Introduction
A Singular Remedy

> What commerce […] for the people that are the sole proprietors of the most powerful remedy that medicine possesses to restore the health of mankind in the four corners of the Earth.
>
> – Francisco José de Caldas, *Memoria sobre el estado de las quinas*, 1809.

By the late 1700s and early 1800s, cinchona bark was, to many, 'the most important, and the most usual remedy that medicine possessed'.[1] Though of limited repertoire – cinchona trees prospered only on the precipitous eastern slopes of the Andes at the time, in the Spanish American Viceroyalties of Peru and New Granada – and comparatively recent acceptance into Old World materia medica, the bark had, by the turn of the eighteenth century, woven itself into the texture of everyday medical practice in a wide range of societies within, or tied to, the Atlantic World. It was everywhere attributed 'wonderful',[2] 'singular',[3] even 'divine'[4] medicinal virtues, the knowledge of which, so it was said, had come to mankind from its simplest, and humblest, specimens, 'wild Indians'[5] close to nature and privy to its most coveted secrets. Bittersweet 'febrifugal lemonades' and bottled wines of the bark sat on the shelves of Lima apothecaries, the counters of Cantonese market

[1] Luis de Rieux, 'Carta a Miguel Cayetano de Soler,' *Archivo General de Indias*, Indiferente 1557, Aranjuez, 1800-05-14, 346 v.

[2] Antonio Caballero y Góngora, Archbishop and Viceroy of New Granada, referred to the bark's 'wonderful effects (*sus maravillosos efectos*)' in a 1788 letter. Antonio Caballero y Góngora, 'Copia de Carta Reservada,' *Archivo del Palacio Real*, Papeles del Almacén de la Quina, Caja 22283 / Expediente 2, Turbaco, 1788-05-28.

[3] Baltasar de Villalobos, *Método de curar tabardillos, y descripción de la fiebre epidemica, que por los años de 1796 y 97 afligio varias poblaciones del partido de Chancay* (Lima: Imprenta Real del Telégrafo Peruano, 1800), 117; Edward Rigby, *An Essay on the Use of the Red Peruvian Bark in the Cure of Intermittents* (London: J. Johnson, 1783), 6.

[4] Simon André Tissot, *Aviso al pueblo acerca de su salud ó Tratado de las enfermedades mas frequentes de las gentes del campo*, trans. Juan Galisteo y Xiorro (Madrid: Imprenta de Pedro Marin, 1790), 161.

[5] William Cockburn, *The Present Uncertainty in the Knowledge of Medicines in a Letter to the Physicians in the Commission for Sick and Wounded Seamen* (London: Benj[amin] Barker, 1703), Preface I. A1.

stands and in the medicine chests of Luanda hospital orderlies. They were routinely concocted, and administered at the bedside, by Moroccan court physicians, French housewives and slave healers alike and they accompanied, tucked into their pouches, Dutch sailors to febrile environs, Peruvian soldiers to the battlefield and North American settlers westward. Scottish physicians, creole botanists and French writers alike were unanimous not only in according the bark 'singularity',[6] and 'the first place among the most effective remedies' (*die erste Stelle unter den würksamsten Arzneimitteln*),[7] but also in holding it to be 'more generally useful to mankind than any in the materia medica'.[8] It was commonly agreed upon that there was 'no febrifuge of such well-known virtue in all of medicine' (*por que no se halla en la Medicina febrífugo de virtud tan conocida*),[9] and that not a single remedy 'more estimable and precious [than the bark] had been discovered unto this day'.[10]

For decades now, historians of science, medicine and technology have insisted on the epistemological lesson that science and knowledge are the result of specific circumstances and close, local settings, situated and bound 'ineluctably to the conditions of their production' – historically contingent, idiosyncratic 'form[s] of practice', rooted in a particular time and place.[11] The field is at present said to be in the midst of a fundamental turn toward global approaches that straddle traditional spatial boundaries but, as some of its most prominent advocates have cautioned, practitioners have hardly begun to understand the consequences of that shift for the field's most basic values and principles, especially its

[6] Aylmer Bourke Lambert, *A description of the genus Cinchona, comprehending the various species of vegetables from which the Peruvian and other barks of a similar quality are taken* (London: B. and J. White, 1797), 1.

[7] Samuel Auguste André Tissot, *Anleitung für das Landvolk in Absicht auf seine Gesundheit* (Zürich: Heidegger und Compagnie, 1763), 288–89.

[8] Rigby, *An Essay on the Use of the Red Peruvian Bark*, 6.

[9] Manuel Hernandez de Gregorio, 'Dn. Manuel Hernandez de Gregorio, Boticario de Camara presenta una memoria compuesta de 37 artículos, queriendo persuadir las grandes conveniencias de la estancación general, y parcial de la Quina en beneficio de la salud publica, y del interés del Real Erario, detallando las reglas gubernativas para su administración,' *Archivo General de Indias*, Indiferente 1556, Madrid, 1804.

[10] Hipólito Ruiz López, *Quinología O Tratado del Arbol de la Quina o Cascarilla, con su descripción y la de otras especies de quinos nuevamente descubiertas en el Perú, del modo de beneficiarla, de su elección, comercio, virtudes, y extracto elaborado von cortezas recientes* (Madrid: La viuda é hijo de Marin, 1792), 38.

[11] For that diagnosis, see James A. Secord, 'Knowledge in Transit,' *Isis* 95, no. 4 (2004), 657. See also Lorraine Daston, 'Science Studies and the History of Science,' *Critical Inquiry* 35, no. 4 (2009). The term 'situated knowledge' is commonly associated with the work of Donna Haraway; see her 'Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective,' *Feminist Studies* 14, no. 3 (1988).

emphasis on locality.[12] This book is an attempt at writing a history of how medical knowledge – in the shape of matter, words and practices – was shared between and across a wide range of geographically disperse and socially diverse societies within the Atlantic World and its Asian entrepôts between 1751 and 1820. Centred on the Peruvian bark, or cinchona, it exposes and examines how that medicine and the imaginaries, therapeutic practices and medical understandings attendant to its consumption, were 'part of the taken-for-granted understanding'[13] of people in many different social and cultural contexts: at Peruvian academies and in Scottish households, on Louisiana plantations and in Moroccan court pharmacies alike. Much of the book is concerned with the conditions, contingency and idiosyncrasy of the prevalence and movement of bark knowledge – through contingent 'act[s] of communication',[14] 'brokerage'[15] and sociality,[16] 'between […] settings' tied together by Atlantic trade, proselytizing, and imperialism[17] – as well as with the variability of the knowledge in motion. Indeed, the book suggests that cinchona's wide spread owed less to its utter immutability and consistency than, as historians have argued for other tools and substances, to a measure of malleability, and multivalence: its ability to 'subtly adapt', be refashioned, or tinkered with.[18] Scholarship on modern and early modern

[12] Kapil Raj, 'Beyond Postcolonialism … and Postpositivism. Circulation and the Global History of Science,' *Isis* 104 (2013), 341; Secord, 'Knowledge in Transit,' 660. See also Fa-ti Fan, 'The Global Turn in the History of Science,' *East Asian Science, Technology and Society: An International Journal* 6 (2012).

[13] Secord, 'Knowledge in Transit,' 655.

[14] Ibid., 661.

[15] On the 'historically situated work of mediation', and brokerage, in the history of science, see Simon Schaffer et al., introduction to *The Brokered World. Go-Betweens and Global Intelligence, 1770–1820*, ed. Simon Schaffer et al. (Sagamore Beach: Watson Publishing International, 2009), xx.

[16] Marcy Norton has stressed the role that sustained, and persistent, exposure to substances, especially through social relationships and practices, played for their spread. Marcy Norton, 'Tasting Empire: Chocolate and the European Internalization of Mesoamerican Aesthetics,' *The American Historical Review* 111, no. 3 (2006).

[17] On debates about 'Atlantic interdependence' around 1800, see Richard J. Blakemore, 'The Changing Fortunes of Atlantic History,' *English Historical Review* CXXXI, no. 551 (2016), 855. See also D'Maris Coffman and Adrian Leonard, 'The Atlantic World: Definition, Theory, and Boundaries,' in *The Atlantic World: 1400–1850*, ed. D'Maris Coffman, Adrian Leonard and William O'Reilly, The Routledge Worlds (London: Routledge, 2015), 3. On knowledge not as 'abstract doctrine but as communicative practice in a range of well-integrated and closely understood settings', see Secord, 'Knowledge in Transit,' 671.

[18] David Kaiser, *Drawing Theories Apart: The Dispersion of Feynman Diagrams in Postwar Physics* (Chicago: University of Chicago Press, 2005), 7. This alludes to the work of Bruno Latour, who argued that practices of 'inscription' produced 'immutable mobiles'. The idea was originally formulated in Bruno Latour, *Science in Action: How to Follow Scientists and Engineers Through Society* (Cambridge, Mass.: Harvard University Press, 1987).

globalization, with its liquid language of elusive flows and unconstrained circulation, still tends to evoke an idea of movement as erosive and antithetical to place, and of 'the very idea of locality […] as a form of opposition or resistance to the […] global', a gesture towards the discrete, and authentic.[19] It was in large measure the bark's ability to tie itself to locales, however, to settle and become situated,[20] again and again, that accounted for its prevalence and mobility. Science and knowledge are not bound to one time and place, this book holds. They may be unmoored and moved – become well known and generally useful elsewhere – but they will invariably do so in ways that are just as contingent, situated and local as those traditionally associated with their production.

The Outlines of Cinchona

It may appear redundant for the historical account of a plant component to further define the outlines of its object of study. The seeming definitional sharpness of cinchona is deceptive, however.[21] Because the bark was, by the late 1700s and early 1800s, spoken of, sought after and studied in countless tongues across the Atlantic World and beyond, there were considerable shifts in its epistemic, chemical and medical contours, its nomenclature and, not least, its therapeutic indications. This is not to say that cinchona was not a distinct, identifiable object by the late 1700s and early 1800s.[22] Indeed, though its passage into the wider Galenic medical repertoire during the late 1600s had been attended by

[19] For a critique of how mobility serves as an antithesis to 'space' in scholarship on globalization, see Stuart Alexander Rockefeller, 'Flow,' *Current Anthropology* 52, no. 4 (2011). On place and the 'liquid' language of global history, see Stefanie Gänger, 'Circulation: Reflections on Circularity, Entity and Liquidity in the Language of Global history,' *Journal of Global History* 12, no. 3 (2017), 316. On 'the very idea of locality […] as a form of opposition or resistance to the […] global', see Roland Robertson, 'Glocalization: Time-Space and Homogeneity-Heterogeneity,' in *Global Modernities*, ed. Mike Featherstone, Scott Lash and Roland Robertson (London: Sage, 1995), 30.

[20] This responds in part to Kapil Raj's question of how to tackle to the 'concomitant situatedness and movement of science'. Raj, 'Beyond Postcolonialism … and Postpositivism,' 337–41.

[21] On the often 'labile' and unstable qualities of substances in movement, see Guy Attewell, 'Interweaving Substance Trajectories: *Tiryaq*, Circulation and Therapeutic Transformation in the Nineteenth Century,' in *Crossing Colonial Historiographies: Histories of Colonial and Indigenous Medicines in Transnational Perspective*, ed. Anne Digby and Waltraud Ernst (Cambridge Scholars Publishing, 2010), 2; Carla Nappi, 'Winter Worm, Summer Grass: *Cordyceps*, Colonial Chinese Medicine, and the Formation of Historical Objects,' in *Crossing Colonial Historiographies : Histories of Colonial and Indigenous Medicines in Transnational Perspective*, ed. Anne Digby, Projit B. Muhkarji and Waltraud Ernst (Newcastle upon Tyne: Cambridge Scholars, 2010).

