

Patents and invention in Jamaica and the British Atlantic before 1857

Patents operate on a global scale but are still largely administered at a national level. This was not always the case. Until 1852 any inventor taking an English patent had the option, for a small fee, to add a clause extending its operation beyond England, Wales and the town of Berwick-upon-Tweed to Britain's colonies and plantations overseas. From 1716 to 1814 about fifteen per cent did so, and between 1846 and 1853, by which point the British Empire had massively expanded, this rose to forty per cent. English patents with colonial clauses, acting in effect as 'imperial' patents, were thus becoming increasingly common in England at the very moment when patent reform cut off this path of development and unified the English, Scottish and Irish patents into a single national patent system that covered only the British Isles, and had coexisted for over a century with a system of prizes and grants, and a parallel set of 'colonial' patents and grants offered by colonies such as Jamaica. The British Atlantic was characterized by a mixed, multinational economy of innovation operated in before 1852, and examining the operation of this system in Jamaica shows for the first time inventors, investors, politicians and public officials weighing up the relative advantages of these two systems and adopting strategies for profit and technological diffusion. The following sections therefore reconstruct the operation of this transnational patent system and show how strategies were developed to exploit it, before drawing broader conclusions about the supranational character of British and colonial patenting and the circulation of technologies and innovation during the early industrial revolution.

I. Historiography

The problems facing the modern patent system have been extensively noted. At a national level the proliferation of ‘patent thickets’ and rent-seeking behaviour by ‘patent trolls’ can make it wholly uneconomic to develop and apply technologies.¹ Where an invention cannot be patented for technical reasons or where these legal protections are weak, patents offer no incentives, and in the eighteenth century this often led to alternative strategies of secrecy and concealment which also deterred diffusion.² Beyond the national level, inventors wishing to market their invention in other countries are forced to weigh the costs of taking out multiple patents against the risks of piracy.³ This disproportionately favours multinational companies in the developed world who alone have the resources to obtain the necessary coverage for their patents, thus helping to entrench existing disparities in the world economy.

Such problems are not new. During a conference in London in 1902 convened to discuss plans for an imperial patent, the Board of Trade in London noted that the ‘extraordinary multiplicity of colonial patent laws ... [is] one of the most curious anomalies of the British patent system’.⁴ Instead of a single imperial patent, what existed were a number of colonial patent regimes which often differed in some degree from the British Patent Act of 1852. This situation contrasted strongly with the system of imperial copyright that had been established in 1813, which allowed any infringements of copyright on books first published in Britain to be prosecuted

¹ See the summary in Encaoua and Madiès, ‘Dysfunctions’, 142-161.

² Bottomley, *British Patent System*, 106-169, 177-201; Dutton, *Patent System*, 69-81, 175-195; Encaoua and Madiès, ‘Dysfunctions’, 131-138; MacLeod, *Inventing*, 58-74, 97-114.

³ Trimble, *Global Patents*, 9-191; Barton, ‘World Patent System’, 341-357; Encaoua and Madiès, ‘Dysfunctions’, 125-171.

⁴ Bentley, “‘Extraordinary Multiplicity’”, 161-200; Wadlow, ‘British Empire Patent’, 311-346.

anywhere in the empire.⁵ Yet this was a situation which had been created by the 1852 Act itself. The earliest phases of innovation, invention and technological diffusion within Britain and the British Empire had taken place under very different legal conditions, in which imperial and colonial patents and grants interacted with each other in ways not fully recognised by the existing scholarship. Any analysis of the spread of technology beyond Britain into the British Empire during the early phases of its industrial revolution, as well as the under-appreciated flow of innovation and invention from the colonies back into Britain during the same time, must therefore begin with an understanding of these conditions as they operated before 1852, which this article seeks to offer.

Examining the global operation of the British imperial patent system before 1852 also helps to correct the overwhelming focus in most scholarship of invention and patenting on untangling the historical experience of innovation and diffusion at a national rather than supranational level. Most approaches towards the role of patenting in the British industrial revolution, for example, focus on what the English patent system could do or did not do to promote domestic invention (the creation of new ideas or processes), innovation (the application of that invention to an economic problem) and diffusion (the dissemination and broader take-up of that innovation).⁶ Studies of the English patent system before 1852 by Henry Dutton and Christine Macleod have thus looked at the concentration of English patents in areas

⁵ Bentley, "Extraordinary Multiplicity", 171-81.

⁶ Allen, *British Industrial Revolution*; Berg, *Age of Manufactures*; Sullivan, "Age of Invention", 424-452. For a summary of this literature as it relates to patenting, see Bottomley, *British Patent System*, 11-20. These analytical definitions are derived from Joseph Schumpeter: see *Theory of economic development*.

of local industrial innovation where rewards for inventors and investors were highest.⁷ Only Sean Bottomley's recent work has adopted a broader perspective, focussed on Scotland and Ireland, showing how inventors employed rational strategies to maximise their rewards in this broader market.⁸ Joel Mokyr, Deidre McCloskey and others who argue that the cultural resources of British society enabled and encouraged an 'industrial enlightenment' in which patent systems and other institutions were largely irrelevant, likewise frame issues of technological invention and diffusion within a national sphere.⁹

This has reduced the role of colonial territories such as the Caribbean or North America in the British industrial revolution to 'walk-on' parts as the suppliers of resources, markets and capital for investment, rather than as sites for invention in their own right or as participants in the process of innovation. One of the few exceptions is Nuala Zahedieh's recent study of the English copper industry around 1700, which notes that 'economic historians have treated activities on the colonial periphery as irrelevant ... to explanations of England's growing technological capabilities, but ... the case of the copper industry [shows that] there were solid reasons for them being inextricably linked'.¹⁰ This has not yet been followed up. There have also been several studies of the patenting and diffusion of the steam engine **in the Caribbean** after the mid-eighteenth century, and a study of the post-1820 patent regime in Cuba. In an examination of the diffusion of agricultural and

⁷ Dutton, *Patent System*, 103-134; MacLeod, *Inventing*, 159-181.

⁸ Bottomley, *British Patent System*, esp. pp. 284-94; Bottomley, 'Patenting', 48-63; Robinson, 'James Watt', 115-139.

⁹ McCloskey, *Bourgeois Equality*; Mokyr, 'Intellectual Origins', 285-351; Mokyr, *Enlightened Economy*, 124-144, 255-178, 486-129.

