmospheric trace of this tethering line. Its presence in the photo serves as a reminder that in resource terms, the steamship could never simply 'steam on'. Nor, contrary to my earlier assertion, were tides or the weather completely irrelevant to the determination of steam-powered routes.[10] Rather, the steamship's passage was 'terraqueous' – that is, part of a history which encompassed the transmutation of earth, water and air (as early modern European scholars understood the term).[11] The ship's course at sea was bound to the ground. Thus, the photograph's smoky trail raises the question: if the penned past ultimately leads historians to the paper archive, then from what archival place can we read terraqueous traces?

We might begin to answer this question by siting the relevant 'bowels of the earth' – in this case, by identifying where the *Yamashiro-maru*'s

[10] Peter A. Shulman, *Coal and Empire: The Birth of Energy Security in Industrial America* (Baltimore, MD: Johns Hopkins University Press, 2015), points out that 'steamships still relied a great deal on winds and currents', especially in terms of crossing the Pacific (p. 83).

[11] Alison Bashford, 'Terraqueous Histories', *Historical Journal* 60, 2 (2017): 253–72, here p. 260.

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coal came from at any particular moment in time. On the morning of 27 March 1900, assuming that the only reason the ship had stopped in the coal transit hub of Wakamatsu was to refuel, its likely origin was one of the mines in Chikuhō, a north-eastern Kyushu coalfield equivalent in land area to today's New York City.[12] The coal with which the *Yamashiro-maru* supplied the imperial navy during the Sino-Japanese War of 1894–5 likewise came from this field and probably also from mines in Nagasaki prefecture. At the beginning of the *Yamashiro-maru*'s career, by contrast, the picture is more precise. Thanks to a combination of the loquaciousness of the ship's chief engineer, Mr Crookson, and the curiosity of the *Daily Pacific Commercial Advertiser*'s representative on the Honolulu docks, we know the following:

> The speed of the vessel is 14¼ knots, with sixty-five revolutions of the propeller per minute. The consumption of coal is about forty-eight tons a day of the soft kind called "Karatsu," which is mined about the centre of Japan. To supply the consumption, the vessel can carry 350 tons of coal in her bunkers, and a further supply of 320 tons for long voyages of about sixteen days.[13]

And so Karatsu, in the western Kyushu prefecture of Saga (not at all 'about the centre of Japan'), is one place we might begin to source the tethering line.

As such, this chapter's first archival port of call would ideally be the earth itself, in the form of any surviving material traces of the nearly 400 pitheads which in the late nineteenth century were dotted around the Matsuura river and its tributaries, some ten to twenty kilometres south of the coastal castle town of Karatsu.[14] The pitheads, or even better the endpoint of the underground shafts, would be my archival ground zero – signified, to borrow from David Sepkoski, by the notation, $archive_0$.[15] But unfortunately the world was a far from ideal place to conduct archival research in March 2020, when I had scheduled to visit Karatsu. Moreover, even if I had been able to hire a car and drive to any of the nineteen villages where the late nineteenth-century pitheads were clustered, it is extremely unlikely I would have got anywhere near a

[12] For an overview of Chikuhō, see Phipps, *Empires on the Waterfront*, pp. 116–27; the size of New York is according to the 2010 United States Census.
[13] 'The Yamashiro Maru', *PCA*, 21 July 1885.
[14] Tōjō Nobumasa 東定宣昌, 'Meiji zenki, Hizen Matsuuragawa no sekitan yusō' 明治前期、肥前松浦川の石炭輸送 [The transportation of coal from the Matsuura river in Hizen, in the early Meiji period], *Enerugii-shi kenkyū* 17 (2002): 31–46, here pp. 32–3.
[15] David Sepkoski, 'The Earth as Archive: Contingency, Narrative, and the History of Life', in Lorraine Daston, ed., *Science in the Archives: Pasts, Presents, Futures* (Chicago: University of Chicago Press, 2017), pp. 53–83.

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shaft (if any still survive); and, in any case, I am not trained to read the earth.

Thus, the empirical base for the journeys this chapter reconstructs is a series of archival reconfigurations, in which we follow historical actors as they visited ground zero (or worked therein) and tried to transcribe the 'original' archive into meaningful words or images. I call their resulting paperwork, $archive_1$ – although unlike the scholars to whose work Sepkoski applies this term, the key initial transcriber of the Karatsu earth was no geologist or paleontologist but rather a German doctor working for the Dutch East India Company in Nagasaki in the mid 1820s. (Perhaps appropriately, his book had the subtitle, *Archiv zur Beschreibung von Japan und dessen Neben- und Schutzländern Jezo mit den südlichen Kurilen, Sachalin, Korea und den Liukiu-Inseln*.) The doctor's account, in turn, was taken up by the US commodore Matthew Perry and abstracted into a new geopolitical imagination of the mid nineteenth-century Pacific world: that is, $archive_2$. And so on.

These indications of distance from archival ground zero in Karatsu run the danger of becoming parodic ends in themselves – $archive_4$? $archive_6$? – rather than, as intended, a heuristic means to identify the transcriptions necessary to render the soil a historical source. But my primary interest in this chapter lies not in archival notation per se but rather in rebraiding the tethering line between the earth and the engine. I do this by following the migration of a piece of coal from seam to ship. Taking my lead from William Cronon's argument that an environmental history must root itself 'in the depths of the earth', I start in Karatsu and follow the line(s) out – from mine to river to market to port to lighter to bunker and finally, burned up and exhausted, to a puff of smoke.[16] But as I have recreated this human history of a fossil fuel's journey, my story has coalesced with a second migration, namely of the archive from its 'original' material form to verbal and visual forms which, due to their digitization, have been accessible to me even during a global pandemic. Comprising a selection of diary entries, newspaper articles, technical reports, memoirs, paintings, handwritten scrolls and much more, this digital constellation of $archives_1$ and $archives_2$ is, by necessity, my own invention.[17] But its principle is the same as a place-based archive: it offers an abstract

[16] William Cronon, 'Kennecott Journey: The Paths out of Town', in William Cronon, George Miles and Jay Gitlin, eds., *Under an Open Sky: Rethinking America's Western Past* (New York: Norton, 1992), pp. 28–51, here p. 48.

[17] '[W]e invent an archive every time we have a question to answer; and then someone reinvents the archive in the service of a new question': Benjamin Zachariah, 'Travellers in Archives, or the Possibilities of a Post-Post-Archival Historiography', *Práticas da História* 3 (2016): 11–27, here p. 27.

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equivalence between its constituent elements – just as the telegraphs and police reports and transcribed testimonies and politicians' letters in the Queensland State Archives are, at the most basic level, afforded equivalent value simply by dint of their accessibility in the same physical location.[18]

One outcome of this invented, migrated archive is an argument concerning the social history of extraction.[19] Beneath the transpacific journeys of the plantation labourers or the brothel workers I traced in earlier chapters toiled men and women whose bodies made possible new lives overseas and yet who are generally overlooked in migration histories. The artifice of my personalized 'Karatsu archive' draws equal attention to these labour histories and the ways they shaped shipboard passages – just as Utagawa Kunisada's woodblock print, detailing dozens of imaginary blue-uniformed labourers inside the human body, brought to the fore the work necessary for a healthy dietary life in the 1850s (Figure 3.1). More generally, my assembled archive reminds us of the extractive contexts which lay behind other histories I have hitherto described in passing or in detail, from the Whitby collier repurposed as Captain Cook's *Endeavour*, to the dynamite-carrying *Sumanoura-maru* with which the *Yamashiro-maru* collided in October 1884, to the holds in which terrified young women were made to hide during transportation to Southeast Asia in the late nineteenth century. This chapter's focus on subterranean histories in Kyushu offers a labour history counterpoint to the simplicity of Yasukawa Keiichirō's diary entry on 27 March 1900; but the chapter could equally well have been placed at the beginning of the book, thus framing my analyses of transoceanic migrations in the 1880s and 1890s.

Indeed, my second contribution in these pages is to suggest a revised framing for Japan's geopolitical engagement with the Asia-Pacific world across the second half of the nineteenth century as a whole. The work of Catherine L. Phipps has highlighted the value of narrating the Sino-Japanese War from the perspective of the recoaling port of Moji (just along the northern Kyushu coast from Wakamatsu), so as to demonstrate some of the energy infrastructures that lay behind Japan's late nineteenth-century military ascendance in East Asia.[20] Similarly, my Karatsu archive projects a revised reading of the epochal encounter between Tokugawa

[18] Concerning photographs, Sekula observes that 'archives establish a relation of *abstract visual equivalence* between pictures': Allan Sekula, 'Reading an Archive: Photography between Labour and Capital', in Liz Wells, ed., *The Photography Reader* (London: Routledge, 2019), pp. 443–52, here p. 445 (emphasis in the original).

[19] Cf. Gabrielle Hecht's innovative labour history of uranium mining: Hecht, *Being Nuclear: Africans and the Global Uranium Trade* (Cambridge, MA: MIT Press, 2012).

[20] Phipps, *Empires on the Waterfront*, pp. 189–216.

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Japan and the US squadron led by Commodore Perry in 1853–4 – an encounter in which the significance of the 'geo-' has been understudied relative to the '-political'. Here too, I argue, historians should focus their attention less on Perry's famous 'black ships' than on the oft-ignored black smoke: its origins are the real 'matter of history'.[21]

The narrative seam of the mid nineteenth-century US–Japanese encounter which burrows through the chapter may appear counter-intuitive, given that Perry arrived in Japan three decades before the *Yamashiro-maru* was even launched. But it is important because the logistical realities which drove US policymakers towards Japan in the early 1850s were fundamentally the same as those which affected the quotidian calculations of NYK ships carrying migrant labourers to Hawai'i at the turn of the 1890s. That is, assuming that the *Advertiser* correspondent noted down Mr Crookson's technical descriptions accurately in 1885, then at a constant speed of 14¼ knots, the *Yamashiro-maru*'s 'long voyage' from Yokohama to Honolulu (3,410 nautical miles, with one knot equal to one nautical mile per hour) would have taken just under ten days and consumed about 480 tons of coal. From Honolulu port records, we know that it actually took two weeks, with Captain Mahlmann remembering 'not having pressed the engines in order to save coal'.[22] Either way, with a maximum coal bunker capacity of 670 tons, the *Yamashiro-maru* would have needed to recoal in Hawai'i in order to return to Japan. This basic fact of steamship life thus underlined the calculations which US naval strategists made from the mid nineteenth century onwards about the geopolitical importance of the recoaling facilities at Pearl Harbor – calculations which, alongside archipelago politics and sugar planter interests, were a key factor in the eventual US annexation of the Hawaiian islands in 1898.[23] The *Advertiser*'s profile of the *Yamashiro-maru* was thus one point in a longer energy history whose trajectory arced, like the lines that US strategists drew across Pacific maps, from the mid to the late nineteenth century.

Tethering lines and cartographic lines notwithstanding, what follows is no linear analysis, at least in chronological terms. It would be practically impossible – at least with my training – to scale in any meaningful way a history whose temporal units range from millions of years to half-past

[21] LeCain, *Matter of History*.

[22] On the nautical mile distance from Yokohama to Honolulu, https://developer.searoutes.com/docs (last accessed 21 June 2021); Mahlmann, *Reminiscences*, p. 184. It's possible that Mahlmann also utilized the *Yamashiro-maru*'s square-rigged sails during the journey, further to reduce coal consumption while maintaining speed.

[23] William M. Morgan, *Pacific Gibraltar: US–Japanese Rivalry over the Annexation of Hawai'i, 1885–1898* (Annapolis, MD: Annapolis Naval Institute Press, 2011).

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eight on a March morning, and thus impossible to do justice to the basic profundity of archive$_0$ over all subsequent transfigurations. And yet, as Dipesh Chakrabarty observed in a groundbreaking essay on how historians might respond to the crisis of climate change, a greater awareness of humans as geological agents, whose initial scrabbling for coal in places like Karatsu eventually culminated in planetary-transforming releases of carbon dioxide into the atmosphere, requires new narrative forms. Chakrabarty urges us to 'cross-hatch' different modes of historical analysis (in his case, between 'the immiscible chronologies of capital and [human] species history'), without spelling out what such a cross-hatching might look like in practice.[24] In this chapter, my small nod towards such narrative challenges comes in the form of textual divisions between generic 'port' and 'passage' sections. The 'port' sections moor the analysis at a particular time or place, while the 'passage' sections indicate history – coal, people, ships – on the move.[25] Thus, for the reader as also for the steamship passenger, the journeys are interrupted, the geographies of fuel consumption unstable. For the labourers on and in the ground, however, the infrastructures of passage were all too constant.