[22] Nappi, 'Winter Worm, Summer Grass'.

controversy over its nature, virtues and properties,[23] by the late 1700s and early 1800s, medical practitioners, both lay and professional, across the Atlantic World generally agreed on the bark's utility as a remedy and its coherence as a category.[24] Rather, the very latitude and cosmopolitanism of the bark's pathways entailed acts of adaptation, customizing and calibration, and, with them, a measure of variability and volatility that compels us to handle both the subject and the term, cinchona, advisedly, and with a measure of care.[25] As much recent scholarship reminds us, objects exist both in space and in time. They have a diachronic quality; are possessed of lives and biographies;[26] and accrete new meanings, names and properties, as they are identified, translated or 'adjust […] to context' in the process.[27] They ought thus to be understood as malleable to a point: as multiple yet coherent, as liminal yet recognizable.[28]

[23] See in particular Saul Jarcho's 1993 study on the plant's 'discovery', its transmission to and within western Europe and its incipient establishment as a canonical part of medical practice through the lens of Francesco Torti's *Therapeutice specialis* (1712). Saul Jarcho, *Quinine's Predecessor. Francesco Torti and the Early History of Cinchona* (Baltimore: Johns Hopkins University Press, 1993). On the bark's gradual acceptance, see also Andreas-Holger Maehle, *Drugs on Trial: Experimental Pharmacology and Therapeutic Innovation in the Eighteenth Century* (Amsterdam: Editions Rodopi, 1999), 1. See also Harold J. Cook, 'Markets and Cultures. Medical Specifics and the Reconfiguration of the Body in Early Modern Europe,' *Transactions of the Royal Historical Society* 21 (2011), 208–09; Samir Boumediene, *La colonisation du savoir. Une histoire des plantes médicinales du 'Nouveau Monde' (1492–1750)* (Vaulx-en-Velin: Les Éditions des Mondes à Faire, 2016).

[24] Lorraine Daston has written about how phenomena 'amalgamate into a coherent category'. Lorraine Daston, 'Introduction. The Coming into Being of Scientific Objects,' in *Biographies of Scientific Objects*, ed. Lorraine Daston (Chicago: University of Chicago Press, 2000), 6.

[25] Guy Attewell, 'Interweaving Substance Trajectories', 2; Nappi, 'Winter Worm, Summer Grass'.

[26] This is an allusion to studies devoted to the 'lives' and 'biographies' of objects and things. See Igor Kopytoff, 'The Cultural Biography of Things: Commoditization as Process,' in *The Social Life of Things: Commodities in Cultural Perspective*, ed. Arjun Appadurai (Cambridge: Cambridge University Press, 1986).

[27] Lorraine Daston, 'Introduction. Speechless,' in *Things That Talk. Object Lessons from Art and Science* ed. Lorraine Daston (New York: Zone Books, 2004), 18. On substances in motion, see also Carla Nappi, 'Surface Tension. Objectifying Ginseng in Chinese Early Modernity,' in *Early Modern Things. Objects and Their Histories, 1500–1800*, ed. Paula Findlen (London: Routledge, 2012), 34; Barbara Orland and Kijan Espahangizi, 'Pseudo-Smaragde, Flussmittel und bewegte Stoffe. Überlegungen zu einer Wissensgeschichte der materiellen Welt,' in *Stoffe in Bewegung. Beiträge zu einer Wissensgeschichte der materiellen Welt*, ed. Barbara Orland and Kijan Espahangizi (Zürich: diaphanes, 2014).

[28] Historians have in recent years suggested replacing the 'notion of an object as always singular with that of an object as always multiple', and malleable. Nappi, 'Surface Tension,' 46. See also Orland and Espahangizi, 'Pseudo-Smaragde, Flussmittel und bewegte Stoffe.' On the difficulties of 'locating' substances, see also Erika Monahan, 'Locating Rhubarb. Early Modernity's Relevant Obscurity,' in *Early Modern Things. Objects and Their Histories, 1500–1800*, ed. Paula Findlen (London: Routledge, 2013), 239. See also Daston, 'Introduction. Speechless,' 18.

As with other introduced exotic commodities – coffee, rhubarb or pineapple[29] – by the late 1700s and early 1800s appellations for the bark across languages varied, if seldom beyond recognition. *Cinchona* was the standard botanical name for the bark after Carl Linnaeus (1707–1778) first defined the genus in the second, 1742 edition of his *Genera Plantarum*, naming it after the Countess of Chinchón, Francisca Fernández de Ribera, for her legendary and, by all accounts, imaginary role in drawing attention to the bark's virtues sometime between 1632 and 1638.[30] The bark also continued to be referred to by the older name of *quinquina* – from *Quina-Quina*, a Quechua word that actually referred to the balsam tree, and had been misapplied to cinchona by the Genoese physician Sebastianus Badus (fl. 1643–1676) in his 1663 *Anastasis Corticis Peruviae*.[31] *Quinquina* persisted in various guises, coterminous with and alongside cinchona, particularly in French[32] and Italian,[33] into the early nineteenth century, while Spanish[34] and Portuguese[35] sources employed the shorter *quina*. German and Dutch texts, presumably onomatopoetically with the Iberian term, likewise referred in common parlance to *China*[36] – or *Chinarinde*[37] – and *kina*,[38] respectively, and to

[29] Monahan, 'Locating Rhubarb,' 232.

[30] Jaime Jaramillo-Arango, 'A Critical Review of the Basic Facts in the History of Cinchona,' *Journal of the Linnaean Society* 53 (1949); Alex Haggis, 'Fundamental Errors in the Early History of Cinchona,' *Bulletin for the History of Medicine* 10 (1941). Linnaeus relied on the description and drawing by Charles-Marie de La Condamine to classify *Cinchona officinalis,* which erroneously merged two distinct cinchona varieties. Spanish botanists would later seek to revise Linnaeus's misapprehension. Matthew Crawford, 'Empire's Experts: The Politics of Knowledge in Spain's Royal Monopoly of Quina (1751–1808)' (unpublished PhD dissertation, University of California, San Diego, 2009), 18–19.

[31] Various historians have examined this early misapprehension: Jaramillo-Arango, 'A critical review'; Haggis, 'Fundamental Errors,' 421–29.

[32] For French uses of the term 'quinquina', see, for instance, M. Mallet, *Sur le Quinquina de la Martinique, connu sous le nom de Quinquina-Piton* (Paris: 1779).

[33] Italian sources frequently referred to 'kinakina'. See, for instance, Enrico Tegut, *Le mirabili virtú della Kinakina, con la maniera di servirsene in qualunque sorte di Febbre, e complessione* (Venice: Presso Antonio Zatta, e Figli, 1785).

[34] See, for instance, Ruiz López, *Quinología*; Pedro Crespo Nolasco, 'Carta apologética de la quina o cascarilla,' *Mercurio Peruano (Lima)* 8 (1795 [1861]).

[35] See, for instance, Jose Mariano Velloso, *Quinografia Portugueza ou Colleccao de varias memorias sobre vinte e duas especies de quinas, tendentes ao seu descobrimiento nos vastos dominios do Brasil, copiada de varios authores modernos, enriquecida com cinco estampas de Quinas verdadeiras, quatro de falsas, e cinco de Balsameiras* (Lisboa: Impressor da Santa Igreja Patriarcal, 1799).

[36] See, for instance, Heinrich von Bergen, *Versuch einer Monographie der China* (Hamburg: Hartwig & Müller, 1826); Tissot, *Anleitung für das Landvolk*, 288.

[37] See, for instance, E. G. Baldinger, 'Geschichte der Chinarinde und ihrer Wirkungen,' *Magazin vor Aerzte* 7 (1778).

[38] For references to 'kina' in Dutch sources, see, for instance, C. Terne, *Verhandelingen over de Vraage, in hoe verre zou men, by gebrek van de Apotheek, uit kelder en keuken de vereischte*

cinchona in jargon. Some European languages possessed other alternate terms for cinchona, revolving around its provenance, medicinal properties or materiality. In English, for instance, its popularity allowed it to be known simply as the 'bark' or, owing to its supposed provenance, as the 'Peruvian bark'. On account of its close association with the Jesuit order, particularly in earlier sources, it was also referred to as the 'Jesuit's bark' or, since it was often available in the pulverized form, the 'Jesuit's powder'.[39] Spanish sources, too, often spoke rather than of *quina* of *cascarilla*, a diminutive of the Spanish word for 'tree bark' (*cascara*), while German sources occasionally referred to it as *Fieberrinde*, that is, 'fever bark'.[40] Nomenclature maintained a measure of coherence and kinship even beyond these earlier consumer societies by virtue of linguistic relationships – translation equivalence, or onomatopoeia – references to geographical provenance, or therapeutic indications. Slavic, Turkic or Asian-language renderings in particular appear to have had onomatopoetic qualities. Eighteenth-century Chinese sources referred to '金鸡勒' ('chin-chi-lei' in Wade-Giles, 'jin ji lei' in pīnyīn),[41] for instance, Russian sources to 'хина' (khina), or 'перуанская хина' (peruanskaya khina),[42] while in the Ottoman Empire the bark was referred to as 'kına' (kina), or 'kûşûru'l-Peruviyane', a literal translation of 'Peruvian bark'.[43] Equations are, to be sure, fraught with difficulty, and these various terms were idiosyncratic and part of widely divergent epistemic systems. They were also, however, cognate appellations, fragments of discourse that reveal networks of production,[44] threaded together by men and women from

Geneesmiddelen, ook tegen de zwaarfte ziekten en kwaalen, zo uit- als inwendig, kunnen bekomen, mits uitzondere de volgende middelen, Kina, Kwik, Opium, Staal, Delfzuuren, Rhabarber en Ipecacoanna (Amsterdam: Petrus Conradi, 1788).

[39] See, for instance, John Gray, William Arrot and Phil Miller, 'An Account of the Peruvian or Jesuits Bark,' *Philosophical Transactions* 40 (1737/38).

[40] Georg Leonhart Huth, *Sammlung verschiedener die Fieberrinde betreffender Abhandlungen und Nachrichten* (Nürnberg: Seeligmann, 1760); Tissot, *Anleitung für das Landvolk*, 288; Alexander von Humboldt, *Ideen zu einer Geographie der Pflanzen: Nebst einem Naturgemälde der Tropenländer* (Tübingen / Paris: F. G. Cotta / F. Schoell, 1807), 63–67.

[41] The term is mentioned in the *Pen-ts'ao kang mu shih-I*, compiled in 1765 by Chao Hsüeh-min (1719–1805). Cited in Paul Unschuld, *Medicine in China. A History of Pharmaceutics* (Berkeley: University of California Press, 1986), 166.

[42] See, for instance, John T. Alexander, *Bubonic Plague in Early Modern Russia: Public Health and Urban Disaster* (New York: Oxford University Press, 2003), 183.

[43] Feza Günergun and Şeref Etker, 'From Quinaquina to "Quinine Law": A Bitter Chapter in the Westernization of Turkish Medicine,' *Osmanlı Bilimi Araştırmaları* XIV, no. 2 (2013), 47; Salim Aydüz and Esma Yildirim, 'Bursalı Ali Münşî ve Tuhfe-i Aliyye. Kına Kına Risâlesi Adlı Eserinin Çevirisi,' *Yeni Tıp Tarihi Araştırmaları* 8 (2002), 93.