¹⁰ Zahedieh, 'Colonies, Copper', 805-825.

industrial technology in Jamaica between 1760 and 1830, Veront Satchell suggested that the colonial patent system encouraged this process as 'technical inventions in both agricultural and manufacturing stages of the production process [of sugar] were the major strategies employed by planters', with demand rather than supply driving innovation.¹¹ In general though, the links between innovation and the colonies in this period and the legal environment that made it possible have been neglected.

Part of the reason for this is that until relatively recently there was considerable agreement about the technological backwardness of the colonies in the eighteenth century, particularly the plantation colonies of the Caribbean and the American South, which seemed to make them unpromising areas for analysing innovation. The literature on the history of the American patent system by Oren Bracha, Zarina Khan and others examines colonial patenting in North America before 1776 largely as a prelude to the United States Patent Office in 1790, with debates circling around the same questions as in Britain of whether American patenting and innovation reflected a growing demand for technology or a growing supply of invention.¹² Efforts to put this process into a transnational perspective by David Jeremy, Doron Ben-Attar and others have focussed mainly on later transfers of technology and skills between the British and American national patent systems after 1790, and even the most sympathetic study of colonial patenting by Bruce Bugbee in 1967 concluded that it

¹¹ Satchell, *Sugar, Slavery*, 19, and pp. 165-194; Fernandez de Pinedo, Petel and Saiz, 'Patents', 46-62. For the steam engine, see below n.15..

¹² Bracha, *Owning Ideas*, 12-31; Bugbee, *Genesis*, 57-81, 125-148; Khan, *Democratization of Invention*; Sokoloff and Khan, 'Democratization of Invention', 363-378; Walterscheid, *American Patent Law*. For an example from the wider literature on the economic history of colonial British America, see McCusker and Menard, *Economy* pp. 321-5.

was 'modest in its proportions and irregular in its course ... [and] of greater legal and constitutional than economic significance'.¹³

This judgement reflects an anachronistic focus on innovation in the north-eastern United States where British-style industrialisation took off after 1790, whereas in fact the focus of innovation beforehand lay elsewhere. The production of plantation commodities required not just the brutal and inhumane exploitation of enslaved labour but also massive investment in mechanical technologies and in chemical processes for refining and claying raw sugar, distilling rum, curing coffee, processing indigo and cleaning cotton. Investments in this area delivered high profits which both incentivised and enabled inventions that promised even higher productivity.¹⁴ Islands such as Saint Domingue and Jamaica had important pockets of scientific and technical expertise which enabled the widespread and early adoption of new technologies such as the steam engine and the hydraulic ram.¹⁵ And in British colonies, the patent system provided the legal environment for the innovation, adaption and adoption of this technology.

Before 1852, the British domestic and colonial patent system functioned on two complementary levels. An imperial patent with a colonial clause was merely a variation on the mainstream English patent as it then existed, resembling a modern

¹³ Ben-Atar, *Trade Secrets*; Bugbee, *Genesis*, 82-83, Jeremy, *Transatlantic Industrial Revolution*, esp. pp. 50-91; MacLeod, 'Paradoxes', 885-910; Rosenberg, 'Factors', 3-33; Thomson, *Structures of Change*, 15-65, 129-159.

¹⁴ Boomgaard and Oostindie, 'Changing Sugar Technology', 3-22; Burnard and Garrigus, *Plantation Machine*; Cateau, 'Conservatism', 1-36; Roberts, *Slavery and the Enlightenment*; Sheridan, 'Changing Sugar Technology', 59-93, and Zahedieh, 'Colonies, copper'. For South Carolina, see below n. 29.

¹⁵ Deerr and Brooks, 'Steam Power', 11-21; Graham, 'Falmouth', 315-332; Satchell, 'Steam for Sugar-Cane Milling', 242-258; Tann and Breckin, 'International Diffusion', 541-564.

patent and granting upon registration a proprietary right to a new invention for a set term of years in England and all its colonies. By contrast, patents issued in Jamaica and other colonies were restricted to those specific colonies but were more flexible in their terms and often included a wider range of legal powers, amounting in practice to an industrial subsidy. Like the patents granted by individual American states between 1776 and 1791 studied by Camilla Hrdy, which operated alongside the federal patenting power established in 1787, these colonial patents were 'individualised semi-contractual arrangements between the sovereign and the patentee ... to establish a working technology that produced beneficial results for the community'.¹⁶ Because imperial and colonial patents differed in their nature and powers, they could serve complementary functions as part of a wider imperial patent system.

II. Imperial and Colonial Patenting

Colonial patenting took place on a noticeable scale. At least 94 patents were passed by colonies in the British Atlantic before 1780, two-thirds of them in the West Indies and the rest in North America, mainly in South Carolina.¹⁷ A further 30 were made by individual American states from 1780 to 1791, when the federal Patent Office began operation, and at least 35 in the British West Indies from 1780 until 1857. Some 472 of the 3,410 patents issued in England between 1700 and 1813 or some 14 per cent had a colonial clause; none of the Scottish or Irish patents had one. Data are not available for the period between 1814 and 1846, but between 1847 and

¹⁶ Bugbee, *Genesis*, 84-102, Hrdy, 'State Patent Laws', 45-113, quotation at p. 160.

¹⁷ Based on patents mentioned in Bugbee, 'Early American Law', 140-203 and Bugbee, *Genesis*, 57-102. The earliest colonial patent was in Massachusetts in 1641: Bugbee, *Genesis* pp. 59-65.

1853 at least 1,092 out of 2,838 English patents or about 39 per cent had a colonial clause (Table 1).¹⁸ There were also 381 Scottish patents and 191 Irish patents in Edinburgh and Dublin issued between 1700 and 1813, mainly to English inventors, about 11 and 6 per cent of English patents respectively, and between 1847 and 1852 there were 1,134 and 334 Irish patents, about 40 and 12 per cent of English figures.¹⁹

Patenting was not widespread in the British Atlantic under colonial rule compared to Britain, and even colonial patents were hardly commonplace, but neither were they so rare as to be irrelevant. The pattern of patenting also has suggestive differences. English, Irish and Scottish patents rose in step between 1700 and 1852, as part of the same smooth acceleration from the 1760s noted by Dutton, Macleod and Bottomley, suggesting they reflected the same underlying processes. By contrast, English or 'imperial' patents with colonial clauses were much more volatile, peaking at 40 per cent of English patents in the 1760s and then falling precipitately by 1813, only to rise back to their previous peak at some point before 1846. This volatility may be because the lower costs of a colonial clause – a few shillings on top of the patent fee, compared to the £100 required for a Scottish or Irish patent – encouraged inventors to splash out on colonial patents at moments such as the 1760s and early 1770s when the opportunities to profit from supplying new technologies to the booming

¹⁸ For reasons which remain unclear the entries in Bennett Woodcroft's *Titles*, the standard reference for English patents, do not report consistently the geographical parameters of the patents issued between 1813 and 1846. Consequently, the only way to obtain a quantitative measure would be to check individually all 8,000 or so patents issued during this period.