Port: 'At Wukumoto We Visited…'

In 1762, in one of the perennial reshuffles of domain management which characterized the Tokugawa shogunate's rule, the feudal lord of Okazaki was ordered to move to Karatsu, many days' travel to the west. Unfamiliar with his domain's socio-economic profile, he commissioned the painter Kizaki Moritaka (1711–92), who had accompanied him from central Honshu, to document local industries. Kizaki's first work, 'Scroll about the Whale Incident', was completed in 1773. Over the next decade, he continued to paint and gather information, culminating in the magnificent eight-scroll 'Illustrations of Products from Hizen Province' (1784). This depicted not only whaling but also nineteen other types of livelihoods, including horse breeding, pottery production, deer and wild boar hunting, falconry, cormorant fishing, coastal fishing, papermaking, textile bleaching, blacksmithery, incense production – and, as I shall shortly discuss, coal mining.[26]

[24] Dipesh Chakrabarty, 'The Climate of History: Four Theses', *Critical Inquiry* 35, 2 (2009): 197–222, citation from p. 220.

[25] On the need to bring 'passage' back into spatial imaginations of the world, see Carter, *Dark Writing*, pp. 16–48.

[26] Kizaki Moritaka 木崎盛標, 'Hizen-shū sanbutsu zukō' 肥前州産物図考 [Illustrations of products from Hizen Province] (1784), digitized by the National Archives of Japan Digital Archive, www.digital.archives.go.jp (last accessed 23 June 2021). Kizaki was

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At around the same time as Kizaki was completing his scroll, a new coal mine opened in Fukumo, in the southern part of Hizen Province. Though some thirty-five kilometres distant from Karatsu, in geological terms Fukumo was located at the southern end of what a 1913 map called the 'Karatsu Coal Field', in today's municipality of Ōmachi (see Map 4, p. 240).[27] And here, doubtless to the surprise of the mine's labourers, a couple of European visitors appeared in 1826. In his diary entry for 18 February, a day after his thirtieth birthday, one visitor mangled the mine's name as he noted, 'Bei Wukumoto besuchten wir eine Steinkohlengrube'.[28]

The diarist was Philipp Franz Balthasar von Siebold (1796–1866), a German physician and botanist who had been working at the Dutch East India Company outpost of Dejima, in Nagasaki, since 1823. At the beginning of 1826 he joined the company's delegation on its mission to the shogunal capital in Edo, and as part of this trip he and a companion took a detour to the coal mine in 'Wukumoto'. Siebold was not the first German doctor to write about Japanese coal production. The Dejima-based Engelbert Kaempfer (1651–1716) had noted coal mines in central Kyushu on his way to Edo in 1691 and again on his return the following year, when he commented that the people around the post station of Koyanose 'were very dirty, perhaps because of the hard coal'.[29] In 1826, Siebold would also pass by 'coal-burning mountains' (*Kohlenbrenner Gebirge*) near Koyanose – in the region later known as Chikuhō. But it was his account of Fukumo that was to have a lasting geopolitical impact:

The coal was brought to the surface through a shaft, which gently slopes downward in 120 deep steps. It was foliated coal (Houille feuilletée), alternating in thin layers with clay shale. Up to about sixty steps down, because our Japanese guides did not permit us to descend any further, the thickness of the

also known by the given name Yūken 攸軒. For the scroll's composition, see Mori Hiroko 森弘子 and Miyazaki Katsunori 宮崎克則, *Kujiratori no shakaishi: Shiiboruto ya Edo no gakushatachi ga mita Nihon hogei* 鯨取りの社会史：シーボルトや江戸の学者たちが見た日本捕鯨 [A social history of whale catching: Japanese whaling as seen by Siebold and Edo scholars] (Tokyo: Karansha, 2016), pp. 100–7.

[27] 'Coal Resources of the World. Japan. Map No. 17, Plate IV. Karatsu and Sasebo Coal Fields. After Y. Otsuki' (Toronto: Morang, 1913), available through the David Rumsey Map Collection, www.davidrumsey.com/luna/servlet/detail/RUMSEY~8~1~205124~3002286:Karatsu-and-Sasebo,-Japan–Coal-Res (last accessed 23 June 2021).

[28] It is unclear when the Fukumo 福母 (also 布久母) mine opened, but one suggestion is sometime in the 1770s or 1780s: Ōmachi-chō 大町町, *Ōmachi-chōshi* 大町町史 [A history of Ōmachi town] (Ōmachi: Ōmachi chōshi hensanshitsu, 1987), p. 332 (and p. 333 for Siebold's visit).

[29] Kaempfer, *Kaempfer's Japan*, pp. 297, 400.

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coal strata was inconsiderable and a matter of only a few inches. But deeper down the strata are apparently several feet in size – something one could also gather from the extracted coal pieces.[30]

Siebold then described what he considered to be an elementary system for extracting ground water, before concluding: 'Because the coal is of strongly bituminous composition, it is usually burned as coke, which happens both at the actual pit and in free-standing ovens.'

In this passage, Siebold's language reveals the extent to which late eighteenth-century 'geognostic' (Earth-knowing) mineralogy framed his vision of the natural world. One of the leading geognosts of the day, Abraham Gottlob Werner (1749–1817), professor of mining and mineralogy at the Bergakademie Freiberg in Saxony, had emphasized in his *Kurze Klassifikation und Beschreibung der verschiedenen Gebirgsarten* (1787) the need for a precise 'description' of different rock strata.[31] Consequently, when Siebold wrote of 'thin layers' (*dünne Schichten*) of 'foliated coal' (*Blätterkohlen, Houille feuilletée*) alternating with 'clay shale' (*Schieferton*), he was employing a stratigraphic vocabulary whereby – to cite Georges Cuvier's 'Preliminary Discourse' to his 1812 *Recherches sur les ossemens fossiles de quadrupedes* – 'nature everywhere maintains the same language'.[32] Siebold's 'reading' of the earth was thus an act of archival transcription, in which he began to abstract the particular characteristics of the Fukumo mine into a universal geological terminology. Future scholars – or commodores, or consuls – would themselves not need to read the archive$_0$ of the earth because they now had Siebold's *Nippon: Archiv zur Beschreibung von Japan* (1832).

[30] Philipp Franz von Siebold, *Nippon: Archiv zur Beschreibung von Japan und dessen Neben- und Schutzländern Jezo mit den südlichen Kurilen, Sachalin, Korea und den Liukiu-Inseln*, Alexander Freiherr von Siebold and Heinrich Freiherr von Siebold, eds., 2nd edn (Würzburg: KUK Hofbuchhandlung von Leo Woerl, 1897 [1832]), vol. 1, p. 88. Digitized by the Internet Archive, https://archive.org/details/b29352411_0001 (last accessed 8 January 2020). Siebold's journey to Edo was in the company of Heinrich Bürger (see 'Port: No Further than Sixty Steps Down', later in this chapter), the Dutch East India Company's chief factor (Opperhoofd) in Dejima, Johan Willem de Sturler (1777–1855), and fifty-seven Japanese men: Arlette Kouwenhoven and Matthi Forrer, *Siebold and Japan: His Life and Work* (Leiden: Hotei Publishing, 2000), p. 33.

[31] Rudwick, *Earth's Deep History*, pp. 82–5. For the influence of Werner on Siebold, see Togo Tsukahara, 'An Unpublished Manuscript *Geologica Japonica* by Von Siebold: Geology, Mineralogy, and Copper in the Context of Dutch Colonial Science and the Introduction of Western Geo-sciences to Japan', *East Asian Science, Technology, and Medicine* 40 (2014): 45–80, here pp. 56–8. According to Tsukahara, Siebold had a copy of Werner's *Letztes Mineral-System: Aus dessen Nachlasse auf oberbergamtliche Anordnung herausgegeben und mit Erläuterungen versehen* (1817) with him in Japan.

[32] Cited in Sepkoski, 'Earth as Archive', p. 61.

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And indeed, two decades later, this brief diary entry would be pored over by powerful actors in the corridors of Washington, DC – a fuel, as it were, for a new imagination of the Pacific world.[33]

Passage: 'The Great Mineral Agent of Civilization'

The lithograph entitled 'Landing of Commodore Perry, Officers & Men of the Squadron', by the Dresden-born Wilhelm Heine (also known as William, 1827–85), has become one of the most famous visualizations of US–Japanese engagement in the mid nineteenth century. Commemorating Perry's second visit to Japan in February–March 1854, it offers a shoreside view of the commodore's ceremonial landing in the then-village of Yokohama on 8 March. From behind two lines of immaculately attired troops, their white trousers pristine and their bayonets standing to attention, a crowd of Japanese onlookers strains to catch a glimpse of the navy-uniformed central group, headed by Perry, as it marches in formation up the beach to awaiting shogunal officials. Just to the rear of Perry and his officers, three African-American men serve as the commodore's personal guards. In the distance, the US squadron is anchored in calm waters, the steam-powered *Susquehanna*, *Mississippi*, and *Powhatan* identifiable by their funnels. Heine's image records detailed choreographies of power in the beach encounter, from the minstrel diplomacy of racial hierarchies performed by the Americans to the theatre of gift exchange between the two sides.[34] Indeed, in another famous lithograph from March 1854, often wrongly attributed to Heine, US engineers explain the workings of a quarter-size steam locomotive to enchanted samurai, while up to three miles of telegraph wire stretch along the shore into the distance.[35]

This model train and the telegraph were just a few of the presents which Perry lavished upon his Tokugawa counterparts in order to showcase US technology and systems of knowledge – a collection which Heine himself later described as 'one of the most valuable gifts ever brought and

[33] China's place in the world was similarly reconceptualized through mineral resources in the late nineteenth century: Shellen Xiao Wu, *Empires of Coal: Fueling China's Entry into the Modern World Order, 1860–1920* (Stanford, CA: Stanford University Press, 2015).

[34] On the performance of blackface minstrel shows by Perry's crew in Japan, see Brian Rouleau, *With Sails Whitening Every Sea: Mariners and the Making of an American Maritime Empire* (Ithaca, NY: Cornell University Press, 2014), pp. 46–55.

[35] The lithograph is thought to be by W. T. Peters, a New York artist, and based on a now-lost daguerreotype by the Perry mission's photographer, Eliphalet Brown, Jr: see John W. Dower, 'Black Ships & Samurai: Commodore Perry and the Opening of Japan (1853–54)', MIT Visualizing Cultures, https://visualizingcultures.mit.edu/black_ships_and_samurai/index.html (last accessed 2 July 2021).

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presented by one nation to another'.[36] But Perry's gift-giving equally had a strategic purpose: in offering objects of great financial and intellectual value to Japanese officials, he was attempting both to impress upon them American 'advancement' and also to force them into a position of reciprocal diplomacy. As Courtney Fullilove has argued, this was 'an exercise of power', in which 'largess became a weapon rather than homage'.[37] But although the asymmetries of gift-giving in 1854 were undoubtedly important, the problem with such analyses is that they follow the Heine framing of encounter, thus foregrounding the significance of the shore and relegating the ships and the sea to mere background details. In fact, the challenges raised by the transoceanic passage from the United States to Japan were central to the Perry expedition's goals – and, in pursuing those goals, the commodore was exposed to a very different exercise of power from that represented in the mission's visual records.

On his initial arrival in Edo Bay, in July 1853, Perry had carried a letter from President Millard Fillmore for the emperor of Japan that framed the geopolitical ambition of the expedition according, first, to the US's recent expansion to Oregon and California (and the latter's production of 'about sixty millions of dollars in gold every year'), and, second, to the fact that '[o]ur steamships can go from California to Japan in eighteen days'. Fillmore was 'desirous' of mutual trade, and he also sought protection for American whalers who had become shipwrecked in Japan. (The significance of the whaling industry was alluded to in one of Perry's gifts for the Japanese empress, namely perfume produced from ambergris.)[38] But the expedition's key goal – or so it has been argued – came in the paragraph which followed the president's request for 'kindness' to be shown to the whalers:

> Commodore Perry is also directed by me to represent to your imperial majesty that we understand there is a great abundance of coal and provisions in the Empire of Japan. Our steamships, in crossing the great ocean, burn a great deal of coal, and it is not convenient to bring it all the way from America. We wish that

[36] Wilhelm Heine, *With Perry to Japan: A Memoir*, trans. Frederick Trautmann (Honolulu: University of Hawai'i Press, 1990 [1856]), pp. 126–7, cited in Courtney Fullilove, 'Gift and Gunboat: Meanings of Exchange in the Perry Expedition', *Diplomatic History* 42, 1 (2018): 90–108, here p. 96.

[37] Fullilove, 'Gift and Gunboat', pp. 97, 98.

[38] Ian Jared Miller, 'Writing *Japan at Nature's Edge*: The Promises and Perils of Environmental History', in Ian Jared Miller, Julia Adeney Thomas and Brett L. Walker, eds., *Japan at Nature's Edge: The Environmental Context of a Global Power* (Honolulu: University of Hawai'i Press, 2013), pp. 1–17, here p. 15fn.