[44] On practices of equation in the history of medicine, see Nappi, 'Winter Worm, Summer Grass,' 29–30.

various world regions who had evidently long engaged with and relied upon one another – not only in apprehending that substance's 'admirable effects'[45] but also in crafting a name for it.

Significant, and growing, world market demand for the bark in the late 1700s and early 1800s – from buyers in Portuguese Luanda, at the Ottoman Porte and in the Archduchy of Austria alike – rendered cinchona's botanical classification and demarcation both imperative and difficult. As with other plant-based medicinal substances of the period,[46] there was considerable controversy not only over the boundary of cinchona via-à-vis other plants but also over the varieties cinchona was to encompass – the kinds and number of species that were to be contained in the genus *Cinchona*, to resort to the period's botanical lexis.[47] It was in particular the repeated removal to novel bark-growing regions in the Spanish American Viceroyalties of New Granada and Peru – on account of the bark's worldwide appeal, and resultant overexploitation – and with it, the encounter with divergent varieties of cinchona, that distressed consumers, medical practitioners and naturalists alike.[48] The Spanish, British and French commercial quest for substitutes also yielded several South Asian, Filipino, and Caribbean cinchonas – from St Lucia, Saint Domingue, Guadeloupe and Martinique – that were subject to clinical trials and chemical analyses, but eventually, for the most part, discarded.[49] In 1805, as the result of a two-decades-long quest, two tree species supposed to be cinchona varieties – *Cinchona macrocarpa* and

[45] Note dated as of February 12, 1773, in 'Varios Papeles pertenecientes á la Quina del Péru,' *Archivo del Palacio Real*, Papeles del Almacén de la Quina, Caja 22282 / Expediente Número 6, Madrid, 1773-02-12.

[46] On the difficulties of identifying species of rhubarb, and determining which varieties were the 'true rhubarb', see Monahan, 'Locating Rhubarb,' 229.

[47] In common parlance – the lexis of Spanish colonial officials, harvesters and Creole merchants – the term 'species' was also often applied to cinchona at large – 'the said species cinchona (*la d[ic]ha especie de cascarilla*)'. See, for instance, 'Sobre el acopio de la Quina de los Montes de Loxa Callysalla y otros que la produzcan de buena calidad, y su envio a Espana de cuenta de la Rl. Hazienda,' *Archivo Nacional de la Historia*, Quito, Fondo General, Serie Cascarilla, Caja 3, Expediente 13, Cuenca, 1790-08-26, ff. 34–36; 'Expediente sobre el corte de cascarilla en los Montes de Loxa,' *Archivo Nacional de la Historia*, Quito, Fondo General, Serie Cascarilla, Caja 2, Expediente 5, Loja, 1779-08-19, f. 1.

[48] For a detailed account of the removal from one harvest area to another, see Chapter 5.

[49] On botanical descriptions of 'supposed cinchonas' in the late 1700s, see Luis Alfredo Baratas Díaz and Joaquín Fernández Pérez, 'Conocimiento botánico de las especies de cinchona entre 1750 y 1850: Relevancia de la obra botánica española en América,' *Estudios de historia de las tecnicas, la arqueología industrial y las ciencias* 2 (1998), 648–50. On the French quest, see James E. McClellan and François Regourd, *The Colonial Machine: French Science and Overseas Expansion in the Old Regime* (Turnhout: Brepols Publishers, 2012), 260–62. For an example, see 'Séance du Mardi 30 Juin. La Société m'a chargé de porter sur ses plumitifs le résumé suivt. concernant les différentes especes

Cinchona pubescens – were discovered on Portuguese territory in Rio de Janeiro.[50] Other than to the general limitations of Linnaean taxonomy and the difficulty of examining live plant specimens,[51] it was owing to the variation in properties[52] (bark colour, taste and texture), presented by the proliferation of newly found cinchonas by the beginning of the nineteenth century, that caused contemporaries to continue to differ – in some measure, increasingly so – on how to delineate and group that plant. Opinions on the sheer quantity of extant cinchona species varied from author to author, from two to twenty-two.[53] While the inner and outer botanical outlines of cinchona remained elusive, fragile and tenuous in the eyes of botanists from Uppsala to Santa Fé de Bogotá into the

de quinquina qui ont été soumises á son examen,' *Bibliothèque de l'Académie de médecine*, Procès-verbaux des séances de la Société Royale de la Médicine, Ms 11/11, Paris, 1789-06-30. On the British quest for substitutes, see Maehle, *Drugs on Trial*, 277; Pratik Chakrabarti, 'Empire and Alternatives: Swietenia febrifuga and the Cinchona Substitutes,' *Medical History* 54, no. 1 (2010).

[50] Vera Regina Beltrão Marques, *Natureza em Boiões: medicinas e boticários no Brasil setecentista* (Campinas: Editora da Unicamp / Centro de Memória–Unicamp, 1999), 134.

[51] Baratas Díaz and Fernández Pérez, 'Conocimiento botánico de las especies de cinchona,' 649.

[52] On the 'perceptible dimension' of materials in eighteenth-century chemistry, see Ursula Klein and Wolfgang Lefèvre, *Materials in Eighteenth-Century Science. A Historical Ontology* (Cambridge, Mass.: MIT Press, 2007), 58–59.

[53] According to Padréll et Vidal, by 1802, there were between four and seven varieties; see Joseph Padréll et Vidal, 'Dissertation sur l'usage et l'abus du quinquina dans le traitement des fièvres intermittentes; présentée et soutenue á l'École de Médicine de Montpellier le 23 Prairial an 10 (de la République),' in *Collection des thèses soutenues a l'École de Médicine de Montpellier*, ed. L'École de Médicine de Montpellier (Montpellier: Imprimerie de G. Izar e A. Ricard, 1802), 7–14. José Celestino Mutis defined seven species, but found only four of them to be 'medicinal' – *Cinchona lancifolia*, *Cinchona oblongifolia*, *Cinchona cordifolia*, and *Cinchona ovalifolia*. Josè Celestino Mutis, *Instrucción formada por un facultativo existente por muchos años en el Perú, relativa de las especies y virtudes de la quina* (Cádiz: Don Manuel Ximenez Careño, 1792); Manuel Hernández de Gregorio, ed., *El arcano de la quina. Discurso que contiene la parte médica de las cuatro especies de quinas oficinales, sus virtudes eminentes y su legítima preparación. Obra póstuma del doctor D. José Celestino Mutis* (Madrid: Ibarra, Impresor de Cámara de S. M., 1828). Hipólito Ruiz López organized his findings into seven types of cinchona in 1792, and revised them in 1801 to include nine. Ruiz López, *Quinología*, vol. 2, 50–54; Hipólito Ruiz López and José Antonio Pavón Jiménez, *Suplemento a la quinologia, en el qual se aumentan las Especies de Quina nuevamente descubiertas en el Perú por Don Juan Tafalla, y la Quina naranjada de Santa Fé con su estampa* (Madrid: Imprenta de la viuda e hijo de Marín, 1801). By 1797, Aylmer B. Lambert had written of eleven species of cinchona; by 1821 he had come to think there were as many as twenty-two kinds. Aylmer B. Lambert, *An illustration of the genus Cinchona: Comprising Descriptions of all the Officinal Peruvian Barks, incl. Several New Species* (London: Searle, 1821). For discussions of the debates about cinchona classification in the Iberian world around 1800, see Baratas Díaz and Fernández Pérez, 'Conocimiento botánico de las especies de cinchona'; Mauricio Nieto Olarte, *Remedios para el imperio. Historia natural y la apropiación del Nuevo Mundo* (Bogotá: Universidad de los Andes – FLACSO-CESO, 2006), 83, 173–95.

early nineteenth century, however, constant debate about its varieties also reified the idea of cinchona as a single object. As historians have argued for other plants, the very discussion of its instantiations – in continuously referencing the category they instantiate – also contributed to stabilizing and objectifying the bark as a recognizable thing.[54]

London physicians,[55] creole bark merchants in the Viceroyalty of New Granada,[56] and Chinese medical authors[57] alike commonly circumscribed the bark's identity in the late 1700s and early 1800s, like botanists, by virtue of its geographical provenance as well as its material properties – texture, taste, consistency and colour. Genuine cinchona was supposed to have the same shape as cinnamon; a rough, splintery and mealy texture; and to be of either white, pale-yellow, reddish or orange colour, according to species (FIGURE 0.1).[58] When chewed, it was to be of a bitter, aromatic and astringent taste.[59] In conjunction with the rise of clinical pharmacology, experimenters also began to define the bark chemically, through experiments and the testing of properties – its acidity, solubility in various solvents or reaction with other substances, particularly bodily fluids.[60] At a time when simple clinical observations, experiences and statistics to evaluate treatments were gradually being introduced, doctors, botanists and surgeons in Madrid, Cartagena de Indias, London, Saint Domingue, New York, Rio de Janeiro or Lyon also increasingly conducted clinical trials – 'exact, and repeated observations', 'by means of a general, extensive administration' of the bark – among the populations of hospitals, slave plantations, or the military to

[54] Nappi, 'Surface Tension,' 41.

[55] Robert John Thornton, *New Family Herbal: Or Popular Account of the Natures and Properties of the Various Plants Used in Medicine, Diet and the Arts* (London: Richard Phillips, 1810), 117.

[56] Matthew Crawford, *The Andean Wonder Drug. Cinchona Bark and Imperial Science in the Spanish Atlantic, 1630–1800* (Pittsburgh, Pa.: University of Pittsburgh Press, 2016), 103.

[57] Chao Hsüeh-min described cinchona as 'consist[ing] of thin, hollow twigs' that 'resembled the drug *yüan-chih*, after one ha[d] removed from it the marrow' and affirmed that 'the taste [was] slightly acrid'. Cited in Unschuld, *Medicine in China*, 166.

[58] William Buchan advised his readership to learn to 'distinguish' 'genuine' barks from 'false' ones. William Buchan, *Domestic Medicine: Or, a treatise on the prevention and cure of diseases* (London: W. Strahan, 1774), 169.

[59] See, for instance, Johan Andreas Murray, *Johan Andreas Murray's Vorrath an einfachen, zubereiteten und gemischten Heilmitteln, zum Gebrauche praktischer Aerzte bearbeitet*, ed. Ludwig Christoph Althof, 2 vols., vol. 1 (Göttingen: Johann Christian Dieterich, 1793), 1118; Padréll et Vidal, 'Dissertation sur l'usage et l'abus du quinquina,' 7–14. Aydüz and Yildirim, 'Bursalı Ali Münşî ve Tuhfe-i Aliyye,' 94; Crawford, *The Andean Wonder Drug*, 101–02.

[60] Chakrabarti, 'Empire and Alternatives,' 89; Maehle, *Drugs on Trial*, 8, 27; Klein and Lefèvre, *Materials in Eighteenth-Century Science*.

Figure 0.1 *Cinchona rosea Flor. Peruviana*. Sample collected under the aegis of the Botanical Expedition to the Viceroyalty of Peru (1778–1816), under the command of Hipólito Ruiz López and José Antonio Pavón. MA-780943. *Herbario del Real Jardín Botánico, CSIC*. © *RJB-CSIC*

put different or newly discovered varieties of cinchona on trial and gain 'a proper understanding of their virtues' (*o devido conceito das virtudes*).[61] None of these criteria of demarcation was absolute or definite, however.