¹⁹ Sean Bottomley, 'Patenting', 48-63.

imperial economy in the Atlantic seemed to be expanding.²⁰ After 1775, warfare and the loss of the American colonies probably acted to discourage such speculation.

The sectoral concentration of English patents with a colonial clause also mirrored that of English patents as a whole, supporting the suggestion that the decision to apply for a colonial clause was often a spontaneous gesture. For instance, there was much the same over-representation of fields such as engine-making and pumping apparatus (75 patents or 16 per cent), textile-working and -finishing (60 patents or 13 per cent), transportation (41 or 11 per cent), pharmaceutical and surgical patents (33 or 7 per cent) and precision scientific instruments (20 or 4 per cent).²¹ Patents with colonial clauses for agricultural tools, machines and processes only accounted for 4 per cent of the total, as with English patents in general, though this is an underestimate since some patents for mills or steam-engines intended for sugar-milling made no mention of this application.²² This figure may appear low, but out of the 22 patents issued between 1760 and 1813 identified by Woodcroft as relating to sugar production, 12 or 55 per cent had a colonial clause, and the remainder applied to processes of sugar-refining and -baking, which was carried out in Britain rather than the West Indies.²³ Similarly, at the end of the period, out of the 58 patents relating to sugar enrolled between 1847 and 1852, 50 or 86 per cent included a colonial clause. The pattern of sectoral patenting therefore suggests that the small number

²⁰ McCusker and Menard, *Economy*, 51-71; Sheridan, *Sugar and slavery*, 447-79. For the costs of Scottish and Irish patents, see Bottomley, 'Patenting' pp. 50, 51

²¹ For sectoral divisions, see MacLeod, *Inventing* pp. 97-114.

²² For example, John Stewart's patent of 1766 for a 'fire-engine' (#859) or Peter McIntosh's patent of 1776 for a mill (#1,124)

²³ Woodcroft, *Specifications relating to sugar*, pp. 1-121. For restrictions on sugar-refining, see Sheridan, *Sugar and slavery*, 29-30, 43-4

of inventions that were intended to be used in the colonies were patented with a colonial clause as a matter of course, whereas a larger number of patents with colonial clauses were for inventions whose patentees speculatively invested in one when the market seemed promising and the costs negligible.

[Insert Table 1 here]

The difference in the relative incidence of imperial and colonial patenting probably reflected in part the ease of application. In England, Scotland and Ireland they were granted by their respective Lord Chancellors and the process was principally one of registration, which ignored issues of utility and practicability and resolved questions of novelty and precedence by subsequent legal proceedings rather than prior administrative scrutiny.²⁴ Patents lasted for fourteen years and might be sold, mortgaged or licensed like any other piece of property. The process generally cost about £100 and might take up to six months, but was also largely automatic. As noted above, a patent could be extended to British colonies and plantations, but to have legal force the patent had to be enrolled in the office of the registrar of deeds of each colony and colonial infringements were only triable in English courts, both at considerable cost to the patentee.²⁵

By contrast, in the colonies inventors had to petition the colonial house of assembly – or, in Crown colonies after 1800, the legislative council – for a private bill or

²⁴ Sean Bottomley, 'Patenting', 33-72, Christine MacLeod, *Inventing*, 40-57.

²⁵ Parliamentary Papers [hereafter PP] 332 (1829), *Report from the Select Committee on the law relative to Patents for Inventions* (London, 1829), pp. 17-18, 48-50, 103. The patents enrolled overseas are probably still preserved in the patent series at the Island Record Office in Jamaica, but it has not been practical to search through its extensive registers to determine how many of the English patents of invention with colonial clauses were enrolled in Jamaica during this period.

ordinance granting them a monopoly.²⁶ In assemblies such as Jamaica, this petition was referred to a select committee that reported their recommendations to the house, which would then pass the patent as a private act, a statute that differed from regular legislation largely in being deemed for the benefit of an individual or group of individuals, who were consequently charged up to £100 in fees.²⁷ As in England, most patents also contained clauses requiring the inventor to deposit a plan of the invention in the Chancery Office as a condition of the patent, both to resolve later disputes and (increasingly) to facilitate diffusion of the patent.²⁸ The colonial patents were cognisable in their local court but not in England, and often came with several additional powers, but the process involved a higher level of scrutiny which likely deterred many colonial inventors.

The differences between imperial and colonial patenting were therefore primarily legal and financial, but since this procedure was relatively consistent across most colonies in the British Atlantic, regional differences within colonial patenting reflected other factors, most obviously economic. Up to 1770, North American patenting was concentrated in South Carolina, a highly developed colonial economy based on the export of rice and indigo (Table 2). High profits had made South Carolina planters one of the richest groups in British America and both encouraged and enabled them to invest not just in more slaves and land but also in new management

²⁶ For the private bill procedure, see Bugbee, *Genesis*, 57; Hoppit, 'Patterns', 333-335, 340, 353-334.

²⁷ *Journals of the House of Assembly of Jamaica* [hereafter *Journals*] vol. viii, 437

²⁸ See, for example, the Stevens patent of 1820: Satchell, *Sugar, slavery* pp. 229-30. For the development of the plan or specification in England patents, see Macleod, *Inventing*, 41-55; Bottomley, *British patent system*, 46-9.

techniques and mechanical innovations that resulted in growing production of rice.²⁹ Economic need therefore came together with a supportive assembly and a critical mass of technical expertise to produce several patents in the 1730s and 1740s for mechanical mills for rice, both generating and reflecting what Bugbee described as ‘significant “patent consciousness”’. Even more patents were passed in the West Indies up to 1770, mainly in the two largest islands of Barbados and Jamaica, reflecting the far greater economic importance of this region, based on the production of sugar and coffee for export.³⁰ Planters were even richer than in South Carolina and were able to invest even more money in the purchase and management of slaves and adopting new technologies and processes for milling and distilling.³¹ Colonial patenting was therefore concentrated in this period in major export economies which had the most to gain from improvements in productivity and could offer the highest rewards to inventors for their works.