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our steamships and other vessels should be allowed to stop in Japan and supply themselves with coal, provisions, and water.[39]

Crossing the great ocean was indeed inconvenient: so much so that Perry himself did not traverse the Pacific to reach Japan. Drawn by the much cheaper coal which could be purchased on the US East Coast, his mission instead crossed the Atlantic and then the Indian Oceans, sending its coal supplies in advance. Even then, the coal alone cost more than US $600,000 dollars, while its acquisition – in Madeira, Singapore or Shanghai, for example – threw up all kinds of logistical challenges.[40]

Thus, in terms of fuel access, the goal of Perry's expedition may be considered as much to 'open' the Pacific to the conveniences of trans-oceanic passage as to 'open' Japan (itself a deeply problematic notion).[41] This was a perspective ignored for many years in popular portrayals of Perry's arrival – partly because those portrayals tended to overlook the logistics of his lengthy passage to Japan.[42] But when Perry himself later came to dictate the *Narrative* of his expedition, he emphasized – with italics – the importance of US access to Japanese fuel. In the very first paragraph of chapter I, he claimed that California's statehood had rendered America, not China, the new 'Middle Kingdom': 'If the shortest route between Eastern Asia and Western Europe be (in this age of steam) across our continent, then was it obvious enough that our continent must, in some degree at least, become a highway for the world'. The discovery of California gold, he continued, had given

[39] Cited in Matthew Calbraith Perry, *Narrative of the Expedition of an American Squadron to the China Seas and Japan, Performed in the Years 1852, 1853, and 1854, under the Command of Commodore M. C. Perry, United States Navy, by Order of the Government of the United States. Compiled from the Original Notes and Journals of Commodore Perry and His Officers, at His Request, and under His Supervision, by Francis L. Hawks, D. D., L. L. D.*, Washington, DC, vol. 1, pp. 256–7. Digitized by ETH-Zürich, https://doi.org/10.3931/e-rara-14667 (last accessed 2 July 2021). For the argument that Perry's principal interest was coal, and that he 'chose instead to make the public face of his efforts a remonstrance against the mistreatment of shipwrecked American sailors and whaling crews who increasingly washed up on Japanese shores', see Shulman, *Coal and Empire*, p. 80.

[40] On the expedition's costs, and on its logistical challenges, see Shulman, *Coal and Empire*, pp. 37 and 79–91 respectively. A ton of coal procured on the west coast of North America in 1850 cost up to ten times more than one on the Atlantic seaboard (p. 35).

[41] For the argument that Japan's 'opening' lay primarily in new Japanese geographic imaginations of the Pacific Ocean, rather than in older notions of an awakening from slumber, see Endō, 'Cultural Geography of the Opening of Japan'. Cf. Perry, *Narrative*, vol. 1, p. 62: 'The Pacific ocean is destined to be the theatre of immense commercial undertakings.'

[42] Sheila Hones and Yasuo Endo, 'History, Distance and Text: Narratives of the 1853–1854 Perry Expedition to Japan', *Journal of Historical Geography* 32 (2006): 563–78, here p. 566.

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'additional interest to the obvious reflections suggested by our geographical position':

> Direct trade from our western coast with Asia became, therefore, a familiar thought; the agency of steam was, of course, involved, and fuel for its production was indispensable. Hence arose inquiries for that great mineral agent of civilization, *coal*.[43]

'Hence arose inquiries' is an oddly distant formulation, similar to President Fillmore's 'understanding' of Japan's 'great abundance of coal'. But the introductory chapter to Perry's *Narrative* reveals the sources of this knowledge: the Americans had read Kaempfer's description of coal from 1691–2; and they were familiar with Siebold's account of his visit to Fukumo:

> Dr. Siebold also speaks of coal as being in common use throughout the country; and on visiting one of the mines he saw enough to convince him that it was skillfully worked. For domestic purposes they convert the coal into coke. Viewed in the light of commercial intercourse between the two hemispheres, this coal is worth more than all the metallic deposits we have enumerated.[44]

(Which were, to be clear: silver, copper, mercury, lead, tin and iron.)

That Siebold influenced Perry's reading of Japan is well known. While the commodore rejected the doctor's entreaties to be allowed to join the expedition, he did purchase Siebold's *Archiv* for US$503 (out of a total budget of US$30,000 for the expedition's library of maps and books). Perry also used maps which Siebold had sent to Wilhelm Heine, one of two German-speaking members of the expedition with whom the doctor was in correspondence in 1852–3: here, the artist was a mediator of knowledge with more than just his paintbrush.[45] But Siebold's relatively short description of the southern Karatsu coalfield seems to have taken on an oversized significance for the Americans, becoming central to a vision of 'commercial intercourse between the two hemispheres'.

Even though Siebold himself would critique Perry's alleged ignorance of Japanese coal in 1854, the Fukumo pithead remained a lodestar for US imaginations of transpacific passages. In August 1856, on his way to Japan under orders to conclude a comprehensive trade treaty, the new consul Townsend Harris (1804–78) recorded a diary entry which

[43] Perry, *Narrative*, vol. 1, p. 75 (emphasis in original).
[44] Perry, *Narrative*, vol. 1, p. 60.
[45] On this correspondence, see Herbert Plutschow, *Philipp Franz von Siebold and the Opening of Japan: A Re-Evaluation* (Leiden: Brill, 2007), pp. 53–60. On the expedition's budget, see pp. 50–1.

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revealed his onboard reading as his ship steamed away from Hong Kong (having coaled there two days earlier):

> Von Siebold says that coal exists in the Island of Kyushu. At Koyanosi [sic] he saw a coal fire. At Wukumoto [sic] he visited a coal mine. Although he was not permitted to descend the shaft for more than sixty steps, he saw enough to convince him that the shaft was well and judiciously worked. He was told the lower *strata* were several feet in thickness, and the size of the blocks he saw drawn up confirmed the statement. The coal is bituminous, and is converted into *coke* for use by the Japanese.[46]

Port: No Further than Sixty Steps Down

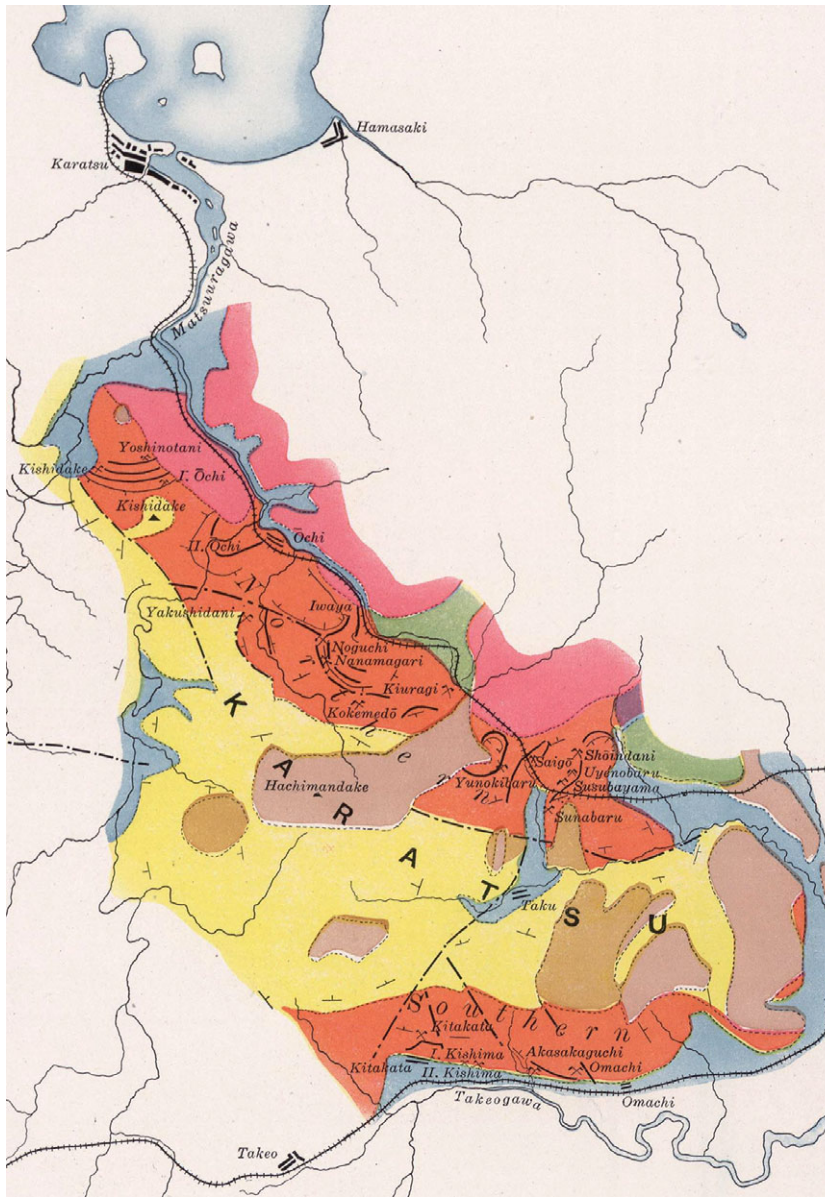
What Harris paraphrased as a 'block' and Siebold had called 'extracted coal pieces' (*gewonnene Kohlen*) was, in the very distant past, perhaps a fern or a palm tree. Between 56 and 23 million years in the past, to be precise – that is, in the Eocene and Oligocene epochs, when the landmass today called 'Japan' was still attached to the continental coastline of Eurasia. This was a younger coal than that mined in the *Yamashiro-maru*'s birthplace in north-east England: it had a more complex chemical composition than those seams, as around Newcastle upon Tyne, which had been formed in the eponymous Carboniferous period (c. 360–300 million years ago), due partly to the relative coolness of the Oligocene, when the Antarctic ice cap was beginning to form.[47] On the aforementioned 1913 map of the Karatsu Coal Field, these deposits would be coloured in two blocks of orange: one in the area encompassing Fukumo, and the other, stretching north, along the western side of the Matsuura river (see Map 4). The river's eastern bank was coloured in pink, to represent granite – a rock predating the region's coal by up to 90 million years. (Such maps were also archival transcriptions: the earth was abstracted into a visual form which could offer other interested parties an ersatz reading of the underground.)[48]

[46] Townsend Harris, *The Complete Journal of Townsend Harris: First American Consul General and Minister to Japan* (New York: Japan Society, 1930), pp. 188–9 (13 August 1856). Available through the Internet Archive (https://archive.org) (last accessed 3 July 2021) (emphasis in original).

[47] Teresa Moreno, Simon Wallis, Tomoko Kojima and Wes Gibbons, *The Geology of Japan* (London: Geological Society, 2016), p. 450; Larry Thomas, *Coal Geology* (Chichester: Wiley, 2013 [2nd edn]), pp. 46–7.

[48] Geological Survey of Japan (地質調査総合センター), GeomapNavi for Karatsu, https://gbank.gsj.jp/geonavi/geonavi.php#12,33.28920,130.10084 (last accessed 5 July 2021). See also Sepkoski, 'Earth as Archive', pp. 61–3.

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Map 4 Karatsu and Sasebo Coal Fields (1913), detail, with Karatsu to the north and Fukumo (Ōmachi) in the south. Courtesy of David Rumsey Map Collection, David Rumsey Map Center, Stanford Libraries.

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In the years after the fern or palm tree died, it came to be covered by layer upon layer of marine and non-marine sediments (mainly non-marine, in the Karatsu case). The pressure of this weight generated heat; gradually, the peat – 'a melange of spores, seed coats, wood, bark, leaves, and roots which looks like chewing tobacco and burns about as well', in John McPhee's memorable description – began to cook.[49] The extent of this cooking, and the amount of hydrogen, oxygen, nitrogen, sulphur and most importantly carbon that escaped or remained trapped within, would determine the coal's classification. Any fossil with more than 50 per cent of carboniferous material counted as a 'coal'. But the famous seams of Pennsylvania, southern Wales, or indeed Amakusa – whence so many women departed on coal ships for Southeast Asia – had a carbon content of between 86 per cent and 98 per cent. This qualified them to be described as *anthracite*, indicating a hard, iridescent fuel which had a high calorific value.[50] This was important because if coal A had a higher calorific value than coal B, a ship would need to carry less of A than B in order to travel the same distance – thus leaving more space in the cargo holds to carry freight, for which a ship owner could charge money. As we shall see, calorific value was not the only determination of a coal's appropriateness for a steamship, but it was important.