[61] On cinchona testing in English, German and French language contexts, see Maehle, *Drugs on Trial*, 268–75. On cinchona testing in hospitals of the Spanish Empire, in what signified a shift away from the mere observation of the bark's physical characteristics, see Crawford, *The Andean Wonder Drug*, 117–18; Rosario Terreros Gomez Maria and Andrés Turrión Maria Luisa, 'First Hospital Experiences with Cinchona Ordered by Spanish Court (ca. 1770),' *Revue d'histoire de la pharmacie* 84, no. 312 (1996). The Portuguese Crown also tested the bark on sufferers. See, for instance, 'Decretos do príncipe regente,' *Arquivo Histórico Ultramarino*, 076 – REINO RESGATE 20121023 / Cx. 30-A, Pasta 18, Queluz, 1804-09-22. For an instance of cinchona testing on Saint Domingue, see Joseph Gauché, 'Description d'un Quinquina indigène á St. Domingue, par Joseph Gauché, habitante, concessionnaire et administrateur des eaux thermales de Boynes, membre du Cercle des Philadelphes du Cap Français. Mémoire lu à l'Académie des Sciences, le 24 juillet 1787,' *La Bibliothèque centrale du Muséum national d'histoire naturelle*, Ms 1275, n.p., c. 1787.

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Plant materials belonged in the world of commodities and trade, and human indiscretion, as well as natural variation in their materiality – or 'perceptible qualities', to use the period's lexis – rendered them as resistant to epistemic and medical stabilization as they did to botanical classification. Other than the removal to novel bark-growing regions and the commercial quest for substitutes, by the late eighteenth century, instances of wilful fraud – the addition of poor-quality cinchona or other, non-medicinal barks – by Caribbean pirates,[62] Habsburg customs officials[63] and London apothecaries[64] alike, as well as of deterioration in transport, further induced the authors of health advice manuals and popular recipe collections to advise caution in selecting cinchona bark.[65] Cinchona was 'now for the most part adulterated', as the author of an Italian manuscript recipe collection phrased it.[66] Readers were well advised to take care that the bark they purchased not be 'spoiled by moisture,'[67] that its taste be neither 'nauseous, or […] mucilaginous', nor its surface too tough or too 'spongy, […] woody, or powdery'[68] – that the bark be, in short, neither false nor deteriorated. Cinchona, as it was conveyed across landmasses and bodies of water, and taken into hospitals, laboratories and apothecary shops the Atlantic World over, thus exhibited a material tendency to decay and a natural and circumstantial bent for variation that hinged on the very breadth of its acceptance and the steadfastness of its appeal. Discourses and practices attendant to the bark's propensity to decay, and its bent for variation,

[62] See Chapter 2.

[63] Luis Martínez de Beltrán, 'Oficio de D. Luis Martínez de Beltrán a Manuel Muzquiz, comunicándole que cuando lleguen los dos cajones de quina regalada a la Emperatriz Reina de Hungría, los hará seguir a su destino,' *Archivo General de Simancas*, Legajo 907, Genova, 1771-04-27.

[64] See the extract from a circular letter, dated as of November 15, 1799, by the Royal College of Physicians, on the yellow bark's liability to 'adulteration', in 'Receipts copied from Miss Myddleton's Book, August 15th, 1785. With many added receipts for remedies by various later hands, extracts, and pasted-in cuttings from newspapers, etc.', *Wellcome Library*, Archives and manuscripts, Closed stores WMS 4, MS.3656, n.p., c. 1785–1818.

[65] Matthew Crawford has studied the problem of cinchona fraud in the Spanish Empire in detail. Matthew Crawford, '"Para desterrar las dudas y adulteraciones": Scientific Expertise and the Attempts to Make a Better Bark for the Royal Monopoly of *Quina*,' *Journal of Spanish Cultural Studies* 8, no. 2 (2007); Crawford, *Empire's Experts*. On the problem of counterfeit drugs in the period more generally, see Roy Porter and Dorothy Porter, *Patient's Progress. Doctors and Doctoring in Eighteenth-Century England* (Cambridge: Polity Press, 1989), 167.

[66] 'Collection of medical receipts and prescriptions: in Italian, by various hands.' Wellcome Library, Archives and manuscripts, Closed stores WMS 4, MS.4105, n.p., n.d.

[67] Thornton, *New Family Herbal*, 117.

[68] Ibid. On counterfeit bark, see also Murray, *Vorrath von einfachen, zubereiteten und gemischten Heilmitteln*, 1, 1118, 21.

certainly encumbered and delayed its epistemic and medical delineation, and stabilization in ways that render any account of it a 'history of likenesses rather than […] of an object',[69] of a historical category rather than of a specific kind of matter. They also indicate, however, the extent to which cinchona had, by the decades around 1800, become an object that trained observation could discern, and the integrity of which it was considered necessary, and ultimately possible, to maintain, police and regulate.[70]

Cinchona was extensive not only in its geographic reach by the late 1700s and early 1800s – enjoying popularity in societies the Atlantic World over – but also in its therapeutic indications. As historians of pharmacology have shown, while in the seventeenth century physicians had still taken cinchona to be a 'specific' – a remedy that targeted and extinguished one particular kind of disease, 'intermittent fevers'[71] – by the eighteenth, medical practitioners from Britain to Muscovy, and from the sultanate of Morocco to the Viceroyalty of New Spain, would have agreed that the bark was effective for various types of fevers – intermittent, but also remittent,[72] bilious,[73] nervous[74] or yellow[75] (FIGURE 0.2). Some practitioners suggested that cinchona could also

[69] Nappi, 'Winter Worm, Summer Grass,' 29. [70] Nappi, 'Surface Tension,' 41.

[71] The very concept of 'specific' changed around 1800: while since Thomas Sydenham it had denoted a remedy that extinguished the *species morbi,* regardless of the patient's individual constitution, it came to mean any medicine that was uniquely powerful and that united its known pharmacological properties – astringency, antiseptic power, etc. – in such 'an inimitable way that it was superior to all other drugs sharing those properties'. Maehle, *Drugs on Trial*, 287. On medical specifics, see also Cook, 'Markets and Cultures.'

[72] See, for instance, Thomas Dancer, *The Medical Assistant; or Jamaica Practice of Physic: Designed chiefly for the Use of Families and Plantations* (Kingston, Jamaica: Alexander Aikman, 1801), 87; Jose Pinto de Azeredo, *Ensaios sobre algumas enfermidades d'Angola* (Lisboa: Na Regia Officina Typografica, 1799), 64. See also the 1808 Russian pharmacopoeia: James Wylie, *Pharmacopoeia castrensis Ruthena* (St Petersburg: Typographia Medica, 1808), 41.

[73] See, for instance, James Clark, *A Treatise on the Yellow Fever, as it appeared in the Island of Dominica, in the Years 1793-4-5-6; to which are added, Observations on the Bilious Remittent Fever, on Intermittents, Dysentery, and Some Other West Indian Diseases* (London: J. Murray & S. Highley, 1797), 81; Gilbert Blane, *A Short Account of the Most Effectual Means of Preserving the Health of Seamen, particularly in the Royal Navy, to the Flag-Officers and Captains of his Majesty's Ships of War on the West-India Station* (Sandwich, off Antigua: – 1780), 33.

[74] Dancer, *The Medical Assistant; or Jamaica Practice of Physic*, 72.

[75] See, for instance, Padréll et Vidal, 'Dissertation sur l'usage et l'abus du quinquina,' 14; José Celestino Mutis, 'Borrador del oficio de José Celestino Mutis al virrey Pedro Mendinueta y Muzquis,' *Archivo del Real Jardín Botánico*, Real Expedición Botánica del Nuevo Reino de Granada (1783–1816), José Celestino Mutis, Correspondencia, RJB03/0002/0002/0172, Santa Fé de Bogotá (Colombia), 1801-10-24.

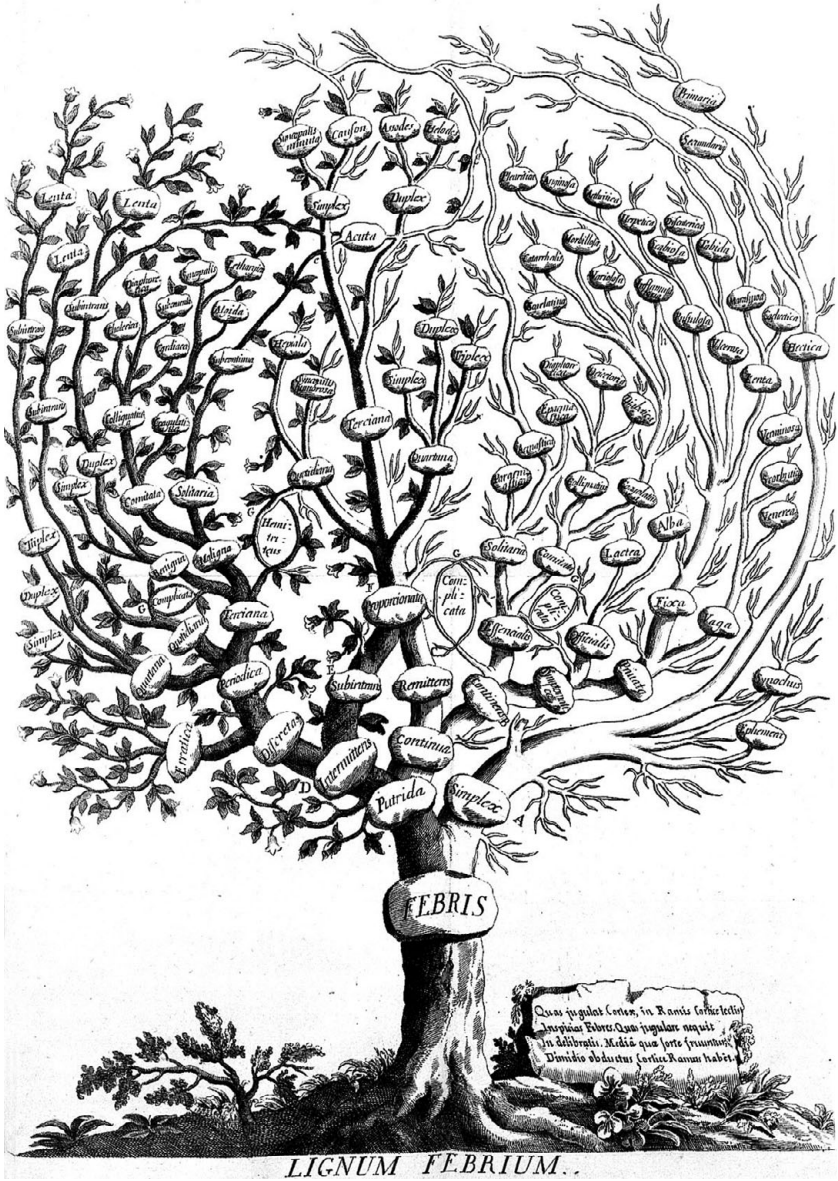

Figure 0.2 The 'Fever Tree (*Lignum Febrium*)' by Francisco Torti, which supplemented the author's taxonomy of fevers. Branches covered with bark, occupying the left part of the picture, represent fevers curable by Peruvian bark, whereas denuded, leafless branches represent continued fevers not curable by cinchona. At the centre are trunks and branches partly covered by bark, corresponding to the 'proportionate fever', in which susceptibility varied. Branches that anastomose represent fevers that change from one category to another, 1712. Francisco Torti *Therapeutice Specialis Ad Febres Periodicas Perniciosas*. Credit: Wellcome Collection. CC BY

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be useful in other diseases: in gangrene,[76] haemorrhages,[77] dysentery,[78] epilepsy,[79] smallpox,[80] rheumatism,[81] consumption,[82] scurvy,[83] jaundice,[84] the gout[85] or in obstructions of the menstrual flux, that is, to induce the menses.[86] Novel indications were brought on both inadvertently, by 'chance observations' and therapeutic experience,[87] and on

[76] See, for instance, Thornton, *New Family Herbal*, 123. The Edinburgh new dispensatory likewise advised the bark 'in gangrenous sore throats, as […] in every species of gangrene'. William Lewis and John Rotheram, *The Edinburgh new dispensatory: with the additions of the most approved formulae, from the best foreign pharmacopoeias; the whole interspersed with practical cautions and observations; and enriched with the latest discoveries in natural history, chemistry, and medicine; with new tables of elective attractions of antimonial and mercurial preparations, &c.* (Walpole, Newhampshire: Thomas & Andrews, 1796), 144. Maehle discusses the administration of the bark in 'gangrene' at length. Maehle, *Drugs on Trial*, 247–58.