[Insert Table 2 here]

In South Carolina, for example, patenting peaked in the 1730s and 1740s as the colony reached the limits of tidewater zones suitable for cultivation.³² Patenting in Barbados was concentrated in the early eighteenth century as the island ran out of agricultural land and suffered soil exhaustion, leading to experiments in improving

²⁹ Bugbee, *Genesis*, 75-82; Chaplin, *Anxious Pursuit*, 134-165, 187-208, 228-268. For the wider role of technology in agricultural improvement, see Crothers, ‘Agricultural Improvement’, 135-167; Lerner, ‘Science’, 11-27; Sullivan, ‘Timing and Pattern’, 305-314; Macleod, *Inventing*, 98-102, and above n. 14.

³⁰ Sheridan, *Sugar and Slavery*, 415-475. For the wealth of Jamaica in 1774, see Burnard, *Planters, Merchants and Slaves*, 157-210.

³¹ See above nn. 14 and 15

³² Chaplin, *Anxious Pursuit*, 252.

productivity that had resulted by the 1750s in a 'capital-intensive, power-intensive system of agriculture conducted on a sustained-yield basis'. This process resulted in moderate but stable returns of 3.4 to 5.6 per cent per annum for the remainder of the eighteenth century, and a much-reduced rate of patenting.³³ By contrast, the rapid expansion of the Jamaican economy after 1730 was initially sustained by the extension of cultivation into new land until by the 1770s planters had exhausted all but the most marginal new lands, leading to a fall in profits.³⁴ As well as importing even larger numbers of slaves to replace those killed by the increased intensity of work, planters in Jamaica also tried to increase productivity through more intensive agriculture, including the better nutrition and management of their slaves, the adoption of superior agricultural techniques, and investment in new technology.³⁵

Satchell's figures suggested that patents had an early peak in the 1760s and 1770s, at the point when an older historiography suggested that the island's economy began to contract, and then another after the abolition of the slave trade in 1807, and he argued on this basis that these conditions 'forced the Jamaicans to invent techniques aimed at increasing efficiency and productivity, thus enabling them to remain competitive in the sugar market'.³⁶ Patenting and innovation was therefore tied to economic demand in Satchell's analysis, tailing off in Jamaica from the 1830s as the end of slavery and new tariff regimes fatally undermined the economy.

³³ Sheridan, *Sugar and Slavery*, 138-147, 389-448; Ward, *British West Indian Slavery*, 48.

³⁴ Sheridan, *Sugar and Slavery*, 211-229, 447-275; Ward, *British West Indian Slavery*, 48; Drescher, *Econocide*; McCusker, 'British West Indies', 310-330; Ward, 'Profitability of Sugar Planting', 38-60, and estimates of national income in Graham, 'Colonial Sinews', 198-202.

³⁵ Ward, *British West Indian Slavery*, 61-118, 190-232 and above n. 14.

³⁶ Satchell, *Sugar, Slavery*, 48-53, quotation at p. 53. For discussion of this older historiography, see n. 34.

However, these figures give only a preliminary and in some respects misleading guide to Jamaican patenting. They omit patents granted before 1760 and after 1830, or not connected with the sugar industry, as well as lumping together the patents with other petitions for grants and failing to distinguish between the successful and failed applications for patents, or to explore their interaction with the imperial patents from England. A careful search of the journals of the Jamaican house of assembly between 1664 and the general patent act of 1857 reveals over 90 applications for patents, of which more than 50 were successful, as well as over 40 more petitions for grants, prizes, bounties, subsidies and other forms of support for new technologies or processes (Table 3).

These new figures suggest that the peak of Jamaican patenting actually came in the 1780s, consistent with the revised chronology suggesting that the Jamaican economy began to experience pressure only after the American Revolutionary War, rather than in the 1760s, and also perhaps to some extent to fill a hiatus in technological diffusion of inventions from Britain to Jamaica signified by the decline in English patents being issued with colonial clauses in this years.³⁷ Rates of patenting Jamaica dipped in the 1790s and 1800s as high sugar and coffee prices enabled the extension of local plantations into hitherto marginal areas, then rose again – but not to the same level – in the late 1810s as Jamaica and the British West Indies began to experience competition from foreign islands such as Brazil and Cuba.³⁸ The abolition of the slave trade in 1807 there had much less immediate impact on patenting in the

³⁷ For the revised chronology, see above n. 34

³⁸ MacLeod, *Inventing*, 144-157. Eisner, *Jamaica, 1830-1930*, esp. pp. 163-70, 190-200, 236-84; Green, *British Slave Emancipation*, 191-260; Hall, *Free Jamaica*, 1-120; Ward, *British West Indian Slavery*, 233-260.

island than Satchell argued, and did not tail off in the 1830s but continued at a relatively consistent level into the 1850s as Jamaican elites once again looked to increase their productivity through technological solutions. Finally, these raw figures are not a simple 'indicator of inventive activity in the island', however. As Macleod and others have shown, patent counts are a reliable guide only to patenting rather than innovation, and reading them against the pattern of colonial grants, as well as the rise and fall of imperial patenting, suggests an even more complex transatlantic economy of innovation which enabled British, Jamaican and other inventors to develop a number of strategies for popularising and marketing their inventions.³⁹

[Insert Table 3 here]

III. Patent strategies

Patents in Jamaica offered an enhanced set of powers compared to imperial patents, enabling inventors to protect and promote their invention more effectively, but in return they had to demonstrate its utility and practicability rather than merely its novelty. For example, Francis Cooke petitioned the assembly in December 1768 that his new sugar mill was novel and would also be 'of infinite service to this country', while John Ashley offered plans for his pumping engine in December 1793 and a model, 'by which it will be seen that the expence of erecting it is so inconsiderable, and its construction so simple that it is likely to prove of general utility'.⁴⁰ Where a model was not possible, petitioners offered testimonials. Daniel Sedon developed a new method of hanging coppers for sugar refining and in December 1790 offered a plan and 'attestations ... from a great number of respectable planters, whom he has

³⁹ MacLeod, *Inventing*, 7, 144-157; Satchell, *Sugar, Slavery*, 49; Sokoloff, 'Inventive Activity', 813-820.

⁴⁰ *Journals* vol. vi, 72, 302; vol. ix, 233

convinced of the utility and convenience of said invention'.⁴¹ The committees examining the petitions, composed mainly of planters with practical experience of the industry, then made an assessment. This was no rubber stamp, because some petitions were denied or the decision was deferred for further information.⁴² For instance, in December 1828 the house heard from William Boyle McCulloch, who had developed a new chemical process for making paint from the metallic ores discovered in the island.⁴³ The committee reserved judgement until they had consulted with 'Dr [Edward] Turner at London University or Mr [William] Faraday or another eminent chemist', not just about whether the process was novel but also whether it was viable and useful, and decided that if so, McCulloch would be given both a patent and a grant to help develop a manufactory for it in Jamaica.