In 1826, Siebold did not have steamship fuel in mind when he entered the mine at Fukumo. But he knew enough to identify the coal there as 'of strongly bituminous composition' – that is, as having a lower calorific value than anthracite. Indeed, his later criticism of Perry's great expectations centred on his belief (mistaken, as it would turn out) that Japan's coal was overwhelmingly lignite – that is, 'brown', with an even lower carbon content than bituminous coal.[51] Once again, the Karatsu field took on an oversized significance in Siebold's imagination of 'Japanese' coal.

And there we might leave the story. Except that the most interesting phrase from Siebold's 1826 diary entry, in my view, is the almost par-

[49] John A. McPhee, *Annals of the Former World* (New York: Farrar, Straus and Giroux, 2006), pp. 246–7.

[50] On calorific value, see Steven Gray, *Steam Power and Sea Power: Coal, The Royal Navy, and the British Empire, c. 1870–1914* (London: Palgrave Macmillan, 2018), pp. 263–4; on carbon content, 'How Is Coal Formed – A Process Spanning Eras', www.planete-energies.com/en/medias/close/how-coal-formed-process-spanning-eras (last accessed 5 July 2021). A calorie indicates how much heat an engine would need to raise one gram of water by one degree Celsius.

[51] Siebold brought back two samples of Japanese coal, both 'brown' and 'black', from his travels: Tsukahara, 'Unpublished Manuscript', p. 79.

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enthical subclause, 'Up to about sixty steps down, *because our Japanese guides did not permit us to descend any further* […]'. This is because it would be possible to characterize the presence and analyses of Siebold and his assistant, pharmacist Heinrich Bürger (1806–58), in mid-1820s Japan in terms of the gradual 'dissemination of modern Western science and medicine' to non-European arenas.[52] Other than the two men's trip to Fukumo, however, much of Siebold's pidgin knowledge about Japanese coal mining was gleaned from his medical students at his school in Nagasaki, thereby pointing to the mediation of local expertise in the production of knowledge about Japan.[53] Similarly, in Fukumo, Siebold and Bürger's descent was restricted by the mediation of 'Japanese guides' to only sixty steps, thereby limiting his direct observational analysis to the upper-level foliated coal. Perhaps the guides were concerned about their visitors' safety. But it seems equally likely that they were protecting their pit from prying outside eyes: denying, as it were, access to the earth's deep archive.

Whether Perry remembered this detail in his reading of Siebold's *Archiv* is unknown. But it may be no coincidence that one of his least satisfactory interactions with the Japanese in 1853–4 came about because of a local reluctance to share coal knowledge. In Shimoda, he writes, the Japanese authorities supplied the US steamers with some 'native coal' – 'brought from their mines, at considerable trouble and expense, in hampers made of rice-straw'. Yet Perry was dismayed to discover that this was only a low-grade surface coal (obtained from fewer than sixty steps down, he might have surmised). 'On being tried on board the steamers,' he continued, 'the engineers reported that it was of a quality so inferior that they were unable to keep up steam with it.' This then prompted the observation:

> Whether the shrewd Japanese supplied an inferior quality to deceive their visitors, or whether from ignorance of the article and want of mining skill they innocently brought that which was inferior, cannot be certainly decided; but as good coal certainly exists in Japan, and as the natives not only use it, but, according to Von Siebold, know very well how to mine it, the probabilities are that they purposely furnished the poorest samples. […] We are inclined to think, after a careful examination of the particulars of the interviews and conferences with them on all topics, that on no one subject did they misrepresent more unscrupulously than on that of coal.[54]

[52] For a partial critique of this view, see Tsukahara, 'Unpublished Manuscript', citation from p. 54.
[53] Tsukahara, 'Unpublished Manuscript', p. 59. See also Harald Fischer-Tiné, *Pidgin-Knowledge: Wissen und Kolonialismus* (Zurich: Diaphanes, 2013).
[54] Perry, *Narrative*, vol. 1, pp. 481–2, 483–4.

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If coal was the 'great mineral agent of civilization', then for all the pomp of Perry's landing ceremonies and performance of US gift-giving, considerable agency lay in Japanese hands in 1853–4 – including the agency of alleged misrepresentation. A similar dynamic had been at play when Siebold was permitted to descend no further than sixty steps in Fukumo. Thus, coal was a leveller in the encounter of Japan and the outside world, its power political as much as calorific.

Passage: From Mine to Market

Siebold's past participle was a grammatical occlusion, of course: behind the 'extracted coal pieces' were men and women engaged in the heavy labour of extraction.

Their passage to the mine had begun long before 1826, in the economic and environmental transformations of the first Tokugawa century. Deforestation, caused partly by the construction boom in the new metropolis of Edo, and partly by an archipelago-wide population growth (necessitating ever more forest clearance for rice paddies and firewood for cooking), was one factor which led local people to burn surface coal deposits where they naturally occurred – as near the village of Koyanose, visited by Kaempfer in 1692.[55] After that area of north-central Kyushu had been devastated by a famine in 1732–3, killing 70,000 people (a fifth of the population), short-term economic hardship also pushed desperate farmers into the nascent coal-mining industry. For years afterwards, as if to recall their need to earn extra money in the agricultural off-season, mining was stigmatised as the 'famine industry'.[56]

Meanwhile, as mainland capitalists expanded their fishing interests north into the islands of Ezo and the world of the Indigenous Ainu peoples, greater amounts of salt were needed in order to preserve springtime catches of herring for transportation back south. From the eighteenth century onwards, central Kyushu coal was shipped both to Kyushu's northern coast and to the western Inland Sea's inshore salt fields, where it was burned to purify brine. Compared to saltwater cauldrons heated by pine boughs and needles, coal's hotter fires produced a cloudier, irregular crystal, one which was adequate for food preservation or for the manufacture of condiments but less good for table

[55] Conrad Totman, *Early Modern Japan* (Berkeley: University of California Press, 1993), pp. 225–9.

[56] Arne Kalland and Jon Pederson, 'Famine and Population in Fukuoka Domain during the Tokugawa Period', *Journal of Japanese Studies* 10, 1 (1984): 31–72, here pp. 44–5; Phipps, *Empires on the Waterfront*, p. 119.

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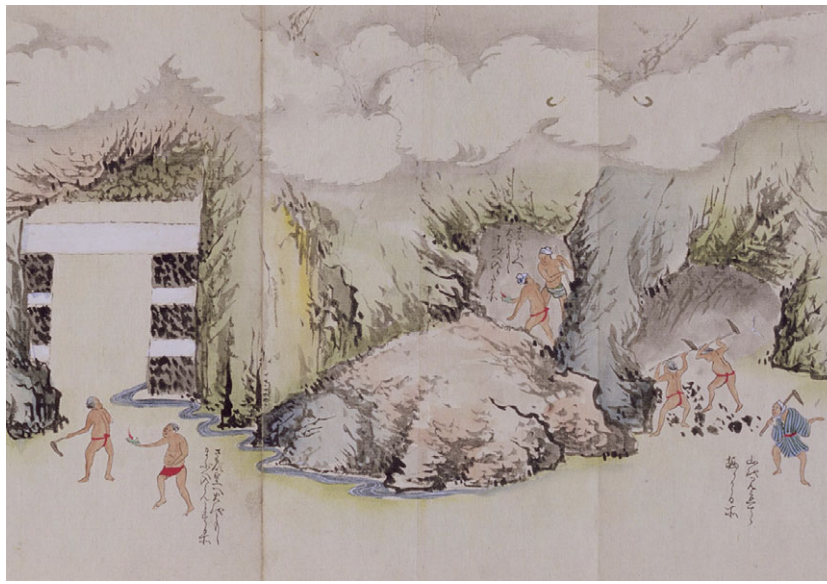


Figure 6.2 Detail from Kizaki Moritaka, 'Illustrations of Products from Hizen Province' ('Hizen-shū sanbutsu zukō' 肥前州産物図考), 1784. Courtesy of the National Archives of Japan.

salt.[57] Even so, until the mid 1880s half of all the coal mined for domestic purposes in Karatsu and in the Chikuhō fields around Koyanose was burned for the manufacture of salt.[58]

These, then, were some of the socio-economic contexts which animated the lives of the near-naked coal miners portrayed in the third scroll of Kizaki Moritaka's 1784 'Illustrations of Products from Hizen Province' (see Figure 6.2). As if reflecting the process by which local villagers initially cleared flora and detritus from the Karatsu hills before extracting surface deposits of coal,[59] the scroll first depicts two men hacking directly at the mountainside. Reading right to left, we then encounter another pair of labourers entering an opening in the mountain, one carrying an unprotected flame to illuminate the way, while the next group works adjacent to a human-made entrance, replete with

[57] Shunsaku Nishikawa, 'The Economy of Chōshū on the Eve of Industrialization', *Economic Studies Quarterly* 38, 4 (1987): 323–37, here p. 330; Arne Kalland, *Fishing Villages in Tokugawa Japan* (Richmond: Curzon Press, 1995), pp. 76, 92–3; Totman, *Early Modern Japan*, p. 272.

[58] Richard J. Samuels, *The Business of the Japanese State: Energy Markets in Comparative and Historical Perspective* (Ithaca, NY: Cornell University Press, 1987), p. 73.

[59] W. Donald Burton, *Coal-Mining Women in Japan: Heavy Burdens* (London: Routledge, 2014), p. 28.

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supporting overhead beams.[60] The latter was much closer to what Siebold and Bürger would have seen four decades later, namely a horizontal entrance to the pithead, from which steps followed the seam down into the hillside. On the other side of the world, in eighteenth-century Northumberland and County Durham, this was known as walk-in drift mining.[61] Thus, drawn in the same year as James Watt patented his new steam engine, the Hizen scroll's depiction of Japanese mining is yet another reminder that proto-industrialization was occurring in parts of Japan even as industrialization took off in Britain, and that Japan's subsequent late nineteenth-century industrialization cannot be explained simply as the inscription of Euro-American expertise onto a blank Japanese slate.

Indeed, in the years immediately after the Meiji revolution, when the new Navy Ministry surveyed its domestic fuel supplies, there were 376 such pitheads recorded in the Karatsu region, clustered around nineteen villages.[62] This points to an extraordinary expansion of coal mining in mid nineteenth-century Karatsu in particular and Kyushu more generally, justifying American and European imaginations of a Japanese 'abundance'. But by this time, as miners were forced to dig deeper into the mountainside, many of the pithead entrances were less sculpted than those depicted in the 1784 Hizen scrolls. Instead, narrow shafts known as *tanuki-bori* 狸掘り (badger holes) followed the seam downwards into the earth. Usually working in teams of two, the male *sakiyama* 先山 (hewer, literally 'pit fronter') crouched on his haunches or lay sideways, chipping away at the coal with a pickaxe or mattock. Brute hacking – as in the Hizen scrolls – would produce nothing but shards and powder, so the *sakiyama* sought out cracks in the seam, wedged his pick in, and loosened the cracks until whole lumps of coal gave way. These he pushed and kicked behind him to the *atoyama* 後山 (assistant, 'pit backer'), often a woman, who raked and scraped the pieces into a wicker basket and then, once she'd manoeuvred herself into more space, into two deeper baskets to yoke over her back. Such a load-bearing practice was adapted from the farm fields, whence labourers carried vegetables, tools and rice back to the village balanced over their shoulders. The coal baskets could load up to 80 *kin* 斤 (48 kg) in front and 100 *kin* (60 kg)

[60] The scroll, Hizen-shū sanbutsu zukō 肥前州産物図考, is digitized by the National Archives of Japan Digital Archive, www.digital.archives.go.jp/. On the visual similarities between the Hizen scrolls and Hirase Tessai's 平瀬徹斎 'Nippon sankai meibutsu zue' 日本山海名物図絵 (1754), see Mori and Miyazaki, *Kujiratori no shakaishi*, pp. 102–7.

[61] Visitors to County Durham's Beamish – The Living Museum of the North (www.beamish.org.uk) can enter the Mahogany Drift Mine, first opened in 1855.

[62] Tōjō, 'Meiji zenki, Hizen Matsuuragawa', p. 32. The ministry was established in 1872.