[77] Murray, *Vorrath von einfachen, zubereiteten und gemischten Heilmitteln*, 1, 1193. See also Ralph Irving, *Experiments on the Red and Quill Peruvian Bark: with Observations on its History, Mode of Operation, and Uses* (Edinburgh: C. Elliot, 1785), 174–75; Wylie, *Pharmacopoeia castrensis Ruthena*, 41.

[78] See, for instance, Wylie, *Pharmacopoeia castrensis Ruthena*, 41; Lewis and Rotheram, *The Edinburgh new dispensatory*, 144.

[79] Murray, *Vorrath von einfachen, zubereiteten und gemischten Heilmitteln*, 1, 1191.

[80] According to Thornton, in 'confluent small-pox it promotes languid eruption and suppuration, diminishes the fever, and prevents or corrects putrescence and gangrene.' Thornton, *New Family Herbal*, 123; Irving, *Experiments on the Red and Quill Peruvian Bark*.

[81] Thornton quoted a Dr Haygarth, who had had 'lately extolled its use in acute rheumatism, from the very commencement, even without premising venesection'. Thornton, *New Family Herbal*, 123.

[82] On cinchona in consumption, see, for instance, William Buchan, *Domestic Medicine, or, the Family Physician: Being an Attempt To Render the MEDICAL ART more generally useful, by shewing people what is in their own power both with respect to the PREVENTION and CURE of Diseases. CHIEFLY Calculated to recommend a proper attention to REGIMEN and SIMPLE MEDICINES* (Edinburgh: Balfour, Auld, and Smellie, 1769), 206; Murray, *Vorrath von einfachen, zubereiteten und gemischten Heilmitteln*, 1, 1186.

[83] Murray cited cases where practitioners had employed the bark with varying degrees of success in scurvy. Murray, *Vorrath von einfachen, zubereiteten und gemischten Heilmitteln*, 1. According to Lewis, some practitioners had 'great confidence in it joined with the acid of vitriol, in cases of phthisis, serophula, ill conditioned ulcers, rickets, scurvy, and in states of convalescence'. Lewis and Rotheram, *The Edinburgh new dispensatory*, 144.

[84] Murray, *Vorrath von einfachen, zubereiteten und gemischten Heilmitteln*, 1, 1202; Thornton, *New Family Herbal*, 123.

[85] See, for instance, Murray, *Vorrath von einfachen, zubereiteten und gemischten Heilmitteln*, 1, 1204. For an example from the Portuguese context, see Francisco Tavares's treatise on the 'profitable, and wholesome use of cinchona in the gout'. Francisco Tavares, *Observações, e reflexões sobre o uso proveitoso, e saudavel da quina na gota* (Lisbon: Regia Oficina Typografica, 1802).

[86] Buchan, *Domestic Medicine*, 361. Cinchona was used as an emmenagogue, or menstrual regulator, in eighteenth-century Europe, where menstruation was considered a necessary cleansing process that, if missed, would cause a multitude of afflictions. Londa Schiebinger, *Plants and Empire* (Cambridge, Mass: Harvard University Press, 2004), 182.

[87] Maehle, *Drugs on Trial*, 247–58. See also Boumediene, *La colonisation du savoir*, 235.

account of alterations in interpretations of the bark's mode of operation – it was increasingly thought to act through general, not specific, tonic, or stimulant, antiseptic, astringent or corroborant properties[88] – as well as in the understanding of the causes of fevers. In the late eighteenth century, fevers came to be seen as the effect of conditions such as debility of the fibres, recurrent 'atony' or putridity, the same disorders that were thought to produce ailments like gangrene, smallpox or dysentery.[89] This is not to say that cinchona ceased to be the remedy of choice in intermittent fevers. As a matter of fact, while it was 'pretty generally agreed' among medical practitioners, both lay and professional, from the West Indies to the Ottoman Porte, that cinchona was the remedy they could 'most certainly rely on for the cure of intermittent fevers',[90] its propriety and effects in other disorders, particularly those that were not fevers, were considered uncertain, 'various and often opposite in different patients, and in different states of the same patients'.[91] It is to say, however, that the bark's curative indications expanded considerably, rendering it, by all accounts, a broad-spectrum febrifuge by the turn of the eighteenth century, and, at least temporarily[92] and to some practitioners, also a panacea and universal remedy.

We tend to think of substances as durable kinds of matter with uniform, definite properties: as foundational, fundamental entities, and as ontologically basic[93] – everything that cinchona, in its evident variability and ambiguity, its shifting epistemic, chemical and medical contours, was not. The Peruvian bark was not so much a specific kind of matter by the late 1700s and early 1800s. It was, rather, a specific historical category that encompassed various kinds of matter: a number of dried,

[88] Maehle, *Drugs on Trial*, 258; 63–66. Antiseptics derived their name from 'septic', which meant putrefactive. Pratik Chakrabarti, *Medicine and Empire 1600–1960* (Basingstoke: Palgrave Macmillan, 2014), 45.

[89] Maehle, *Drugs on Trial*, 264.

[90] Irving, *Experiments on the Red and Quill Peruvian Bark*, 176. For similar remarks, see Robert Jackson, *An Outline of the History & Cure of Fever, Endemic and Contagious; More Expressly the Contagious Fevers of Jails, Ships, & Hospitals, the Concentrated Endemic, Vulgarly Called the Yellow Fever of the West Indies* (Edinburgh: John Meir, 1808), 276; Padréll et Vidal, 'Dissertation sur l'usage et l'abus du quinquina,' 1–2; Tissot, *Anleitung für das Landvolk*, 288–89; Johann Jacob Rambach, *Versuch einer physisch-medizinischen Beschreibung von Hamburg* (Hamburg: Carl Ernst Bohn, 1801), 310–12; Aydüz and Yildirim, 'Bursalı Ali Münşî ve Tuhfe-i Aliyye,' 96. See also Maehle, *Drugs on Trial*, 246; 85.

[91] Irving, *Experiments on the Red and Quill Peruvian Bark*, 176.

[92] 'Collection of medical receipts and prescriptions: in Italian, by various hands,' *Wellcome Library*, Archives and manuscripts, Closed stores WMS 4, MS.4105, n.p., n.d.

[93] Theodore Schatzki, 'Nature and Technology in History,' *History and Theory*, no. 42 (2003), 82–93; Howard Robinson, 'Substance,' in *Stanford Encyclopedia of Philosophy*, ed. Edward N. Zalta (2014).

bitter-tasting shreds of tree bark marketed, dispensed and classified under the name of cinchona – or, indeed, one of that name's alternate and foreign equivalents – inclusive and aware of their shifting therapeutic attributes and of their material tendencies toward decay or variation over time and space.

An Appraisal of the Historiography

The singular medicinal virtues ascribed to cinchona have, over the centuries, attracted a considerable number of historians to the subject. The historiography has suffered, however, from a tendency toward presentism on the one hand – a subservience to quinine, one of cinchona's active compounds, and malaria – and a close association with particular empires and states on the other, the British and Spanish especially. Particularly with an Anglo-American reading public, cinchona is still closely associated with the British Empire and the salvation of the lives and minds of Englishmen in the malaria-stricken Raj of the late nineteenth century.[94] *A Singular Remedy* breaks with these two historiographical traditions, in that it centres on the knowledge movement that limitation to particular empires has largely obliterated and on the contingency, variability and idiosyncrasy of bark knowledge that presentism has so often obscured. At the very heart of *A Singular Remedy* is the richness and latitude of the life of a substance that habitually crossed imperial and medical boundaries: the diversity of therapeutic practices and routines of medication pertaining to cinchona, the variety of ailments and conditions in which it was employed, and the wide range of creole, French, Cantonese, Portuguese or Levantine experts, sufferers and vendors given to its consumption, sale or advocacy.

The book breaks, first, from an important sector of the historiography that has reduced the bark to its part as the source of, and precursor to, quinine, and proceeded on the assumption that it would have been, like that active compound it contained, effective against malaria. Indeed, cinchona has long occupied a prominent place in presentist histories of medicine chronicling 'the ideas and events which brought medicine ever closer to the secrets of disease and health'.[95] Along those same lines, a popular, laudatory, genre of historiography has celebrated the bark as

[94] 'Lives and minds', attributed to Winston Churchill (1874–1965), reads: 'The gin and tonic has saved more Englishmen's lives, and minds, than all the doctors in the Empire.'

[95] Morris J. Vogel, introduction to *The Therapeutic Revolution. Essays in the Social History of Medicine*, ed. Morris J. Vogel and Charles Rosenberg (Philadelphia: University of Pennsylvania Press, 1979), viii.

'the remedy that has spared, or at least ameliorated, the greatest number of lives in human history'.[96] That historiography has also celebrated its discoverers, advocates and pioneers: the friars of the Jesuit order who first appreciated its true value, the visionary physicians and apothecaries – Robert Talbor (1642–1681) and Thomas Sydenham (1624–1689) – who overcame widespread resistance to it, and French and Prussian naturalists – Charles-Marie de La Condamine (1701–1774), Joseph de Jussieu (1704–1779) and Alexander von Humboldt (1769–1859) – who 'braved swamps, […] dangerous animals, and wild river rapids' to bring back specimens, and observations, of cinchona plants in their natural habitat.[97] Much of the academic historiography, too, though far from embracing the same triumphalist rhetoric, has proceeded on the assumption that the bark was a natural remedy against malaria.[98] Even where historians have doubted the bark's efficacy, they have reduced it largely to its administration in ailments retrospectively diagnosed as malaria. Many of the earliest historical studies of the bark,[99] as well as some of the most conspicuous recent publications that make reference to it by environmental and global historians of disease,[100] have come out of the historiography pertaining to malaria. It is, to be sure, perfectly plausible to assume that the various barks contemporaries consumed under the designation of cinchona effectively contained, like their modern-day

[96] Mark Honigsbaum and Merlin Willcox, 'Cinchona,' in *Traditional Medicinal Plants and Malaria*, ed. Merlin Willcox, Gerard Bodeker and Philippe Rasoanaivo (Boca Raton, Fla.: CRC Press, 2004), 22. For a Spanish-language example of the laudatory genre, see Plutarco Naranjo, 'Pedro Leiva y el secreto de la quina,' *Revista Ecuatoriana de Medicina* XV, no. 6 (1979).