Indeed, in some cases utility rather than novelty was the defining criteria. The house heard a petition from Robert William Boussie in November 1785, for instance, that his father William learnt new methods for refining sugar in France in 1784 and written a treatise with the help of Robert Murray and 'that eminent professor of chymistry, Dr Joseph Black of Edinburgh'.⁴⁴ Boussie and Murray had each patented the process in England and become partners, and with support from several leading absentee planters Murray had left for Jamaica to license it to plantations in the West Indies.⁴⁵ Robert William Boussie was his assistant but the two men fell out *en route*,

⁴¹ Ibid. vol. viii, 605

⁴² Satchell, *Sugar, Slavery*, 48-49.

⁴³ The National Archives of the United Kingdom, London [hereafter TNA], CO 140/117 (*Votes of the House of Assembly* [hereafter *Votes*], 1829-30) p. 147-8, 237-8. Edward Turner (1798-1837) was professor of chemistry at the University of London, and had been born in Jamaica.

⁴⁴ *Journals* vol. viii, 104, 154, 157

⁴⁵ See patents #1,428 (Boussie) and #1,448 (Murray)

and on their arrival in Jamaica they each asked the assembly for a patent for the same invention.⁴⁶ After several demonstrations the committee gave the patent to Boussie since Murray had been unable to produce any sugar using the new process, making it useless to the island.⁴⁷ The patent allowed Boussie to begin marketing the invention and adapting it to local conditions, leading to a further series of micro-inventions which were recognised and protected in a subsequent patent. ‘Many improvements ... adapted to the different situations and circumstances of the different parts of the island have suggested themselves to the petitioner’, he said, ‘which, from his not having been acquainted with such respective situations and circumstances upon his former application to the house, he could not then describe’.

The colonial patent offered further protection to British inventors, but it also protected and encouraged local inventors. For example, a free man of colour named John Lodge petitioned for a patent in December 1799 for his machine for grinding sugar canes faster, ‘that negroes need not as usual be worked so hard nor obliged to be up at nights, to the great danger of their healths, and consequently loss of interest to their proprietors’.⁴⁸ Two weeks later the committee reported that the principles of the machine were sound but that they had some doubts about whether it was practicable. They therefore recommended that the assembly offer Lodge a provisional patent for two years, with a full patent to follow if he managed to construct a machine successfully, and a grant of £140 ‘in consideration of his being a cabinet-maker and having lost much time by his attendance on the house’. Over a

⁴⁶ Ibid. vol. viii, 154

⁴⁷ Ibid. vol. viii, 104

⁴⁸ Ibid. vol. x, 389, 440

third of Jamaican patents, about 20 in total, were also separately patented in England, usually after they had first been patented in Jamaica, suggesting that the local patent provided colonial inventors with the chance to develop their technology in this way before the expensive of making a trip to England themselves or hiring a patent agent to secure an imperial patent. Three early inventors from Barbados even ignored the imperial patent system entirely and instead protected the spread of their invention by acquiring distinct patents in Jamaica and other islands.⁴⁹

The institutional structure of the colonial patent therefore evolved to meet local needs. To ensure that inventions were useful as well as novel, a number of Jamaican patents had licensing clauses which gave further security to local patentees in return for the rapid dissemination of the invention. For instance, Hugh King was one of the first petitioners for a patent, and in February 1734 he asked for a patent for his new mill 'that others might not receive the benefit of his invention and charge'.⁵⁰ The house agreed but ordered that others might use the invention on paying a fee of £10. Samuel Sainthill was granted a patent in November 1778 for his new method of clarifying sugar, and when he died two years later his executor offered to license the process to planters.⁵¹ Edward Peter Sergeant had a patent for his new cane mill in 1783 and offered licenses for £50, adding that 'all persons are hereby warned against constructing or using the said new-invented mills without such license, as he

⁴⁹ They were Rudhall Russell, Thomas Sainthill and Thomas Spencer: see *Acts of Assembly Passed in the Island of St. Christopher from the Year 1711 to 1769*, 91; Hall, ed., *Acts Passed In ... Barbados*, 502, 504, 512, 515; *Journals* vol. iii, 357, 374, 383; *The Laws of the Island of Antigua* vol. i, 202, 206

⁵⁰ *Journals* vol. iii, 223

⁵¹ *Royal Gazette*, iii, 132, 27 October 1781, 'Advertisement'

is determined to prosecute the offenders'.⁵² As late as 1820, John McLachlan Stevens obtained a patent which specified a fine of £200 for each infringement but also required him to appoint agents throughout the island and sell licences for £50 or less, or face a penalty in turn of £200.⁵³ The house was even willing to help out when the licensing process failed. Boussie's patent allowed him to receive 5s per hogshead of sugar from planters using his process, but he complained in November 1786 that he and his agents had only granted eight or nine licenses because, 'by means of the enrolment of the principles and modes of invention, the same has become public and well-known', despite the penalty of £200 for unauthorised use.⁵⁴ He duly received an updated patent which more closely defined the procedure in order to facilitate prosecutions and incorporated the various improvements noted above

Inventors or introducers of new technology such as Boussie who secured a colonial patent in addition to their imperial one were therefore strategically exploiting a set of overlapping but complementary powers. Admittedly, most British inventors chose not to. Of the 472 English patents granted with a colonial clause between 1700 and 1813, only sixteen were separately patented in the colonies, and all but two of them in Jamaica. This was because foreign inventors had to undergo the same scrutiny as local inventors, even if they already held an English patent, which entailed both costs and delays. For instance, although Jean le Grand received an English patent in 1824 for his new methods for refining sugar and rum, and had been sent to Jamaica by the

⁵² *St Jago Gazette*, No. 1396, 16 to 23 January 1783, 'To the public'; *Journals* vol. vii, 520

⁵³ A copy of this act is reproduced in Satchell, *Sugar, slavery* pp. 229-30.

⁵⁴ *Journals* vol. viii, 187.