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behind; even if both were only half-filled, an assistant might lug more than 50 kilograms back through the tunnels, either to a haulier or all the way to the pithead.[63]

Kizaki Moritaka did not offer visual depictions of such details: perhaps, like Siebold, he was not permitted to descend very deep into the Karatsu shafts, and thus was prevented from witnessing the brutal working conditions underground. (This may be another reason why the 'Japanese guides' restricted Siebold's access.) Nearly two centuries later, however, a retired coal miner from Tagawa – the mines owned by the diarist Yasukawa, until he sold them to Mitsui in 1900 – began to paint scenes from his working life and thereby bequeath the world an extraordinary archive of the subterranean.[64] Born in Fukuoka in 1892, Yamamoto Sakubei first joined his older brother in the Chikuhō mines of north-central Kyushu when he was seven or eight years old and still at elementary school. He became a full-time miner in 1906, the same year Mitsui Tagawa identified its ideal unit of labour recruitment as 'three people comprised of a couple with a 12- or 13-year-old child, all working, and an elder to cook'. (For context: there were officially 17,570 men, 8,316 women and 115 children working as hewers or assistants in the Chikuhō mines in 1906.)[65]

Many of the nearly 600 watercolour and ink paintings that Yamamoto composed between his retirement in 1955 and his death in 1984 look back to the turn of the twentieth century. They may therefore be taken as the best surviving record of what working life was like for the men and women in whose calloused fingertips the passage of coal from Karatsu to the *Yamashiro-maru* began. In 'Mining Coal in a Lying Position', for example (see Figure 6.3), Yamamoto depicts a hewer/assistant team working on a seam thinner than 1.5 metres (which the team could approach from a standing position) or even 0.45 metres (which might allow them to squat). The painting's power is to offer a full sensory vision of the labour. The underground heat is suggested through the bare torsos of both the male hewer and the female assistant – the former's tattoos alluding to the fact that many Meiji-era miners were convicts or social outcasts, or were stigmatized as such. The exaggerated gradations of colour extending outwards from the hanging lamps – yellow to cream to grey to black – connote the intense darkness of the couple's daily

[63] For details of these working conditions, see Burton, *Coal-Mining Women*, pp. 29–33.

[64] The Yamamoto Collection became Japan's first entry in UNESCO's 'Memory of the World' programme in 2011: www.y-sakubei.com/english/mow/index.html (last accessed 6 July 2021).

[65] Tagawa Mitsui citation from Burton, *Coal-Mining Women*, p. 17. For the figures from Chikuhō, ibid., p. 15: compare to 3,153 men, 1,561 women and 144 children working as hewers or assistants in the Karatsu mines in 1906.

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Figure 6.3 Yamamoto Sakubei, 'Mining Coal in a Lying Position' (*Nebori* 寝掘り), December 1964. © Yamamoto Family. Courtesy of The Tagawa City Coal Mining Historical Museum Collection.

world. Though both labourers wear bandana-like cloths to protect their heads from sharp rocks above, they eschew facecloths attached to the ears: many miners, Yamamoto writes in his customary comments on another painting, hated such coverings because they muffled the warning sounds of collapsing roofs. But the ears could play tricks, too. Yamamoto recalls hearing a raccoon dog in the summer of 1899 making noises as if it were driving or dragging a pickaxe – a terrifying illusion for a seven-year-old boy. Thus, to the right of the diagrammatic inset in 'Mining Coal in a Lying Position', he records the lyrics to a mining song. The words reveal the calculations the hewer was making as he inched forward, but also the comfort of hearing fellow human voices in this domain of raccoons, rockfalls and the spirits of colleagues killed in accidents:

Noborya horinasanna me ni ishi ga iru.
Orosha horinasanna mizu ga tsuku.
Gotton!

Don't mine coal of an ascending coalface, or your eyes will catch coal dust.
Don't mine coal of a descending coalface, or the coal will get soaked with water.
Gotton! [chant]

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So: from pickaxe to basket, the coal must now be hauled to the pithead entrance – a job that in both the Chikuhō and Karatsu regions accounted for another 4 per cent or so of the total underground labour force in the early twentieth century.[66] There, it must be sifted, sorted, picked and packed (another job often for women), and then carried down to the depots, which in Karatsu were built adjacent to the Matsuura river. In his 1784 scroll, Kizaki depicted the journey from pithead to depot in human-drawn, open-topped carts. This remained the case a century later, as Tōjō Nobumasa's meticulous research has shown: of twenty-five Karatsu pitheads surveyed in 1883, for example, only two used horses to transport the coal. For the other twenty-three, the need for human labour made this the most expensive leg of the journey to market.[67]

From riverside depot downstream to the wholesale merchants based in the shadow of the former domain castle in Karatsu town, the coal now entered the penultimate stage of its migration to the steamship bunker. And it was the relative ease of this riverine transportation which prompted Meiji naval officials to establish a supply infrastructure in the central Karatsu field in the 1870s.[68] One key cluster of depots was to be found near where the Matsuura river forks at today's Ōchi town – that is, north of the Fukumo mine visited by Siebold in 1826 (see Map 4). There were almost 200 pitheads in the vicinity of the Navy Ministry's branch office here (established in 1879), and the distance from the furthest depot to Karatsu was only fifteen kilometres – a two-day round trip at most, and one that an unusually enterprising boatman called Kōshichi made some 113 times in 1880.[69] Again, this was a supply line which had hardly changed since Kizaki's 1784 depiction of single-manned coal barges carrying between 2,000 and 4,000 *kin* (between approximately 1.2 and 2.4 tons, depending on the water level). But despite relatively small barges, the Matsuura river itself gave Karatsu coal a significant advantage over Chikuhō coal in the 1870s and 1880s. This is because the complex flow of the Onga river in Chikuhō – despite its barges carrying up to 10,000 *kin* (approximately 6 tons) – rendered the fastest journey from pithead depots to Wakamatsu market five or six days, increasing to two weeks in bad conditions. In other words, even though Chikuhō coal was known to have a higher calorific value than that of Karatsu, the ease of the

[66] Burton, *Coal-Mining Women*, p. 15 (the figures are for 1906).
[67] Tōjō, 'Meiji zenki, Hizen Matsuuragawa', pp. 41, 38.
[68] On direct mine management, see Tōjō Nobumasa 東定宣昌, 'Karatsu kaigun tankō no settei to sono kei'ei' 唐津海軍炭坑の設定とその経営 [The establishment and management of navy coal collieries in Karatsu], *Keizaigaku kenkyū* 59, 3–4 (1993): 81–109.
[69] Tōjō, 'Meiji zenki, Hizen Matsuuragawa', pp. 36–7.

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latter's riverine transportation network – served with a peak of 1,780 coal barges at the time of the Sino-Japanese War – made the Karatsu region of central strategic importance to Meiji Japan well into the third decade after the revolution.[70] Only the opening of the first railway line connecting the Chikuhō mines to Wakamatsu in August 1891 eroded the hitherto superior infrastructure offered by the Matsuura river, making Onga boatmen such as the artist Yamamoto's father unemployed in the process.[71]

And so the coal has arrived in Karatsu town by river, as it will do until the opening of the first Karatsu railway in 1899.[72] There, the highest quality fuel will be sold by the wholesalers – for an unusually low price of 23 yen per 10,000 *kin* in December 1884, just as the post-crash repairs to the *Yamashiro-maru* are completed.[73] Yet the likely coal-carrying functionality of the *Sumanoura-maru*, the ship with which the *Yamashiro-maru* had collided two months previously, is a reminder that the coal's final passage, onwards from Karatsu, would have been impossible without the countless sail-powered ships which transported it to ports big enough to handle steamships. In Japan, those were ports such as Yokohama, Kobe, Nagasaki – and, at least if the ships anchored in deeper waters offshore, Wakamatsu.[74]

[70] Tōjō, 'Meiji zenki, Hizen Matsuuragawa', pp. 37, 43. For the navy's survey of forty-nine river bargemen whom it directly contracted in 1881, ibid., pp. 34–5: some 71 per cent of the Matsuura river's coal barges were between 4,500 and 5,500 *kin* in 1881.

[71] On the bargemen's response to the Chikuhō railways, see Yamamoto's painting, 'Sendō to okajōki' 舟頭と陸蒸気 [The bargeman and the steam train] (April 1965), in which the boatman glowers at the coal freight train and complains, 'Oh shit! That damned steam train came here to finally rob me of my job'. On Yasukawa's shares in the Chikuhō Railway Company in the 1890s, see Nakamura, *Chihō kara no sangyō kakumei*, p. 212. In terms of the share of Japan's total coal production, Chikuhō coal rose from 27.7 per cent in 1890 to 54.4 per cent in 1900, even as total production trebled from 2.6 million tons to 7.5 million tons in this period, suggesting the transformative effect of rail transportation on Chikuhō production (p. 197).

[72] Tōjō Nobumasa 東定宣昌, 'Karatsu tanden no yusō taikei no kindaika: Karatsu Kōgyō Tetsudō Gaisha no seiritsu to sekitan yusō' 唐津炭田の輸送体系の近代化：唐津興業鉄道会社の成立と石炭輸送 [The modernization of the transportation system in Karatsu Coalfield: The founding of the Karatsu Kōgyō Railway Company and coal transportation], *Hikaku Shakai Bunka* 1 (1995): 49–60. The railways carried 29 per cent of the 906,000 tons produced in Karatsu by 1902, and 62 per cent of the 1.03 million tons produced there in 1906 (p. 58).

[73] *AS*, 10 December 1884. By contrast, in times of unusually high prices, 10,000 *kin* of Karatsu coal could sell for 41 yen: *AS*, 22 August 1882.

[74] In an 1881 survey ordered by the Ministry of Agriculture and Commerce, Wakamatsu was not considered as one of the forty ports suitable for foreign steamship anchorage: Kokaze, *Teikokushugika no Nihon kaiun*, pp. 203–4. That Wakamatsu was a port of call for ships such as the *Yamashiro-maru* by 1900 was due in no small part to the modernization efforts led by entrepreneurs such as Yasukawa, who served on the municipal council from 1898 onwards: Hibino, 'Nisshin/Nichiro senkanki ni okeru Yasukawa Keiichirō', pp. 30–3.

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Port: Alternative Geographies of Japan's 'Opening'

As a small tug conveyed Yasukawa Keiichirō from Wakamatsu to the *Yamashiro-maru* on the morning of 27 March 1900, he may or may not have known that the ship had just arrived from Shanghai.[75] In fact, after its final return to Japan from Melbourne in January 1899, the *Yamashiro-maru* ran the NYK's Yokohama–Shanghai line once or twice a month until mid 1900 – a route which sometimes also extended from Yokohama to Vladivostok. The ship carried passengers and freight across the East China Sea, including (to Shanghai) Japanese green tea for transshipment to North America, and (from Shanghai) groups of Chinese students who were going to study in Japan.[76] But the embarkation of one of Japan's leading coal industrialists, on a ship steaming the Shanghai line and in a port synonymous with coal transportation: this serves as an opportunity for us briefly to consider how coal from Karatsu and Chikuhō was central not just to the fuelling of Japanese ships across the Pacific but, more generally, to a transformation of shipping infrastructures in late nineteenth-century East Asia.

When Commodore Perry first navigated his four-vessel squadron into Edo Bay in July 1853, it is not known exactly which coal his two steamships were burning.[77] All that's clear, according to one of the iconic Japanese woodblock prints of his arrival, is that the ships belched vast amounts of black smoke (see Figure 1.4). But on second thoughts, perhaps the billowing clouds merely represented, like so many other aspects of the print (the figurehead, the paddlewheel, the stern, the monkey-like sailors on the rigging), artistic licence: that is, one of several exaggerations to emphasize the foreignness of the 'black ships' (*kurofune* 黒船) to Japanese eyes. In fact, a key consideration for naval officials across the Euro-American world in the mid nineteenth century was the ability to source coal which offered as *little* smoky discharge as possible,

[75] 'Shanghai Shipping Intelligence', *North China Herald*, 28 March 1900 (the *Yamashiro-maru* reportedly departed Shanghai on 24 March). I am grateful to Rudolph Ng for his research assistance on this aspect of the *Yamashiro-maru*'s history.

[76] For example, 'Commercial Intelligence', *North China Herald*, 9 October 1899, reporting that 440,906 pounds (lb) of green tea carried by the *Yamashiro-maru* had been cleared for ports in Canada and the United States, and 9,315 lb for London; and the Chinese-language *Shenbao* 申報 newspaper (Shanghai), 17 November 1899, for brief mention of a group of thirty-five Chinese students bound for Tokyo. See also Robert Hellyer, *Green with Milk and Sugar: When Japan Filled America's Tea Cups* (New York: Columbia University Press, 2021); Paula Harrell, *Sowing the Seeds of Change: Chinese Students, Japanese Teachers, 1895–1905* (Stanford, CA: Stanford University Press, 1992).

[77] On the 1854 mission, the *Mississippi* consumed 2,336 lb of coal per hour, compared to the *Susquehanna* (3,310 lb) and the *Powhatan* (3,248 lb): Dower, 'Black Ships & Samurai'.

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thus to increase – should it be necessary – the element of surprise in any maritime engagement.