[97] Steven Lehrer, *Explorers of the Body. Dramatic Breakthroughs in Medicine from Ancient Times to Modern Science* (New York: iUniverse, 2006), 236–43. Cinchona has inspired many similar, often popular accounts by historians or doctors. See, for instance, Honigsbaum and Willcox, 'Cinchona,' 25–26; Leonard Jan Bruce-Chwatt, 'Cinchona and Quinine: A Remarkable Anniversary,' *Interdisciplinary Science Review* 15, no. 1 (1990); T. W. Keeble, 'A Cure for the Ague: The Contribution of Robert Talbor (1642–81),' *Journal of the Royal Society of Medicine* 90, no. 5 (1997).

[98] Honigsbaum and Willcox, 'Cinchona,' 21. For a similar discourse, see also the chapter on quinine in Lucille H. Brockway, *Science and Colonial Expansion* (New Haven: Yale University Press, 2002 (1979)), 108.

[99] The earliest relevant publications on cinchona by Alex W. Haggis and Jaime Jaramillo-Arango were partly stimulated by the military importance of malaria control in the Second World War. Haggis, 'Fundamental Errors'; Jaramillo-Arango, 'A Critical Review.' See also L. W. Hackett, *Malaria in Europe. An Ecological Study* (London: Oxford University Press, 1937).

[100] For general histories of malaria that include chapters on or references to cinchona, see Randall M. Packard, *The Making of a Tropical Disease: A Short History of Malaria* (Baltimore: Johns Hopkins University Press, 2007); Leonard Jan Bruce-Chwatt and Julian de Zulueta, *The Rise and Fall of Malaria in Europe* (Oxford: Oxford University Press, 1980); James L. A. Webb, *Humanity's Burden. A Global History of Malaria* (Cambridge: Cambridge University Press, 2009), 92–196.

equivalents and in varying proportions according to species, natural alkaloids (among them, quinine and quinidine, cinchonine and cinchonidine), which, in an isolated and crystallized state, are at present thought to interfere with the growth and reproduction of malarial parasites.[101] It is also reasonable to assume a relationship between intermittent fevers, the ailments most commonly treated with the bark, and forms of malaria, or rather, the disease consequences of the protozoan parasite species *Plasmodium vivax*, which occurs with 48-hour periodicity, *Plasmodium malariae*, which causes paroxysms every 72 hours, and *Plasmodium falciparum*, respectively.[102] For intermittent fevers, as distinguished from continual or remitting fevers, had 'intervals or remissions of the symptoms'.[103] There were tertian fevers, so-called because febrile accessions recurred on the third day, and quartan fevers, so-called because they came with attacks on the first and fourth days, as well as several less clearly synchronous, malignant forms of intermittent fevers.[104] It is not pertinent, however, to reduce the bark to its administration in intermittent fevers, when it was by all accounts a broad-spectrum febrifuge and panacea by the turn of the eighteenth century. Nor is it commensurate to assume that the bark cured men and women in the past, nor that it even afforded them relief. Not only is there in fact only limited clinical evidence to support ideas about the efficacy of whole cinchona bark extracts, even in the treatment of uncomplicated *P. falciparum* and *vivax* malaria, especially since the last extensive clinical trials with whole cinchona bark extracts were conducted in the 1930s.[105]

[101] Jane Achan et al., 'Quinine, an Old Anti-malarial Drug in a Modern World: Role in the Treatment of Malaria,' *Malaria Journal* 10, no. 144 (2011).

[102] Frederick L. Dunn, 'Malaria,' in *The Cambridge World History of Human Disease*, ed. Kenneth F. Kiple (Cambridge: Cambridge University Press, 1993), 859.

[103] Whereas a 'continual fever' never left 'the patient during the whole course of the disease', or at least showed 'no remarkable increase or abatement in the symptoms', those suffering from 'remittent fever' experienced variations in the intensity of the fever, yet without any periods of relief. On the eighteenth-century category of 'fevers', see, for instance, William F. Bynum, 'Cullen and the Study of Fevers in Britain, 1760–1820,' in *Theories of Fever from Antiquity to the Enlightenment*, ed. William F. Bynum and Vivian Nutton (London: Wellcome Institute for the History of Medicine, 1981); Johanna Geyer-Kordesch, 'Fevers and Other Fundamentals: Dutch and German Medical Explanations c. 1680 to 1730,' in *Theories of Fever from Antiquity to the Enlightenment*, ed. William F. Bynum and Vivian Nutton (London: Wellcome Institute for the History of Medicine, 1981). On early modern conceptions of 'intermittent fevers' and how settlement and exploration carried that framework into the Atlantic, see Hugh Cagle, *Assembling the Tropics. Science and Medicine in Portugal's Empire, 1450–1700* (Cambridge: Cambridge University Press 2018), 227; 81–82.

[104] Buchan, *Domestic Medicine*, 166–76.

[105] The relevant studies are cited in Philippe Rasoanaivo et al., 'Whole Plant Extracts versus Single Compounds for the Treatment of Malaria: Synergy and Positive Interactions,' *Malaria Journal* 10, no. 1 (2011).

There is also great uncertainty about the concentration of alkaloids in the barks commercially available in the eighteenth century. Even if we were to assume that barks sold under the name of cinchona uniformly contained active compounds and that these were effective in the treatment of malaria, there would still be no way of knowing whether the intermittent fevers for which the bark was ordered were identical with modern-day malaria – retrospective diagnosis based on observation and description of symptoms naturally leads to a wide margin of error[106] – whether contemporaries administered curative doses of the bark, and whether the by all accounts common admixture of purgatives would not have mitigated sufferers' response.[107] Also, the historical record is too incomplete to allow for any kind of quantitative assessment. Comprehensive, systematic military and civilian health records that would allow for conclusions on the impact of medications are essentially creatures of the later nineteenth century.[108] The material point, however, is whether it is the historian's province to pose the essentially ahistorical question of efficacy, and to wrench early modern medicine, and pharmacology, into a twenty-first-century biomedical lexis, and explanatory repertoire, at all. There is overwhelming evidence that 'efficacy and rapid cures were not part of the cultural expectation of the suffering'[109] in the eighteenth century, that our historical subjects' medical horizon of expectation and therapeutic experience differed radically from ours.[110] What is more, historians have long argued that body knowledge is 'in and of itself

[106] On the pitfalls of retrospective diagnosing in the history of malaria, see Guenter B. Risse, *New Medical Challenges during the Scottish enlightenment*, vol. 78, Clio medica: The Wellcome Institute Series in the History of Medicine (Amsterdam: Rodopi, 2005), 173; Mary J. Dobson, *Contours of Death and Disease in Early Modern England* (Cambridge: Cambridge University Press, 1997), 309–27.

[107] Some historians have been more cautious than others about cinchona's 'effectiveness'. Mary Dobson, while she does not doubt that the bark was an 'effective' and 'powerful drug in controlling ague', questions its impact, since it would not have been used sufficiently widely, and would often have been 'adulterated and or used indiscriminately'. Dobson, *Contours of Death and Disease*, 316. Philip Curtin, in a similar vein, points to cinchona barks that contained 'little or none of the effective antimalarial alkaloids'. Philip D. Curtin, *Death by Migration. Europe's Encounter with the Tropical World in the Nineteenth Century* (New York: Cambridge University Press, 1989), 63.

[108] The earliest quantifiable records for the history of disease are military health records kept by the British and other European armies from 1816 onwards. Curtin, *Death by Migration*, xvi.

[109] Martha Baldwin, 'Expanding the Therapeutic Canon: Learned Medicine Listens to Folk Medicine,' in *Cultures of Communication from Reformation to Enlightenment*, ed. James Van Horn Melton (Ashgate: Aldershot, 2002), 255; Maehle, *Drugs on Trial*, 268–72.

[110] Many eighteenth-century physicians would have insisted that 'the timing of remedies rather than the factor of their composition was essential for healing', or that 'only a

constituting', productive rather than merely reflective of versions of the diseased body.[111] Just as any assumption of the constancy of human nature and the human condition is untenable in the face of historians' heightened awareness of historical singularity and discontinuity,[112] the act of collapsing past medical experiences into present categories will invariably distort and obscure our understanding of the corporeal experience of the suffering, their bodily anxieties, knowledge and imaginaries. Cinchona's complexity – the fact that it yields natural alkaloids that are today believed to profoundly affect humans and other living organisms – would have unfolded not only at a scale invisible to the experience of men, women and children in the past, but also at a level that was likely irrelevant to them. This book is greatly indebted to, and draws significantly on, global histories of disease in general, and of malaria in particular. It distances itself, however, from a history written in terms that are not those of its historical subjects and structured in terms of concepts and categories of sickness and therapy not available to past societies.[113] *A Singular Remedy* is concerned precisely with the contingency and peculiarity of medical knowledge and the knowledge movement in the past that a presentist approach will obscure. It studies the variety of illnesses and fevers in which the bark was employed, and the profuse medical vocabulary, rich curative repertoire and influential cultural and topographical imaginary that grounded practitioners' and sufferers' experience of them.

A Singular Remedy breaks, second, from a historiographical tradition confined to imperial boundaries and frameworks, in its attempt at writing a history of how medical knowledge was shared between and across the Atlantic empires. The tendency among historians of the bark to settle for explanations that can be drawn from events and processes within particular national, or imperial, territories is partly symptomatic of the wider field. Indeed, there are few global histories of health, or medicine in

certain application of cinchona in a very particular pattern of febrile illness would lead to health'. Geyer-Kordesch, 'Fevers and Other Fundamentals,' 112.

111 On the historicity of disease entities and 'versions' of the body, see, for instance, Roger Cooter, 'The Turn of the Body. History and the Politics of the Corporeal,' *ARBOR. Ciencia, Pensamiento y Cultura* CLXXXVI, no. 743 (2010), 396–97. On the fluid, unbounded version of the body that had grown out of humoral pathology, see Barbara Duden, *The Woman beneath the Skin. A Doctor's Patients in Eighteenth-Century Germany* (Cambridge, Mass.: Harvard University Press, 1991).

112 Michael Pickering, 'Experience as Horizon: Koselleck, Expectation and Historical Time,' *Cultural Studies* 18, no. 2–3 (2004).

113 See Charles E. Rosenberg, *Explaining Epidemics and Other Studies in the History of Medicine* (Cambridge: Cambridge University Press, 1992), 1.

general,[114] the one exception being the thriving field of historical scholarship on disease, epidemics and contagion.[115] Even the buoyant literature on medicine trade and therapeutic exchange across the Atlantic basin that had taken shape already from the fifteenth century[116] has commonly been written along imperial lines, with studies focusing on the Dutch,[117] Spanish,[118] British[119] or Portuguese[120] contexts.

[114] In the history of health, disease and medicine, studies framed by familiar entities – the colony, or the nation-state, or a particular medical 'tradition' – still 'consistently and predictably' outweigh 'comparative', connected or 'global' studies. Jonathan Andrews, 'History of Medicine: Health, Medicine and Disease in the Eighteenth Century,' *Journal for Eighteenth-Century Studies* 34, no. 4 (2011), 505. For a more recent critique of the fact that 'surprisingly few works in the history of health, disease, and medicine can accurately be described as global histories or claim to be such', see Mark Harrison, 'A Global Perspective: Reframing the History of Health, Medicine, and Disease,' *Bulletin of the History of Medicine* 89, no. 4 (2015), 640.