West India Committee of planters and merchants specifically to pass on his knowledge, the assembly insisted on referring his petition for a patent to several outside experts 'who, from the nature of their studies and their experience, were supposed competent to judge of the information and capabilities of the petitioner' and could confirm that the inventor and invention were fit to receive a patent.⁵⁵ Some felt that it was not worth the effort. The Falmouth Water Company offered to procure a patent for Boulton and Watt in 1799 for their hydraulic ram, for example, but the partners turned this down since they concluded that the island did not have any large ironworks that were capable of pirating this new technology, '[so] we are not apprehensive of rivalry'.⁵⁶ As with the international marketing of their steam engines, the colonial patent was not always seen as necessary, but clearly a small number of inventors faced particular circumstances which made the powers of a colonial patent a useful part of their strategy for overseas dissemination.⁵⁷

For example, in the case of Robert William Bousie, the colonial patent not only gave him priority over Robert Murray but also gave him additional legal powers for licensing. In turn, his second patent enabled him to incorporate several improvements.⁵⁸ The London merchant John Innes had purchased John Hague's English patent for an improved method of making molasses, and his agent in Kingston duly applied for a patent in November 1830, stating that he had made some further improvements and it would 'be necessary for him to obtain the aid of the legislature of this island to enable him to enjoy the advantage of such invention',

⁵⁵ *Journals*, vol. xiv, 393, 466

⁵⁶ Graham, 'Falmouth', 332.

⁵⁷ Tann, 'Marketing Methods', 363-391; Tann and Breckin, 'International Diffusion', 541-564.

⁵⁸ *Journals* vol. viii, 187-8

as the English patent might now have been superseded.⁵⁹ Perhaps the most important advantage that a colonial patent also offered was the ability to prosecute infringements of the imperial patent in local courts as well as in England. The London-based patent attorney John Farey told a select committee of the British Parliament on patent reform in 1829 that Hague had told him ‘that if law proceedings on a patent right were limited to suing infringers in our courts in this country, it would amount to a prohibition altogether; hence he applied for an act of the colonial legislature at the same time with his patent for this country’.⁶⁰

As in Britain, the colonial patent was also only the first stage in a much wider ‘trade in inventions’ between the inventor, investor, entrepreneur and end-user.⁶¹ For example, the choice by Sainthill’s executor to license his process for clarifying sugar was a last resort, since Sainthill had intended to profit by selling and installing the necessary equipment. ‘Where it has been accurately executed, every person’s expectation has been exceeded; but [where] on the contrary, disappointment’, he advertised in the *Jamaica Mail*, ‘... [so] he will undertake the workmanship himself, and as he will not be able to perform the engagements already made ... he will enter into partnership with any good mason who has tradesmen of his own’.⁶² Boussie asked for his revised patent to address the problem of piracy but also admitted that he was nevertheless also profiting by selling his technical expertise to planters.⁶³

‘Notwithstanding such promulgation and general notoriety of the principles and

⁵⁹ TNA, CO 140/119 (*Votes*, 1830-1) p. 85

⁶⁰ PP 332 (1829), *Report* p. 17

⁶¹ Bottomley, *British Patent System*, 202-228; Dutton, *Patent System*, 108-142; MacLeod, *Inventing*, 139-143.

⁶² *Jamaica Mail*, vi, 5 June 1779, ‘Advertisement’

⁶³ *Journals* vol. viii, 187-8

mode of process of the said invention', he stated, 'many of the most respectable planters of this island have considered the petitioner's personal exercise of such invention upon their respective estates as necessary for the instruction of the persons employed by them in making sugar'. Under these circumstances, his colonial patent served to reinforce the existing rights of the imperial patent, as well as strengthening his claim to specialised knowledge and putting him in a stronger position in his negotiations with customers. Colonial and imperial patents were thus complementary parts of a supranational patent system between 1640 and 1852, resembling the relationship between the federal and state patents in America in the 1790s, giving inventors flexibility and thereby facilitating technological diffusion.

IV. Patents and Grants

A comprehensive understanding of how these two levels of patenting in Britain's colonies interacted can only come from an examination of their broader context, in which patents were only one part of a wider system of colonial measures. These included a number of bounties, subsidies and prizes, but by far the most common alternative to patenting was to provide grants of money to inventors in return for them releasing details on their invention to the public.⁶⁴ Recent work has highlighted the flexibility which the grants offered to inventors in Britain by public or semi-public institutions such as the Royal Society of Arts after 1754, providing immediate rewards and allowing rapid diffusion of an invention or idea around Britain and – with the 'colonial' prizes offered by the Society – the wider empire. The real importance of the practice has also been questioned though, on the basis

⁶⁴ Hall, *Free Jamaica*, 121-76

that little evidence can be found for their effectiveness.⁶⁵⁶⁶ Looking at patents and grants in parallel in Jamaica show that the two were used strategically by both inventors and the assembly to encourage the spread of new technologies within the island.

Between forty to fifty applications were made for grants between 1767 and 1857, depending on what criteria are used and including petitions which asked for an unspecified 'encouragement' or 'relief' but did not result in a bill for a patent. For reasons that are still not clear, they followed a different pattern to the colonial patents, occurring every one or two years from the 1780s through to the 1830s; one inventor noted in 1787 that in recent years 'sundry persons attempting to serve the public have received considerable bounties and large gratuities, both from the public funds and private subscriptions'.⁶⁷ Petitioners had to go through the same rigorous process for a grant as a patent and demonstrate the novelty, utility and viability of their invention.

The first grant of £50 was made to the botanist and naturalist Dr Anthony Robinson in December 1767, for example, for publishing a procedure for making soap from local plants, which he claimed would provide work for aged and infirm slaves and allow 'all such lands, which at present lie useless and uncultivated ... [to] become

⁶⁵ For the British system, see Burrell and Kelly, 'Public Rewards', 858-887; Burrell and Kelly, 'Parliamentary Rewards', 423-449; MacLeod, *Inventing*, 183-200; Wood, *History*, 84-100.

⁶⁶ Khan, 'Inventing Prizes', 631-660.

⁶⁷ *Journals* vol. viii, 322

extremely valuable to this community'.⁶⁸ A Loyalist refugee named John Hunter received two grants of £300 in 1783 and 1785 to set up a potash manufactory using a technique brought from America, which would then supply another useful export for the island.⁶⁹ The committee duly consulted several local experts about the case for potash manufacture, Hunter's credentials, the quality of his samples and the practicality and reliability of his new process.⁷⁰ When Charles Blackford asked for a grant in February 1801 for his method for purifying sugar, the committee examined it in operation on two nearby estates before they concluded that it was 'of great public utility' and granted £250 'as an encouragement for such laudable endeavours, as well as an acknowledgement of the important improvement ... which he has evinced to the satisfaction of the committee'.⁷¹

Since a patent cost the assembly nothing but a grant involved public expenditure, petitioners also had to justify their request, making it possible to reconstruct the strategies they used and choices they made. A common argument was that chemical and biological processes were difficult to define and the patents almost impossible to enforce, and that grants provided the rewards necessary to recognise merit and encourage other inventions.⁷² Another argument was that the invention was so easy to pirate that the inventor would otherwise have no incentive for make it public. Thus, John Humber received £450 in 1839 from the legislature for publishing his plan

⁶⁸ Burnard, *Mastery, Tyranny and Desire*, 102-104, 119; *Journals* vol. vii, 558; vol. viii, 124-5, Long, *History*. vol. ii, 135-6

⁶⁹ *Journals* vol. vii, 558-9, 560; vol. viii, 124-5, 144, 160. For potash, see Roberts, 'American Potash Manufacture', 383-395; Paul Warde, 'Trees, Trade and Textiles', 47-82.