Again, anthracite was in theory the panacea to this problem, for in addition to its high calorific value, it was a relatively smokeless coal. At the same time, however, anthracite was also very hard. This made it difficult to ignite, meaning that once shovelled into an already-lit furnace, it could have an initial cooling effect, followed by a surge in heat once it did ignite – thereby creating an uneven temperature in the fire and thus in the production of steam. Equally, a very hard fuel was less likely to adhere to the furnace's sides, increasing the likelihood of an imbalanced fire when the ship rolled in high seas (the same problem of potential imbalance was true in the coal bunkers).[78] Softer, bituminous coals – '[the *Yamashiro-maru's*] consumption of coal is about forty-eight tons a day of the *soft* kind called "Karatsu"' – ignited faster and dislodged less easily than anthracite. They produced more smoke, however, and, due to their lower calorific value, demanded higher consumption and thus more frequent recoaling. Bituminous coals also had a greater tendency to self-combust – as indeed occurred during the *Yamashiro-maru*'s first crossing to Hawai'i, causing what Captain Mahlmann recalled to be a small fire in one of the ship's coal bunkers.[79]

But as naval engineers on both sides of the Atlantic experimented with different classifications in the 1840s and 1850s, the British Admiralty discovered that the coal extracted from the South Wales Field, especially the central area served by the port of Cardiff, was the ideal steamship fuel. With an average carbon content of 92.5 per cent, the calorific value of 'Best Welsh' was competitive with anthracite – meaning that, per unit of energy, it required less onboard bunker space than bituminous coals. It was also a smokeless coal and produced less ash than softer coals, reducing the labour required of the ship's firemen (about whom more later).[80] In short, no other coal held a flame to Best Welsh.

With Royal Navy warships designed for the consumption of Best Welsh by the late nineteenth century, this particular coal became the standard fuel for the maintenance of British interests around the world. From the east coast of Latin America to East Asia, Welsh coal was to be found in every port of strategic significance for Britain – even when there were 'local' coal industries.[81] In Shanghai, for example, more than half of

[78] Shulman, *Coal and Empire*, p. 46; Brian Lavery, *SS Great Britain, 1843–1937 Onwards: Enthusiasts' Manual* (Yeovil: Haynes Publishing, 2012), p. 99.
[79] Mahlmann, *Reminiscences*, p. 184. [80] Gray, *Steam Power and Sea Power*, p. 70.
[81] Trevor Boyns and Steven Gray, 'Welsh Coal and the Informal Empire in South America, 1850–1913', *Atlantic Studies* 13, 1 (2016): 53–77; on the relative failure of British attempts to develop coal mining in mid-century Labuan (Borneo), see Robert Bickers,

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the coal was imported from Britain in the mid 1860s. Together with coal from Newcastle (New South Wales), British imperial coal thus accounted for around 90 per cent of the port's coal imports. (Mahlmann was employed on a coal barque from Newcastle to Shanghai in 1868.)[82] This predominance of Best Welsh, despite the vast distances in question, was partly explained by economic factors. British imports from India and Burma back to the metropole tended to be bulk commodities (including cotton, jute, rice and teak), whereas British exports to the Asian colonies were higher-value but less bulky manufactured products. The resulting extra capacity in Asia-bound shipping therefore facilitated the export of coal from Wales and contributed to relatively low coal freight costs from Britain to Shanghai or Hong Kong – costs which declined even further after the opening of the Suez Canal in 1869.[83]

From Perry's difficulties in securing a supply of coal in Singapore and Shanghai to the ways in which French colonial officials in Indochina were cognisant of their dependence on what one scholar has called the 'British carbon system', the time was ripe for the emergence of a major new coal supplier in East Asia.[84] This was another reason why President Fillmore's letter expressed such interest in Japanese 'abundance': Japanese coal had the potential to disrupt the British coal monopoly in the crucial port of Shanghai and thus 'open' the Pacific to US steamships – and China to US cotton exports.[85] For their part, British planners were also interested in developing new sources of coal in East Asia so as

'The *Challenger*: Hugh Hamilton Lindsay and the Rise of British Asia, 1832–1865', *Transactions of the RHS* (2012): 141–69, here pp. 157–65.

[82] Kokaze Hidemasa 小風秀雅, '19 seiki ni okeru kōtsū kakumei no shinten to Nihontan no yakuwari' 19世紀における交通革命の進展と日本炭の役割 [The development of the nineteenth-century transportation revolution and the role of Japanese coal], in Nagasaki-shi 長崎市, ed., *Takashima tankō chōsa hōkokusho* 高島炭鉱調査報告書 (Nagasaki: Nagasaki-shi, 2014), pp. 2-6–2-27, here p. 2-20. On Mahlmann, see Chapter 1.

[83] Yrjö Kaukiainen, 'Coal and Canvas: Aspects of the Competition between Steam and Sail, c. 1870–1914', *International Journal of Maritime History* 4 (1992): 175–91, here p. 181. The bulk cost of transporting Welsh coal to Asia declined by between a third and a quarter over the decade 1873–83: Kokaze, *Teikokushugika no Nihon kaiun*, p. 41. See also On Barak, 'Outsourcing: Energy and Empire in the Age of Coal, 1820–1911', *International Journal of Middle East Studies* 47, 3 (2015): 425–45.

[84] Shulman, *Coal and Empire*, p. 85; James R. Fichter, 'Imperial Interdependence on Indochina's Maritime Periphery: France and Coal in Ceylon, Singapore, and Hong Kong, 1859–1895', in James R. Fichter, ed., *British and French Colonialism in Africa, Asia and the Middle East: Connected Empires across the Eighteenth to the Twentieth Centuries* (London: Palgrave Macmillan, 2019), pp. 151–79.

[85] One context for Perry's expedition was the United States having lost out to Britain in trying to establish new coal supplies in Labuan: Shulman, *Coal and Empire*, pp. 70–9.

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to reduce fuel costs in the Royal Navy's budget.[86] In 1866, British consular officials in Nagasaki singled out the nearby coalfields of Takashima, Karatsu, Hirado and Hizen (Saga) as sites ripe for vertical mining technology, and, in the same year, Japanese coal was first exported to Shanghai.

Like historians surveying an archive's potential, geologists and entrepreneurs rushed to analyse Japan's fossil past so as to position themselves favourably in exploiting its fuel future. The British businessman Thomas Blake Glover (1838–1911), based in Nagasaki since 1859, focused his efforts on Takashima island, some fourteen kilometres offshore from the city, where the coal was of a higher quality but also more expensive than that mined in Karatsu.[87] The *Journal of the Tokyo Geographical Society* discussed Karatsu in the context of Japan's 'underground resources' in 1881, while in the same year the British consulate in Nagasaki offered a carbon, sulphur and ash comparison of Takashima and Karatsu coals.[88] In November 1883, two months before the *Yamashiro-maru*'s launch, the *Asahi shinbun* reported on tests carried out by the KUK company, comparing Karatsu coal to that from Horonai (Hokkaido): for eight hours of steaming in identical conditions, 7 tons of Karatsu coal were consumed compared to 6.25 tons of Horonai. The latter produced less ash, too, and weaker smoke than Takashima or Karatsu coals, thus – in the newspaper's optimistic reading – rendering Horonai coal 'no different from high grade British coal'.[89] But, of course, Hokkaido was much further away from East Asian ports hitherto monopolized by Welsh fuel than the coalfields of northern and western Kyushu.

Thus, in exactly the years when steamship tonnage in East Asia began to grow exponentially due to the US-based Pacific Mail Steamship Company commencing its transpacific line (1867), to the concomitant connection of the east and west coasts by transcontinental railway (1869), and especially due to the opening of the Suez Canal, Japanese coal became available to meet the new demand. And not just any coal, but fuel of sufficient calorific value and yet softness to be, if not in the league of Best Welsh, then at least more than adequate for steamship

[86] Fichter, 'Imperial Interdependence', p. 167. On Prussia's attempts to exploit Chinese coal reserves from the 1860s onwards, see Wu, *Empires of Coal*, pp. 33–65.

[87] John McMaster, 'The Takashima Mine: British Capital and Japanese Industrialization', *Business History Review* 37, 3 (1963): 217–39.

[88] Sano Tsuneki 佐野常樹, 'Chika tōgen no gaikyō' 地下當源ノ概況 [Overview of underground resources], *Tōkyō chigaku kyōkai hōkoku* 10, 3 (1881), reprinted in *Tōkyō chigaku kyōkai hōkoku* 東京地学協会報告 (Tokyo: Tōkyō chigaku kyōkai, 1990), vol. 4, pp. 279–88.

[89] *AS*, 1 November 1883.

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consumption. Because of Kyushu's relative proximity to Shanghai, and the resulting low transportation costs, the proportion of Japanese coal – particularly from Takashima (shipped via Nagasaki), then later from the Miike mines in central Kyushu (shipped via Kuchinotsu) – relative to all coal sold on the Shanghai market increased from 40 per cent to 78 per cent between 1873 and 1881, and it was a similar story in Hong Kong, too. By the early 1900s, Japanese coal also supplied between one-third and one-half of the total coal sold in Singapore. As an absolute figure, 450,790 tons of Japanese coal were exported to Shanghai as the *Yamashiro-maru* ran the Yokohama–Shanghai line in 1900 – the majority from Chikuhō and shipped via Moji.[90]

In turn, this transformation of Japan's resource relationship to East Asia forces historians to reconsider the geographies of the archipelago's late nineteenth-century engagement with the outside world. Standard narratives of Japan's 'opening' draw a line from Perry's conclusion of the Treaty of Kanagawa in 1854, to the arrival of Townsend Harris two years later and the signing of comprehensive if 'unequal' commercial treaties between Japan and the Western powers after 1858, to the subsequent key role of the five international ports defined in those agreements as hubs for Japan's foreign connections – that is, the so-called treaty ports of Yokohama, Nagasaki, Kobe, Niigata and (in Hokkaido) Hakodate. And yet, as Phipps has argued, 'a framework that relies on the treaty ports alone misses the much more complex system of maritime relations that developed in East Asia during this pivotal era'. For in fact, when the abolition of the unequal treaties came into effect in 1899, the Japanese metropole – excluding the newly acquired Taiwan and the Pescadores – was equipped with an additional twenty-one 'special' ports whose denizens were engaged in overseas trade. Ninety per cent of the trade through these trading ports was handled by Japanese merchants – men such as Yasukawa – by the 1890s, compared to the 80 per cent of trade handled by non-Japanese in Yokohama.[91] In other words, shifting our focus away from the five well-known treaty ports brings a range of new actors into view in the history of Japan's overseas relations, and it brings to the fore

[90] On Shanghai and Hong Kong, see Kokaze, '19 seiki ni okeru kōtsū kakumei', pp. 2-22 and 2-24 respectively (p. 2-21 for 1900 tonnage). On Singapore, Fichter, 'Imperial Interdependence', p. 166. The value of Japanese coal sold in the Straits Settlements increased from US$1.6 million in 1894 to US$5.3 million in 1913, making it the most valuable Japanese export commodity there: Shimizu, 'Karayuki-san', p. 127. On Kuchinotsu and Moji, see Phipps, *Empires on the Waterfront*, pp. 101, 146.

[91] Phipps, *Empires on the Waterfront* (citation from p. 4). In addition to the twenty-one 'special' ports, Taketoyo (near Nagoya) also opened in 1899. On the handling of international trade, see p. 248.

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sites of international trade that otherwise make at best marginal appearances in the mainstream narratives of Meiji Japan.

For example, four of the nine nationwide 'special export ports' (*tokubetsu yushutsukō* 特別輸出港) designated by the Ministry of Finance in 1889 were located in Kyushu. All four – the aforementioned Kuchinotsu, plus Karatsu, Misumi and Moji – were authorized to handle the export of coal, one of the Meiji government's five key export products.[92] Such designations built on the previous export histories of all nine ports: in Karatsu's case, coal had been directly shipped by a private entrepreneur to Shanghai since 1882, despite the Navy Ministry having requisitioned key Karatsu pitheads for state use in the 1870s.[93] But with the new 'special export port' status, the coal trade could remain largely in Japanese hands, thereby generating profits for Japanese businesses and additional customs revenue for the state. Moreover, the proximity of these ports to the coal mining regions of Karatsu, Chikuhō and Miike simplified the logistics of international export – especially to the key markets of Shanghai, Hong Kong or Singapore. (As noted in Chapter 5, the opening of Kuchinotsu and Karatsu had the unexpected consequence, according to the Japanese consul in Hong Kong in 1890, of facilitating the opportunities for young women 'to slip secretly abroad'.)