[115] See Sanjoy Bhattacharya, 'Global and Local Histories of Medicine: Interpretative Challenges and Future Possibilities,' in *The Oxford Handbook of the History of Medicine*, ed. Mark Jackson (Oxford: Oxford University Press, 2011). The earliest, 'global' histories of disease, epidemics and contagion were Alfred W. Crosby, *The Columbian Exchange. Biological and Cultural Consequences of 1492* (Westport, Conn.: Greenwood, 1972); William H. McNeill, *Plagues and Peoples* (Garden City, N.Y.: Anchor Press, 1976). Global histories of particular diseases are a thriving field, too. See, for instance, Christopher Hamlin, *Cholera. The Biography* (New York: Oxford University Press, 2009); Webb, *Humanity's Burden*.

[116] For an overview of the literature on early modern Atlantic drug trade, see Harold J. Cook and Timothy Walker, 'Circulation of Medicine in the Early Modern Atlantic World,' *Social History of Medicine* 26, no. 3 (2013).

[117] See, for instance, A. M. G. Rutten, *Dutch Transatlantic Medicine Trade in the Eighteenth Century under the Cover of the West India Company* (Rotterdam: Erasmus Publishing, 2000); Harold J. Cook, *Matters of Exchange. Commerce, Medicine and Science in the Age of Empire* (Hyderabad: Orient Longman, 2008).

[118] There is a considerable breadth of scholarship on drug trade in the Spanish Atlantic from around 1500. See, for instance, J. Worth Estes, 'The Reception of American Drugs in Europe, 1500–1650,' in *Searching for the Secrets of Nature. The Life and Works of Dr. Francisco Hernández*, ed. Simon Varey, Rafael Chabrán and Dora B. Weiner (Stanford, Calif.: Stanford University Press, 2000); María Luz López Terrada and José Pardo Tomás, 'Las primeras noticias y descripciones de las plantas americanas (1492–1553),' in *Medicina, drogas y alimentos vegetales del Nuevo Mundo. Textos e imágenes españolas que los introdujeron en Europa*, ed. José María López Piñero et al. (Madrid: Ministerio de Sanidad y Consumo, 1998); José María López Piñero, 'Los primeros estudios científicos: Nicolás Monardes y Francisco Hernández,' in *Medicina, drogas y alimentos vegetales del Nuevo Mundo. Textos e imágenes españolas que los introdujeron en Europa*, ed. José María López Piñero et al. (Madrid: Ministerio de Sanidad y Consumo, 1998).

[119] There are several valuable studies of foreign drug imports, and consumption, in England. See, in particular, Patrick Wallis, 'Exotic Drugs and English Medicine: England's Drug Trade, c. 1550 – c. 1800,' *Social History of Medicine* 25, no. 1 (2011).

[120] See, for instance, Timothy Walker, 'The Early Modern Globalization of Indian Medicine: Portuguese Dissemination of Drugs and Healing Techniques from South Asia on Four Continents, 1670–1830,' *Portuguese Literary & Cultural Studies* no. 17/18 (2010); Timothy Walker, 'The Medicines Trade in the Portuguese Atlantic World: Acquisition and Dissemination of Healing Knowledge from Brazil (c. 1580–1800),' *Social History of Medicine* 26 (2013).

A tendency to limit the purview to one imperial context among historians of cinchona is also, however, intrinsic to the subject matter, and an effect of the bark's longstanding association with particular empires and states. Much of the post-1970s English-language historiography, for instance, refers to cinchona almost exclusively as the source of, and precursor to, quinine, a drug that has captured historians' imaginations owing to its alleged role in British imperial expansion in particular and in the high tide of European imperialism after 1878 more broadly. Malaria – or rather, tropical fevers retrospectively diagnosed as *P. falciparum* malaria – historians argued, had long represented perhaps 'the most powerful barrier to the projection of European influence in the tropics'.[121] Increasingly, systematic quinine therapy and prophylaxis after 1820, in reducing Europeans' mortality from the disease, enabled French and British colonizers to finally 'break into the African interior successfully'.[122] In a tendency perhaps symptomatic of a historiographical tradition enamoured with human scientific and technological ingenuity,[123] quinine was often considered, alongside submarine cables, breech-loaders and railroads, as yet 'another technological advance, a triumph over disease', as Daniel R. Headrick put it,[124] or, as Richard Drayton re-phrased it, the 'parable of the relations of mutual benefit struck between science and British Empire'.[125] Along those same lines, historians have devoted considerable attention to imperial rivalries, particularly the British, Dutch, French and Portuguese attempts at breaking the Spanish Empire's natural monopoly on cinchona. The British, Dutch and French quest for cinchona surrogates – plant components that promised similar effects, such as tulip tree bark, quassia, gentian root or Winter's bark – in

[121] Richard Drayton, *Nature's Government: Science, Imperial Britain and the 'Improvement' of the World* (New Haven: Yale University Press, 2000), 207.

[122] Lucile Brockway argued in 1997 that the 'availability of increased stores of quinine under British control had a […] facilitating effect on the British colonial expansion into Africa in the late nineteenth and early twentieth centuries'. Brockway, *Science and Colonial Expansion*, 127–33. Brockway based her argument on the work of Philip Curtin, who pointed to the high share of 'malaria' in soldiers' 'relocation costs', and the supposed role of quinine consumption after 1840 in reducing these. Philip D. Curtin, *The Image of Africa. British Ideas and Action, 1780–1850*, vol. 1 (Madison: University of Wisconsin Press, 1964); Curtin, *Death by Migration*. Historians like Daniel R. Headrick later elaborated on these arguments. Daniel R. Headrick, *The Tools of Empire: Technology and European Imperialism in the Nineteenth Century* (New York: Oxford University Press, 1981), 58–79.

[123] See Tim Ingold, 'Toward an Ecology of Materials,' *Annual Review of Anthropology* 41 (2012), 432.

[124] Headrick, *The Tools of Empire*, 4.

[125] Drayton, *Nature's Government*, 230. See also Chakrabarti, *Medicine and Empire*, 126–28.

the Greater Caribbean and South Asia,[126] the Portuguese pursuit of cinchona varieties on Brazilian territory[127] and the long-standing Dutch and British attempts at smuggling and transplanting cinchona seedlings have long received comparatively abundant consideration.[128] So have, of course, the Spanish Empire's efforts at managing, regulating and preserving the harvest of and trade in cinchona. There are a series of valuable studies on its administrative organization,[129] the five – failed – projects aiming to establish a royal monopoly over the bark[130] and the politics of knowledge, science and expertise attendant to it.[131] Particularly in the latter field of study, historians of Spain's imperial project of economic botany – a Bourbon reform effort centred on the exploitation of profitable natural commodities, of which cinchona exports were one cornerstone – have studied the quest for experiences with and classification of new cinchona varieties in botanical expeditions and studies, especially those in the service of the Spanish Crown. In particular, the cinchona research carried out by José Celestino Mutis (1732–1808) in and beyond the framework of the Royal Botanical Expedition to the

[126] On 'Atlantic competitions' over natural commodities, including cinchona, see, Bleichmar, 'Atlantic Competitions.' See also Schiebinger, *Plants and Empire*, 146. On the British quest for substitutes, see Chakrabarti, 'Empire and Alternatives.' On the French quest for substitutes in Canada and Saint-Domingue, see McClellan and Regourd, *The Colonial Machine*, 260–62. Johann Reinhold Forster (1729–1898) and other naturalists for some time set their hopes on 'winter's bark' (*drimys winteri*). Anne Mariss, *A World of New Things. Praktiken der Naturgeschichte bei Johann Reinhold Forster* (Frankfurt: Campus Verlag, 2015), 140. On the quest for cinchona substitutes, see also Maehle, *Drugs on Trial*, 277; 80–81.

[127] Beltrão Marques, *Natureza em Boiões*, 132–35.

[128] See, for instance, Kavita Philip, 'Imperial Science Rescues a Tree: Global Botanic Networks, Local Knowledge and the Transcontinental Transplantation of Cinchona,' *Environment and History* 1, no. 2 (1995), 207–09; Brockway, *Science and Colonial Expansion*, 112–26. There are several somewhat dated, often 'triumphalist' accounts of British and Dutch cunning in smuggling the seeds out of South America. See, for instance, Donovan Williams, 'Clements Robert Markham and the Introduction of the Cinchona Tree into British India, 1861,' *The Geographical Journal* 128, no. 4 (1962); Hilda Knobloch, *Der Wunderbaum im Urwald. Wie die Chinarinde zum Allgemeingut der Menschheit wurde* (Wien: Eduard Wancura Verlag, 1954); Norman Taylor, *Cinchona in Java: The Story of Quinine* (New York: Greenberg, 1945).

[129] On the administrative structures governing cinchona production and trade within the Spanish Empire, see María Luisa Andrés Turrión and María Rosario Terreros Gómez, 'Organización administrativa del ramo de la quina para la Real Hacienda Española en el Virreinato de Nueva Granada,' in *Medicina y Quina en la España del siglo XVIII*, ed. Juan Riera Palmero (Valladolid: Universidad de Valladolid, 1997).

[130] On the five projects after 1752, see Martine Petitjean and Yves Saint-Geours, 'La ecomomía de la cascarilla en el Corregimiento de Loja (Segunda mitad del siglo XVIII-Principios del siglo XIX),' *Revista Cultural del Banco Central del Ecuador* 5, no. 15 (1983), 46.

[131] Crawford, *The Andean Wonder Drug*; Nieto Olarte, *Remedios para el imperio,* 163–206.

Kingdom of Granada (1783–1816),[132] by Jorge Juan y Santacilia (1713–1773) and Antonio de Ulloa (1716–1795), members of the Charles-Marie de La Condamine expedition (1735–1745),[133] and by the 1778–1816 botanical expedition to the Viceroyalty of Peru headed by Hipólito Ruiz López (1754–1816), José Antonio Pavón (1754–1840) and Joseph Dombey (1742–1794) has attracted considerable attention,[134] even if mostly on the margins of studies of these men's wider botanical interests. Scholars from other linguistic or national backgrounds have, likewise, been concerned primarily with the bark's reception in their various domestic contexts: Finland,[135] the Ottoman Empire[136] or the Habsburg territories, with the German-language literature converging on Samuel Hahnemann's (1755–1843) self-experimentation with cinchona and its part in the formation of homeopathy.[137] In virtually all of these

[132] Gonzalo Hernández de Alba, *Quinas Amargas. El sabio Mutis y la discusión naturalista del siglo XVIII* (Bogotá: Academia de Historia de Bogotá / Tercer Mundo Editores, 1991); José Antonio Amaya, ed., *Mutis, Apóstol de Linneo. Historia de la botánica en el virreinato de Nueva Granada (1760–1783)*, 2 vols. (Bogotá: Instituto Colombiano de Antropología e Historia, 2005); Manuel Salvador Vázquez, 'Mutis y las quinas del norte de Nueva Granada,' in *Medicina y Quina en la España del siglo XVIII*, ed. Juan Riera Palmero (Valladolid: Universidad de Valladolid, 1997); Marcelo Frias Núñez, *José Celestino Mutis y la real expedición botánica del nuevo reino de Granada, 1783–1808* (Sevilla: Diputación Provincial de Sevilla, 1994); Daniela Bleichmar, *Visible Empire. Botanical Expeditions and Visual Culture in the Hispanic Enlightenment* (Chicago: University of Chicago Press, 2012).