⁷⁰ *Journals* vol. vii, 558-9, 560; vol. viii, 124-5, 144, 160

⁷¹ *Ibid.* vol. x, 529, 567

⁷² See above pp. 2

for a machine for processing coffee beans.⁷³ ‘On account of its economy and efficaciousness, it will tempt persons constantly to infringe on the patent right of the inventor, [and] as no enactment can guarantee him against this piracy, he has no recourse but in the liberality of the legislature’, the committee told the house, and concluded that ‘by purchasing out his patent rights and throwing the invention open at once to the public, the colony will be unrestrictedly benefitted, and the ingenious inventor duly rewarded’.⁷⁴ Grants could thus help to encourage innovation by rewarding inventions that were not suitable for patenting.

Grants could also reward and support inventors who could not afford to obtain or make use of either a colonial or imperial patent, helping to cover what were, at least among English inventors, often heavy costs of research and development, and thereby facilitating technological innovation within the island.⁷⁵ For instance, Blackford applied for a grant because he was ‘so circumstanced that he cannot carry his model into execution without the aid of the house, for the benefit of the public’. Similarly, Hugh Greaves offered his plan for a cattle mill in October 1807 in return for a grant, ‘[as] the petitioner hath been deprived of his sight for many years, and is now almost blind, and his circumstances will not admit of his applying to the house for a patent for erecting mills upon the said model’.⁷⁶ The house heard a complaint from the carpenter and millwright Anders Jensen Schouberg in November 1822 that his plan for a horizontal cane mill had been ‘pirated’ [sic] by William Anderson Orgill,

⁷³ TNA, CO140/130 (*Votes*, 1839-40) pp. 115-16, 121, 125, 255-6

⁷⁴ TNA, CO140/131 (*Votes*, 1840) pp. 101-2, 106-7, 299

⁷⁵ Bottomley, *British Patent System*, 266-279; Dutton, *Patent System*, 155-168.

⁷⁶ *Journals* vol. xi, 576

a planter to whom he had lent a model of it a year before.⁷⁷ Schouberg also added though that he himself was in no condition to promote the mill himself, being 'in very moderate circumstances, and with a wife and four children who are dependent on his exertions', and asked the house for a grant rather than a patent. Finally, the assembly received a petition in March 1832 from a planter in Antigua named John Hanmer Baker, who offered a new method of refining sugar, and testimonials from the governor there in support of it.⁷⁸ Rather than go to the trouble of securing a patent, he simply offered his invention to the house and '[left] it to the generosity of the house to award him such remuneration as they deem meet'.

The grant supported innovation by correcting gaps within the patent system and rewarding local inventors who might not otherwise have brought forward their inventions. It is possible to see colonial inventors moving strategically not just between colonial and imperial patents but also between colonial patents and grants to obtain the best rewards.⁷⁹ John Greenhill Yonge secured a Jamaican patent in 1762 for his new sugar mill, for example, but later obtained an imperial patent in November 1766 for his 'hydraulic machine', and then applied for a Jamaican patent for it in December 1773 for additional protection. The committee inspected a model he had erected at his house in Kingston, found it practical and useful, and approved.⁸⁰ However, when Yonge developed a new chemical process for making fireproof tiles from artificial stone in 1783 and proposed to develop this as a business, he applied for a grant, '[as] in order to render the manufacture of said tiles

⁷⁷ Ibid. vol. xiv, 9, 56

⁷⁸ TNA, CO 140/121 (*Votes*, 1831) p. 63, 69

⁷⁹ See above n. **Error! Bookmark not defined.**

⁸⁰ *Journals* vol. v, 372; vol. vi, 468, 476

of general use to the island and profitable to himself, the petitioner must incur a heavy expence for the necessary apparatus etc. much beyond his present ability'.⁸¹

Peter Edward Sergeant similarly received a patent from the house in December 1783 for his new sugar mill.⁸² He came before the house again in 1801 and 1806 with some improvements but asked this time for a grant, explaining that he was 54 years old, disabled and unable to develop it properly, and the house duly awarded him £500. Five years later he petitioned the house again for a new method he had found of tanning leather, and requested either a grant or a patent.⁸³

The assembly also exercised its discretion in similar ways to balance the cost of the grant against the public benefit of the invention. When William Roach developed a machine for pumping water he asked in November 1788 for a grant of money, for instance, '[as] the public disclosure thereof will deprive the petitioner of all benefit of his discovery, from the certainty of its being immediately imitated and becoming the general mode of raising water'.⁸⁴ The committee were not convinced and he was given a patent instead, and placed advertisements in the *Cornwall Chronicle* offering licenses to planters for £5 each.⁸⁵ On the other hand, if the house felt that an inventor did not have the capacity to make their invention useful and practical, it might vote a grant to the inventor to encourage further research, as in the case of John Lodge, or even buy out their own interest entirely. For instance, Jean Baptiste

⁸¹ *Journals* vol. vii, 623, 637

⁸² *Ibid.* vol. vii, 520; vol. x, 591; vol. xi, 448, 539

⁸³ *Ibid.* vol. xii, 526

⁸⁴ *Ibid.* vol. viii, 448

⁸⁵ *Cornwall Chronicle*, 7 Feb. 1789, Advertisement

Brouet asked the house in December 1799 for a patent for a machine for curing coffee he had brought from Saint Domingue.⁸⁶ This was a propitious moment, as coffee cultivation was expanding rapidly in the island to fill the gap in world coffee markets left by the slave revolt in Saint Domingue.⁸⁷ The committee all agreed that Brouet's machine was useful, 'but as the petitioner has not been naturalised and is totally unable to pay the fees for a private bill', they suggested granting him £350 instead, 'as a full reward for his invention; [and] the machines constructed according to the model whereof may then be used by any person desirous of the same without any license from or fee paid to the petitioner.'⁸⁸ Colonial patents and grants therefore fulfilled complementary roles for the assembly and the inventor.,

V. Inventors and inventing

How did the system of imperial and colonial patents and grants interact to support the spread of technology within the empire? As Macleod and others note, apart for the most important inventions it is difficult to track the actual impact of patenting on invention without detailed scrutiny. Indeed, the surge in patents for steam-driven sugar milling in England and Jamaica in the 1770s did little to generate long-term adoption, since the technology only became widespread in the Caribbean in the early nineteenth century.⁸⁹ However, even if it is not always possible to shift the perspective away from institutions towards inventions, shifting it towards inventors at least makes it possible to assess the relative importance of this complex mix of patents and grants in processes of invention and innovation. Through this, we can

⁸⁶ *Journals* vol. 388-9, 466

⁸⁷ Smith, 'Sugar's Poor Relation', 68-89.