Thus, in the case of Karatsu, its designation as a special port in 1889 was effectively an opportunity to expand into East Asia the riverine transportation networks first depicted in the Hizen scrolls of 1784 – such that we may think rather of a basic historical *continuity* across the supposedly epochal events of the 1850s. That is, in terms of international relations, and from the archival perspective of Edo/Tokyo, Perry's arrival might seem to be *the* pivotal event of the mid nineteenth century, his ships' smoke casting a pall over subsequent decades. Meanwhile, from the perspective of Yokohama, itself transformed from fishing village to international port, the late nineteenth-century story might seem to be one of still nascent Japanese trading networks (e.g. with Australia) and newly emerging industries (e.g. transpacific shipping). But from the starting point of a coal seam in Karatsu, the line connecting 1784 to 1889 might be considered entirely natural if somewhat unexpected, uncoiling as it did from an already established local industry and merely extending – with the aid of central government finance and

[92] Phipps, *Empires on the Waterfront*, p. 46. One other special export port handled coal exports, namely Otaru, in Hokkaido. The other products were rice, sulphur, wheat and wheat flour (p. 62). In 1896, Karatsu, Kuchinotsu and Misumi were redesignated as 'world trade ports' (*kaikōgai bōekikō* 開港外貿易港), giving merchants greater freedom to engage in international exports *and* imports (pp. 51–2).

[93] Phipps, *Empires on the Waterfront*, pp. 99–100.

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management – the infrastructure of coal transportation from the Matsuura river to an East Asian arena.

Idling in the domestic coaling hub of Wakamatsu on the morning of 27 March 1900, fresh from a run to Shanghai and refuelled for the final journey to Yokohama with coal from Kyushu, the *Yamashiro-maru* epitomized these alternative geographical frameworks by which historians might understand Meiji Japan. Honolulu, Sydney, Singapore or Shanghai were indisputably central to the story I have told in this book, their roles documented in the paperwork of Japan's Foreign Ministry and other institutions. But so too were the subterranean spaces of the Karatsu and other Kyushu mines, an archive which reveals the extent to which the need for coal indeed tethered ship-shaped histories to the bowels of the earth.

Passage: Stevedores and Bronze Buddhas

Anthropomorphizing the ship with an unfortunate want of care, I have ascribed to it a human emotion – *fresh*! – which erases the labour histories rigged to its refuelling. The coal did not magically spirit itself from port to ship bunker, wisping through the air like the ghosts of the dead miners who haunt Yamamoto Sakubei's underground paintings. Rather, it was carried: on the backs of men, women and children.

In the digital archives of the Smithsonian Institute, there survives a photograph from 1904 which depicts this heavy labour in the port of Nagasaki.[94] Close enough in both time and place that we may assume a similar process occurred when the *Yamashiro-maru* docked in Wakamatsu in March 1900 (or, indeed, anywhere else during its career in Japan), the photograph profiles the starboard side of the Pacific Mail Steamship Company's *Siberia*, launched in 1901. This was a huge ship by comparison to the *Yamashiro-maru* – at 572 feet, almost twice as long, and more than six times as big in terms of gross tonnage (18,000 tons). The image's waterline perspective thus dramatizes an already large vessel's draft, while four of the *Siberia*'s lifeboats hang over the

[94] 'Coaling the Pacific Mail S. S. "Siberia" at the fortified naval station of Nagasaki, Japan', Underwood & Underwood, 1904 or earlier, The Henry and Nancy Rosin Collection of Early Photography of Japan, Freer Gallery of Art and Arthur M. Sackler Gallery Archives (Smithsonian Institution: Washington, DC), https://sova.si.edu/record/FSA.A1999.35?s=216&n=12&t=D&q=Japan&i=217, call number FSA A1999.35.609 (last accessed 16 July 2021). The photograph also survives in the Library of Congress, www.loc.gov/resource/cph.3c34388/ (last accessed 16 July 2021). My thanks to David Fedman (@dfedman) for posting a link to this image on Twitter, 7 February 2021.

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scene like mini versions of the Zeppelins being contemporaneously trialled in Germany.[95]

From the pointed bow of the wooden lighter on which the camera must have been balanced, the viewer's eye is directed towards three other lighters drawn up perpendicular to the *Siberia* – that is, long narrow boats which were capable of carrying up to sixty tons of coal from the pier to the offshore steamship.[96] We are thus cast into the middle of a multistep process. The lighters have already been loaded by onshore stevedores (*okanakashi* 陸仲仕) working at the pier, the coal there sometimes blended according to a particular steamship's needs. Now, standing thigh-deep in the lighters, a dozen or so offshore stevedores (*okinakashi* 沖仲仕) stoop down to shovel and hoe the coal into bamboo baskets. These are relayed to the bottom of a ladder-like structure which angles at approximately sixty degrees up the ship's metal hull. Like the coal, our eyes are drawn upwards: on each of the ladder's shelflike steps stand one or two labourers, who pass the baskets to their colleagues above in what the photograph implies to be a metronomic rhythm. I can count labourers at nine different levels of the ladder, which is attached to the ship's bulwarks by rope. Hanging over those bulwarks from the *Siberia*'s promenade deck, passengers look down at the industrious scene below.

In the photograph's foreground, three such ladders have been tied to the *Siberia*. Just below the bulwark, the ladders are connected by two horizontal cross-shelves, onto each of which are crowded another half-dozen labourers who are busy tipping the coal into the bunkers and stacking the empty baskets. This is because the *Siberia* was equipped with sideloading coal bunkers on its main deck. But on ships like the *Yamashiro-maru*, the coal would have been carried over the bulwarks, across the main deck and then lowered down into the coal bunker(s) two decks below – where another group of stevedores levelled the fuel to make it safe in high seas and accessible to the ship's passers.

Although one or two of the labourers in the 1904 photograph glance towards the camera and seem aware of its presence (and why not? Such a device would not ordinarily have made an appearance on a lighter), for the most part this is a normal work scene. The male labourers wear straw

[95] The draft refers to the measurement from keel to waterline, which would therefore increase as the ship was loaded. On the *Siberia*'s dimensions and architecture in this and the following paragraphs, 'Cabin Plan of the Pacific Mail Steamship Co's New Twin Screw Steamships, Transpacific Service, "Korea" & "Siberia"' (c. 1906), John Haskell Kemble Collection, Huntingdon Digital Library, call number priJHK 00187, https://hdl.huntington.org/digital/collection/p9539coll1/id/22028/ (last accessed 16 July 2021).

[96] I take some additional details in this paragraph from Phipps, *Empires on the Waterfront*, p. 174.

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Figure 6.4 'Loading Women', date and photographer unknown. Courtesy of Nagasaki University Library Collections.

hats or *hachimaki* headbands to keep the sweat and dirt from their eyes. Perhaps between a third and half of the workforce are female, their distinctive bleached cotton head towels, tied in the *anesan-kaburi* style, offering some protection against the dust – but also shadowing their faces from view. By contrast, another photograph, preserved in Nagasaki University Library, shows a contemporaneous group of stevedore women in a pose, the ground around them littered with large lumps of coal (see Figure 6.4).[97] In truth the women seem no older than teenagers, their hands resting on each other's shoulders, one girl offering another an affectionate clasp from behind. These were the kinds of workers rendered faceless and voiceless in the Honolulu *Advertiser*'s observation that 'the [*Yamashiro-maru*] can carry 350 tons of coal in her bunkers, and a further supply of 320 tons for long voyages of about sixteen days'. In fact, if the ship had carried a full load – say, for a crossing to Hawai'i – then it would have taken a group of fifty stevedores, hauling at a load of between

[97] 'Loading Women', photographer and date unknown, Nagasaki University Library Collection, 'Japanese Old Photographs in Bakumatsu-Meiji Period', http://oldphoto.lb.nagasaki-u.ac.jp/top/en_top.php, catalogue number 7081 (last accessed 15 July 2021).

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twenty-five and thirty-five tons an hour, approximately eleven hours to render the ship capable of carrying 670 tons in its bunkers.[98]

But the carrying is not complete. As the ship prepares to depart, a team of passers (also known as trimmers) must manoeuvre the coal by wheelbarrow from bunker to furnace – a job that could be dangerous in high seas and, due to the necessity of bringing fuel from the ship's more distant bunkers, increasingly difficult the longer the journey lasted. Only now can the engine be fired – and that is where the firemen took centre stage.

'The importance of skilful firemen cannot be too much insisted upon,' British civil engineer Robert Murray wrote in his grippingly entitled *Rudimentary Treatise on Marine Engines and Steam Vessels; Together With Practical Remarks on the Screw and Propelling Power as Used in the Royal and Merchant Navy* (3rd edn, 1858). He continued: 'It is a great mistake to suppose, as too many captains and owners of steam vessels do, that any able-bodied man who can throw coals on a fire is fit for a stoker'. This was because 'ignorance of the despised art of stoking' could lead to as much as one quarter of a ship's fuel being discarded during a journey. The skilled and conscientious fireman in fact had to consider the weight of coal upon each square foot of grate surface per hour; the frequency of when to stoke and when to open the furnace door to check (for to open the doors and let in cold air was to hinder the steady generation of steam); the state of the fire from its colour; the even spread of coal upon the grate; the need to break up 'very bituminous coal […] owing to the tendency of such coal to cake upon the bars, and thus prevent the passage of air through them'; and the importance of cleaning the fires after each watch, including clearing ashes and collecting cinders to be re-burned.[99] In short, many of the calorific and smoke-related benefits offered by a ton of Best Welsh over, say, a ton of Karatsu coal would go to waste if the firemen did their job badly.

In the previous chapter, I introduced the seaman Katō Hisakatsu, who began his career in February 1897 as a deckhand on the 850-ton *Koto'o-maru*, sailing from Yokohama to Karatsu to pick up coal, and who in retirement penned several books about his experiences at sea. In one

[98] For this loading calculation, see Phipps, *Empires on the Waterfront*, p. 172.

[99] Robert Murray, C. E., *Rudimentary Treatise on Marine Engines and Steam Vessels; Together with Practical Remarks on the Screw and Propelling Power as Used in the Royal and Merchant Navy*, 3rd edn (London: John Weale, 1858), pp. 49–53 (quotations on pp. 50 and 51 respectively). Digitized by HathiTrust Digital Library, www.hathitrust.org (last accessed 18 July 2021). See also Alston Kennerley, 'Stoking the Boilers: Firemen and Trimmers in British Merchant Ships, 1850–1950', *International Journal of Maritime History* 20, 1 (2008): 191–220.

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collection of reminiscences, he described the work of the firemen and passers:

> All day and night, their bodies discoloured by soot and sweat and oil until they resemble bronze Buddhas, they run to-and-fro like squirrels in the coal holds. In the eyes of the ladies and gentlemen strolling with easy-sounding footsteps on the upper deck, these are the men – 'Golly, the crew!' – barely regarded as humans. They work in a world of darkness never visited by the sun, a place where the mouldy black air drifts constantly and thickly, where both clouds of fine coal powder and tepid airs or hot winds begin to blow in all directions after grazing your body, where with the sound of a dripping tap you sweat black ink and feel as if lukewarm water is washing over your skin; they work in the depths of a fiery hell. And their work, continuing to carry coal with the loyalty of an army of ants – the coal that drives the power, the power that drives the ship – this job is truly the most invaluable on the whole ship.[100]

As with his graphic descriptions of women stowed away on ships from Japan to Southeast Asia, there is more than a hint of late-night yarn in Katō's characterization of 'bronze Buddhas' (*kanabutsu-sama* 金佛さま). The everyday, all-day realm of the firemen was very much of the here and now, not the enlightened afterlife – although, as Frances Steel has observed, there was also a 'startling rate' of suicides among steamship firemen, attributed by contemporaries to 'a kind of heat insanity'.[101]

Like the 'ghost workers' who power today's internet, who at some level have made it possible for me to read Robert Murray's *Rudimentary Treatise* online, the firemen and the passers described by Katō were 'the unseen workers of the steam age'.[102] I cannot see or name the person who digitized Murray. But I do know the names of the *Yamashiro-maru*'s firemen and passers in August 1898, when the ship deposited 100 sugar labourers at Port Douglas. They are only single-line entries in a Burns, Philp & Co crew list (itself also anonymously digitized) – but perhaps they go some way towards counterbalancing the weight this chapter has ascribed to Yasukawa Keiichirō's one-line diary entry:

T. Akushi	38 (age)	Fireman
S. Katayama	20	Fireman
S. Naito	24	Fireman

[100] Katō Hisakatsu 加藤久勝, *Madorosu yawa* マドロス夜話 [A sailor's night tales] (Tokyo: Shōkōdō shobō, 1931), p. 20. For details on the *Koto'o-maru*, see pp. 23–7.

[101] Frances Steel, *Oceania under Steam: Sea Transport and the Cultures of Colonialism, c. 1870–1914* (Manchester: Manchester University Press, 2011), p. 83.

[102] Steel, *Oceania under Steam*, p. 77; Mary L. Gray and Siddharth Suri, *Ghost Work: How to Stop Silicon Valley from Building a New Global Underclass* (Boston, MA: Houghton Mifflin Harcourt, 2019); cf. also Hecht on the 'invisibility' of uranium labourers: Hecht, *Being Nuclear*, pp. 183–212.