[133] Luis Javier Ramos Gómez, *El viaje a América (1735–1745), de los tenientes de navio Jorge Juan y Antonio de Ulloa, y sus consecuencias literarias* (Madrid: Consejo Superior de Investigaciones Científicas, Instituto Gonzalo Fernández de Oviedo, 1985), 265–76; Dora Leon Borja, 'Algunos datos acerca de la cascarilla ecuatoriana en el siglo XVIII,' in *Medicina y Quina en la España del siglo XVIII*, ed. Juan Riera Palmero (Valladolid: Universidad de Valladolid, 1997); Boumediene, *La colonisation du savoir*; Eduardo Estrella, 'Introducción de la quina a la terapeutica: misión geodesica y tradición popular,' *Revista de la Facultad de Ciencias Médicas – Quito* 14, no. 1–4 (1989); Paloma Ruiz Vega, 'La quina en la expedición geodésica al Virreinato de Perú (1734–1743),' in *Las Cortes de Cádiz, la Constitución de 1812 y las independencias nacionales en América*, ed. Antonio Colomer Viadel (Valencia: Universidad Politécnica de Valencia, 2011).

[134] Félix Muñoz Garmendia, ed. *La botánica al servicio de la corona. La expedición de Ruiz, Pavón y Dombey al Virreinato del Perú (1777–1831)* (Madrid: CSIC / Real Jardín Botánico, 2003); Arthur Robert Steele, *Flowers for the King: the Expedition of Ruiz and Pavón and the Flora of Peru* (Durham: Duke University Press, 1964); Cesar Gonzalez Gomez, *Aspectos de la labor quinológica de los botánicos Ruiz y Pavón* (Madrid: Imprenta Góngora, 1954); Bleichmar, 'Atlantic Competitions.'

[135] Lena Huldén, 'The First Finnish Malariologist, Johan Haartman, and the Discussion about Malaria in 18th century Turku, Finland,' *Malaria Journal* 10, no. 43 (2011).

[136] Günergun and Etker, 'From Quinaquina to "Quinine Law."'

[137] Birgit Lochbrunner, *Der Chinarindenversuch. Schlüsselexperiment für die Homöopathie* (Essen: KVC Verlag, 2007). See also Georg Bayr, *Hahnemanns Selbstversuch mit der Chinarinde im Jahre 1790. Die Konzipierung der Homöopathie* (Heidelberg: K.F. Haug, 1989).

studies, developments elsewhere serve principally as a distant backdrop against which a given intellectual, political or economic history may unfold – be that elsewhere in the Spanish American natural habitat, as in the case of British historians of empire, or the consumer societies, for Spanish historians of cinchona production and commerce. While it does not deny the relevance of imperial frameworks, or, indeed, the bark's implication in them, the purpose of this book is to bring together, synergistically, cinchona's many elsewheres, in pursuing its object 'across time, space, and specialism'.[138] Inspired by a growing body of research on plant trade, epistemic brokerage and therapeutic exchange across imperial boundaries,[139] *A Singular Remedy* does not settle for explanations drawn from one territory, denomination or linguistic framework. As various historians have argued, though medicine trade across the Atlantic basin was lively and extensive around 1800, few medicinal substances travelled as widely and were traded as massively as the Peruvian bark.[140] With its range and reach fully understood and explored – unfettered by a reductionist emphasis on its collusion, and complicity, with either the British or the Spanish Empire – the bark provides a rare, and valuable, window into drug trade, epistemic brokerage and sustained interaction[141] in the realm of medicine during the late 1700s and early 1800s.

Book Structure

This book covers the period in which the bark was at the height of its popularity: the decades running from 1751, the year when the Spanish Crown issued the royal order that declared cinchona to be 'an object worthy of interest, curiosity and attention',[142] to 1820, when the

[138] James Belich, John Darwin and Chris Wickham, 'Introduction. The Prospect of Global History,' in *The Prospect of Global History*, ed. James Belich et al. (New York: Oxford University Press, 2016), 3; Matthew W. Klingle, 'Spaces of Consumption in Environmental History,' *History and Theory. Studies in the Philosophy of History*, no. 42 (2003), 94.

[139] See, for instance, Sarah Easterby-Smith, *Cultivating Commerce. Cultures of Botany in Britain and France, 1760–1815* (Cambridge: Cambridge University Press 2017); Miruna Achim, *Lagartijas medicinales. Remedios americanos y debates científicos en la Ilustración* (Mexico: Conaculta/UAM-C, 2008); Monahan, 'Locating Rhubarb.'; Irina Podgorny, 'The Elk, the Ass, the Tapir, Their Hooves, and the Falling Sickness: A Story of Substitution and Animal Medical Substances,' *Journal of Global History* 13, no. 1 (2018).

[140] For an extensive discussion of this claim, see Chapter 2.

[141] For this paraphrase of 'globalization', see Dennis O. Flynn and Arturo Giráldez, 'Born Again: Globalization's Sixteenth Century Origins (Asian/Global versus European Dynamics),' *Pacific Economic Review* 13, no. 4 (2008), 360.

[142] See the 'Royal Order' issued in Madrid, dated as of August 27, 1751, and addressed to the Viceroys of Peru and New Granada, which proposed the creation of a Royal

dislocations of the struggle for independence in the harvest areas and the isolation of quinine, which unfolded through a sequence of experiments conducted in Lisbon, Paris and Jena,[143] changed the grounds of its production, commerce and consumption. Geographically, it covers an Atlantic World constituted by relations among the continents rimming the Atlantic basin and with other regions, especially the Asian reaches of the Atlantic empires.[144] Its focus rests in particular on the Viceroyalties of Peru, Brazil, New Granada and New Spain, the Dutch, British and French West Indian possessions, and the French and British North American colonies – or, after 1776, the United States; on the Portuguese, Spanish and British enclaves along the African coast, the Sultanate of Morocco and the Ottoman Empire; on France, England and Scotland, the Habsburg territories, Scandinavia, the Swiss Confederacy, the Italian peninsula and Muscovy; on the Spanish, Portuguese, French, British and Dutch colonial possessions and commercial and evangelizing entrepôts in Qing China, Mughal India and Tokugawa Japan, on Java and the Philippines.[145]

At its core, *A Singular Remedy* is concerned with how the Peruvian bark and stories, practices and understandings attendant to its consumption were shared between and across Atlantic societies. The five chapters that follow expose and examine the prevalence and movement of narratives about the discovery of the bark's medicinal properties, of the Peruvian bark as a form of matter, of medical formulae for preparations of the bark, and of understandings of the environs and ailments in which the

Monopoly on the bark. 'Real Cedula,' *Archivo General de Indias*, Indiferente 1552, Madrid, 1751-08-27. Cited in Crawford, *The Andean Wonder Drug*, 67. Crawford has studied the order in depth. Crawford, 'Para Desterrar las Dudas y Adulteraciones,' 196.

[143] Quinine was 'discovered' by Pierre-Joseph Pelletier (1788–1842) and Joseph Caventou (1795–1877) through repetition of an experiment devised by the Portuguese naval surgeon Bernardino António Gomes. Walter Sneader, *Drug Discovery: The Evolution of Modern Medicines* (Chichester: John Wiley & Sons, 1985). Gomes published his finds in his 1811/1812 essay 'Ensaio sobre o cinchonino, e sobre sua influencia na virtude da quina e de outras cascas', in the journal *Memórias de ciencias,* edited by the Lisbon Academy of Science. Beltrão Marques, *Natureza em Boiões*, 135.

[144] Historians of the Atlantic World have argued that several, self-sufficient settings were gradually absorbed into a single, interdependent Atlantic World by the eighteenth century. Nicholas Canny and Philip Morgan, 'Introduction. The Making and Unmaking of an Atlantic World,' in *The Oxford Handbook of the Atlantic World: 1450–1850*, ed. Nicholas Canny and Philip Morgan (Oxford: Oxford University Press, 2011), 2.

[145] The 'Atlantic powers', or 'Euro-Atlantic states', were all involved in commerce with regions beyond the Atlantic basin. Bernard Bailyn, 'Introduction. Reflections on Some Major Themes,' in *Soundings in Atlantic History. Latent Structures and Intellectual Currents, 1500–1830*, ed. Bernard Bailyn and Patricia L. Denault (Cambridge, Mass.: Harvard University Press, 2009), 9–10.

use of the Peruvian bark would be most beneficial. *A Singular Remedy* contends not only that bark knowledge – in the shape of matter, words and practices – was movable but that it moved in ways that were contingent upon place and locality – a peculiar culinary lore, cultural imaginary or medical topography. Chapter 1 not only exposes the various story elements present in narratives about the bark's discovery – the natives' alleged secrecy, their closeness to nature and unlettered simplicity – as long-lived *topoi* that served to make sense of, and propagate, the bark's wonderful properties. It also points to these stories' divergent reception across the Atlantic World and the part of cultural, religious or political idiosyncrasies in it. Chapter 2 exposes and examines how bottled compound wines and powdered bark moved along the veins of Atlantic trade, proselytizing and imperialism, with their course defined by the situation of these societies' trade entrepôts, military outposts and diaspora communities. Chapter 3 contends that even though methods for arranging and administering the bark had coalesced into identifiable formulae by the late 1700s and early 1800s – bittersweet febrifugal lemonades, extracts of cinchona and aromatic compound wines of the bark, most notably – these preparations also accommodated a measure of variability. Indeed, medical practitioners tinkered with the particulars of these formulae, adapting them to the religious beliefs, peculiar culinary lore or commercial possibilities of their place of abode. Chapter 4 exposes how bark knowledge was shared in the form of expertise in indications for cinchona, a topographic literacy of sorts that associated certain environments with febrile threat. The chapter holds not only that the period's medical topography, with its distinct contours of insalubrious, febrile environments, directed the bark to particular situations – the world's low-lying marshlands, the sickly air of close, crowded spaces, and the hot and humid climates of the tropics. It also exposes how sufferers adapted modes of administration, depending on the season, place or climate they sought to shield themselves from. There is an unspoken premise in much current scholarship that the local and the global are opposites – the dichotomy of a discrete locale that resists change and a placeless global that imposes it.[146] Not only is that polarity a figment of our scholarly imagination; it is a detrimental one, since it diverts attention from the contingency of both knowledge and its movement. By the late 1700s and early 1800s, knowledge and use of the Peruvian bark was common across a wide range of geographically disperse and socially diverse societies

[146] This may well be an inheritance from the globalization discourse of the 1990s, which popularized the 'idea of locality […] as a form of opposition or resistance to the […] global'. For a critical discussion of that polarity, see Robertson, 'Glocalization,' 30; 34.

within, or tied to, the Atlantic World, in part because of that substance's ability to acquire validity, become situated, and weave itself into the fabric of everyday therapeutic practice elsewhere. Both knowledge of the bark and its global movement were, so this book contends, local – as in, related to place, and peculiar to it.

Chapter 5 reminds readers, at parting, once more of how plant trade, therapeutic exchange and epistemic brokerage are not extricable from space. Written in the style of a lengthy coda, it is concerned with how the bark's prevalence, wide fame and general usefulness in therapeutic practice among disperse societies, affected its natural habitat in the central and northern Andes. The last chapter argues that the bark's very mobility, and the popular demand that arose for it, altered the area's landscape of possession, commerce and demographics; the distribution and abundance of vegetation; and the livelihood, health and fate of the men and women implicated in harvesting, processing and conveying the bark. Consumption, and the imaginaries, therapeutic practices and medical understandings attendant to it, it contends, invariably begins with changes to the material world, to physical nature and to society.[147]

[147] Klingle, 'Spaces of Consumption in Environmental History,' 94.

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