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K. Fujino	24	Fireman
T. Aoki	32	Fireman
H. Ifuji	29	Fireman
S. Takisa	26	Fireman
S. Kashiwabara	26	Fireman
N. Utsu	22	Fireman
T. Tamaki	21	Fireman
T. Ishii	25	Fireman
K. Koyoshi	20	Fireman
M. Hisakata	23	Coal Passer
Y. Nakao	25	Coal Passer
T. Honda	21	Coal Passer
H. Nabeoka	25	Coal Passer
K. Yoshida	27	Coal Passer
H. Matsuo	21	Coal Passer
B. Takahashi	31	Coal Passer
K. Zaima	21	Coal Passer
D. Nematsu	19	Coal Passer
J. Kawagoi	21	Coal Passer Apprentice[103]

Mining

In John Oliver's words, coal is 'basically cocaine for Thomas the Tank Engine'.[104] It's a funny and appropriate analogy, speaking as it does to some of the histories of labour exploitation, consumer addiction, international commerce and supply logistics which I have touched upon in this chapter. Historians' figures of speech, by contrast, are far more earnest. From our apparently extraordinary repertoire of practical skills, we *map*, we *sketch*, we *navigate* (all of which I have done over the course of this book) – and we also *mine*. The Italian archives, wrote Carlo Ginzburg and Carlo Poni in the late 1970s, are 'precious deposits of primary materials, in large part never mined'.[105] 'Students of the colonial experience "mine" the *content* of government commissions and reports,' Ann Laura Stoler has observed, conscious of the extractive metaphor,

[103] Burns, Philp & Co, 'A List of the Crew and Passengers arrived in the Steamship *Yamashiro Maru* […] from the Port of Japan via Brisbane to Sydney, New South Wales, 19 8 1898 (Inward)', digitized by www.ancestry.com (last accessed 24 October 2013). I have been unable confidently to decipher the first letter of the surname, 'Zaima'.

[104] 'Coal: Last Week Tonight with John Oliver (HBO)', 19 June 2017, www.youtube.com/watch?v=aw6RsUhw1Q8 (last accessed 17 July 2021).

[105] Carlo Ginzburg and Carlo Poni, 'The Name and the Game: Unequal Exchange and the Historiographic Marketplace', in Edward Muir and Guido Ruggiero, eds., *Microhistory and the Lost Peoples of Europe*, trans. Eren Branch (Baltimore, MD: Johns Hopkins University Press, 1991 [1979]), pp. 1–10, here p. 2.

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'but rarely attend to their peculiar *form* or *context*'.[106] By contrast, Allan Sekula warns that '[a]rchives are not like coal mines: meaning is not extracted from nature, but from culture'.[107]

In tracing the journey of a piece of coal to its burned-up conclusion, this chapter has experimented with turning figures of speech literal, such that the coal mine exists not *like* the archive but *as* the archive. What is the value, intellectual if not calorific, of such an experiment?

The first point is that my focus on the particular pitheads of the Karatsu coalfield highlights the contingency even of deep histories of the earth. This is exactly the argument that natural scientists advanced in the eighteenth century as they began to apply the language of archives to the study of fossils.[108] 'Contingency' might feel like an awkward term to describe change across tens of millions of years – at least for scholars whose training in the discipline of history habituates them to think in units of decades or at most a couple of centuries. The contingencies I have discussed in this book, for example, concern themselves with why economic contraction in a particular decade may have led young men to board a Hawai'i-bound steamship a few years later, or how a young woman was diverted from travelling to Singapore by dint of being 'kidnapped' in Hong Kong. That said, it does matter to the human histories I reconstructed in this chapter that the formation of fossil fuels in today's Kyushu, contingent as it partly was on the climatic conditions of the Oligocene Epoch, led to a carbon composition in Karatsu coal which was more than adequate for the onboard requirements of steamship engines. It matters that the stratigraphic profile of Karatsu was such that, as the demand for coal grew in Japan in the second half of the nineteenth century, it could be extracted without vertical mining technologies. And it matters that Karatsu coal in particular – as opposed to that in Chikuhō – was located serendipitously close to navigable waterways, such that the fuel could be quickly transported to market. In short, if the earth is this chapter's archive, then its exact geographical location and stratigraphic composition, or its *context* and *form*, fundamentally shape the history it can tell – in Karatsu no less than in the archival collections I have discussed in Honolulu or Brisbane. The matter of coal, to paraphrase Timothy J. LeCain, has played an essential role in the human

[106] Ann Laura Stoler, 'Colonial Archives and the Arts of Governance', *Archival Science* 2 (1–2) (2002): 87–109, here p. 90 (emphasis in the original).

[107] Sekula, 'Reading an Archive', p. 445. Historians using digital methodologies also text mine: for a reflective consideration, see Christian Henriot, 'Rethinking Historical Research in the Age of NLP', *Elites, Networks and Power in Modern China* blog, https://enepchina.hypotheses.org/3275, 21 May 2020 (last accessed 23 July 2021).

[108] Sepkoski, 'Earth as Archive', pp. 57–60.

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history this chapter has covered – and coal's deep history offers new material contexts to the analyses of Japanese overseas migration that scholars have undertaken to date.[109]

The contingent question of where and what kind of coal was to be found in nineteenth-century East Asia also invites historians to reconsider one of the most contentious historiographical debates of the early twenty-first century, namely why 'Europe' industrialized at an exponentially greater intensity after 1800 than 'China'. One reason, Kenneth Pomeranz advanced in *The Great Divergence* (2000), concerned the ways in which British coal consumption reduced demographic and resource pressure on the land. This, in turn, could be explained by the relative proximity of northern coalfields to British centres of industrialization. By contrast, in Qing China, major coal deposits in the north and north-west were sufficiently distant from the proto-industrializing Lower Yangzi region for technological advancements analogous to those in British industries to remain unsupported by steam engines. Thus, in terms of coal consumption, 'Europe's advantage rested as much on geographic accident as on overall levels of technical skill'.[110]

The evidence in this chapter suggests that 'geography' is somewhat of a misnomer when talking about Karatsu – at least if defined in terms of nation-state units. On the one hand, the location of the Karatsu coalfield, and especially its riverine access, facilitated regional industrial development prior to the arrival of Commodore Perry, in particular the development of the salt industry in northern Kyushu and the western Inland Sea. That this did not lead to accelerated economic growth comparable to that of nineteenth-century north-western Europe thus suggests that other 'divergence' factors were more important than geographical accident, including the sufficiency of wood as a source of fuel (thanks to Tokugawa afforestation policies). On the other hand, Pomeranz's postulation of a relationship between coal mine location and economic growth is more convincing when we consider the extent to which Japanese coal – especially Kyushu coal – was exported to Shanghai, Hong Kong and Singapore in the late nineteenth century. Here, however, it is more useful to think about East Asian rather than Japanese economic growth per se. In other words, be it for Karatsu coal's contribution to regional economic growth *within* Japan prior to 1850 or for its contribution to regional industrialization *beyond* Japan after 1850, the story of coal mining

[109] LeCain, *Matter of History*, p. 11.
[110] Kenneth Pomeranz, *The Great Divergence: China, Europe, and the Making of the Modern World Economy* (Princeton, NJ: Princeton University Press, 2000), pp. 59–68, citation from p. 62.

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I have sketched in this chapter is not one that necessarily aligns with the polity of 'Japan' across the nineteenth century.[111]

My second observation departs from Siebold, the man whose writings were directly or indirectly referenced so often in the Euro-American imagination of Japanese coal 'abundance'. Following David Sepkoski's notation, I have assumed that what Siebold described was the 'original' archive of the earth – that is, archive$_0$. In fact, however, his access to that archive was restricted by his 'guides' (or minders): what he saw was already shaped by human hands, both in terms of the samples brought up from below sixty steps, and in terms of the mine shaft, which literally tunnelled his vision of the stratigraphic record. In this sense, and to return to Sekula, the coal mine *is* like the archive, because the fossil documentation therein is not unmediated – just as the materials a historian calls up from an archive's stacks are never an 'unprocessed historical record'.[112] This is important because it calls into question Sekula's unwritten assumption – at least in the previous citation – that the coal mines are 'nature' while the archive is 'culture'. Rather, as William Cronon argues from his study of the copper mines in Kennecott (Alaska), '[t]he special task of environmental historians is to tell stories that carry us back and forth across the boundary between people and nature to reveal just how culturally constructed that boundary is – and how dependent upon natural systems it remains'.[113] There *was* a natural coal system at some point in Karatsu's history, as formed in the millions of years between the Oligocene and the Holocene. But whether it is useful for historians to apply a language of 'archive' to this natural record is a different question. Given the extent to which I have argued in this book that archives are (human) constructions, it would seem that Karatsu may only usefully be considered an archive *after* curious farmers started clearing, burrowing, digging and extracting from its hillsides. Perhaps, therefore, there is no such thing as an archive$_0$, and historians

[111] For understanding the applicability of the 'Great Divergence' to Japanese economic history, see Penelope Francks, *Japan and the Great Divergence: A Short Guide* (London: Palgrave Macmillan, 2016). For using 'Japan' to think through some of the Great Divergence debates, see Julia Adeney Thomas, 'Reclaiming Ground: Japan's Great Convergence', *Japanese Studies* 34, 3 (2014): 253–63.

[112] *Pace* Hayden White: 'I take "chronicle" and "story" to refer to "primitive elements" in the *historical account*, but both represent processes of selection and arrangement of data from the *unprocessed historical record* in the interest of rendering that record more comprehensible to an *audience* of a particular kind.' See Hayden White, *Metahistory: The Historical Imagination in Nineteenth-Century Europe* (Baltimore, MD: Johns Hopkins University Press, 1973), p. 5.

[113] Cronon, 'Kennecott Journey', p. 33.

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need a different vocabulary by which to conceptualize the earth's prehuman record.

My final point is axiomatic but bears repeating. Along with the railways and the telegraph, steamships were one mechanism by which the world was commonly imagined to be shrinking in the late nineteenth century, with time and space allegedly 'annihilated' by ever faster transits.[114] (Remember: 'Our steamships can go from California to Japan in eighteen days.') But if steam engines were one catalyst of this transformation, then any study of the 'great mineral agent of civilization' which fuelled the engines requires historians, conversely, to *expand* our temporal units of analysis – from days to millions of years. How to 'cross-hatch' these multiple imaginations of time, or of agency, raises a separate problem of narrative structure. My slowing down of the coal's journey from bowels to bunkers has been one attempt to indicate non-linear temporalities in this story, even as I have tried to rebraid what Sekula so persuasively calls the steamship's tethering line back to the earth.

As with some of the other interventions I have tried to make in *Mooring the Global Archive*, these points can be loosely tethered to Kodama Keijirō's gravestone. Marking Kodama's arrival in 'Hawaii Nei' in June 1885 and his death in Meiji XXIX (1896), the inscription posited four temporal regimes I have already discussed: Japanese imperial time, Gregorian time, international time and of course Kodama's own lifetime. But there was a fifth regime inherent in the numerals '1885' and '1896' – not Gregorian time per se but *Christian* time. Indeed, *Anno Domini* referred to more than God's human incarnation. For many believers well into the nineteenth century, Christian time was synonymous with *world* time (*Anno Mundi*): in particular, with James Ussher's (1581–1656) theory that the Creation had occurred 'upon the entrance of the night preceding the twenty-third day of October' in the year 4004 BCE.[115] In 1885, however, Ussher's claim was cut from the margins of the Revised Version of the King James Bible. In the same year, the International Geological Congress met in Bologna to debate the proposition that the epoch of the 'entirely recent' be termed the Holocene, thereby continuing the revolution in understandings of planetary time which disciplines

[114] Yrjö Kaukiainen, 'Shrinking the World'; Wolfgang Schivelbusch, 'Railroad Space and Railroad Time', *New German Critique* 14 (1978): 31–40. For an important recent critique of 'annihilation' as an analytical language for understanding social histories of space, see Alexis D. Litvine, 'The Annihilation of Space: A Bad (Historical) Concept', *Historical Journal* 65 (2022): 871–900.

[115] McPhee, *Annals of the Former World*, p. 70.

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such as geology and paleontology had already started.[116] Seen in this light, the notation '1885' on Kodama's gravestone is a subtle invitation for historians to consider his life, and global migrations more generally, in terms of expanded temporalities: to acknowledge that histories of geographical breadth must also entail material depth.[117]

[116] Rudwick, *Earth's Deep History*, p. 17; Simon L. Lewis and Mark A. Maslin, 'Defining the Anthropocene', *Nature* 519 (2015): 171–80, here pp. 172–3.

[117] In this sense, my approach in this chapter has encapsulated the so-called volumetric turn in history: Franck Billé, 'Volumetric Sovereignty: Introduction', *Society & Space* (2019), accessible at www.societyandspace.org/forums/volumetric-sovereignty (last accessed 30 June 2022).

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