⁸⁸ *Journals* vol. x, 466, 467

⁸⁹ See above n. 15

also see its transnational character.⁹⁰ Many of these inventors were highly globalized, moving back and forth between colonies and the metropole, and the mixed economy of imperial and colonial innovation described here was integral to this process.

For example, examining the origins of those seeking patents or grants from the assembly in Jamaica shows that about, about 75 per cent of petitioners were either from the island or were long-term residents there, pointing to an important tradition of domestic innovation, while 13 per cent had either arrived recently from Britain or were applying for a patent through their agent, and the remainder were from elsewhere (Tables 4a-c). About 52 percent of the inventors who offered their profession or status were planters or gentlemen and 19 percent were tradesmen or artisans, including 12 millwrights, who tended to be highly skilled in practical and mechanical engineering.⁹¹ This differed from England, where the patenting process was dominated after 1760 by 'industrial producers', and suggests the continued importance of sugar and coffee cultivation to the economy of the island and the process of technological invention which accompanied it.⁹²

The petitions for patents and grants confirm Satchell's surmise that innovation in Jamaica was dominated by the demands of the plantation sector, especially sugar; that the focus of invention switched from mechanical improvements to milling to chemical improvements in distilling around 1800; and that the first mainly arose

⁹⁰ For a focus on inventors, see MacLeod, *Heroes of Invention*.

⁹¹ MacLeod, *Inventing*, 109, 118, 137; Mokyr, *Enlightened Economy*, 109-110.

⁹² MacLeod, *Inventing*, 134-139.

from local planters and artisans whereas the second tended to be granted to foreign inventors with scientific training.⁹³ As Macleod has cautioned, such figures may suggest little about the actual sources of innovation, since there were no doubt many inventions which were never formally recognised, and others which were stolen by the patentees from the slaves or artisans who invented them – as in the case of Anders Jensen Schouberg – but they do set a lower bound which confirms that invention and patenting was not limited to the elite.⁹⁴ As in Britain and the United States, even artisans and tradesmen were prepared to apply for some sort of reward. At least two petitioners, John Lodge and Dugald Clarke, were free people of colour, though this probably suggests nothing more than that the planters and merchants of the island were cynical enough to temporarily set aside their racial prejudices when the chance of profit was involved.

[Insert Tables 4a-c here]

The mixed economy of innovation therefore supported patenting from a wide range of social classes but also, in addition, from a wide range of places.⁹⁵ Robert William Boussie's father had obtained the new process for refining cane juice in Paris, for instance, but had patented it in London, where he secured testimonials from various absentee Jamaican planters, and then sent it to Jamaica for a further patent and for commercial exploitation.⁹⁶ John Hunter had imported from North America his knowledge of potash manufacture, and Jean Baptise Brouet likewise brought over

⁹³ Satchell, *Sugar, Slavery*, 50-71, 85-100.

⁹⁴ MacLeod, *Inventing*, 115-143; Veront Satchell, *Sugar, Slavery*, 66-68.

⁹⁵ A point made in Satchell, *Sugar, Slavery*, 60-64.

⁹⁶ See above n. 2

from Saint Domingue his new stove for drying coffee, which he had developed after seeing 'the success of stoves in curing clayed sugars', providing an example of an invention jumping not just from one place to another but also from one industry to another in response to market forces, as Jennifer Tann has highlighted.⁹⁷

As earlier sections have shown, there was also an interchange between Britain and Jamaica, with British inventors developing various inventions and coming out to Jamaica to exploit them, or providing the technical expertise that Jamaican inventors needed to translate their vision into reality. Francis Cooke 'invented and got from England at great expence friction wheels of an uncommon and entirely new construction', for example, which would make his cattle mill for grinding sugar canes even more effective, and applied for a revised patent in 1770 on this basis.⁹⁸ Just as important though was the movement in the other direction, as Jamaican inventors perfected local technologies before moving on to bigger markets. Before sending off his steam engine to Britain in 1789, for example, Isaac Lascelles Winn informed the house that he 'hath not only made many experiments himself ... but hath also been the occasion of several ingenious men applying their studies to the same subject, whereby the public ... hath been benefited', protected by the local patents he had previously secured.⁹⁹ British patentees used the skills of local artisans and mechanics to adapt inventions to local conditions and resources. As noted above, Robert William Boussie declared that he required a second patent in 1786 because of improvements made since coming to the island. The hydraulic ram had been

⁹⁷ *Journals* vol. x, 388; Tann, 'Borrowing Brilliance', 94-114.

⁹⁸ *Ibid.* vol. vi, 302. See also the example of Edward Woollery: Edwards, *History*. vol. ii, 263 and *Journals* vol. vi, 350, 550

⁹⁹ *Journals* vol. viii, 319, 424-5, 518; Woodcroft, *Titles*, 309.

adopted by the Falmouth Water Company partly to allow the directors to assess its suitability for irrigation, and provided an opportunity for Boulton & Watt and the directors to work with local engineers, artisans and mechanics to adapt it to local conditions and to suggest improvements to components before deciding whether to market the invention more widely.¹⁰⁰

VI. The end of the patent system

By 1852 the system of imperial and colonial patents and grants was therefore part of a vibrant mixed economy of innovation, supporting inventors and inventions on both sides of the Atlantic. The shift to an order of national patent laws did not necessarily reflect the failure of the system, but was an unplanned product of very specific circumstances, as Moureen Coulter in particular has emphasised, in much the same way that the application of British copyright law in 1813 to the wider empire was not the result of a careful strategy but reflected a ‘considerable element of arbitrariness’.¹⁰¹ British sugar-refiners took the lead in debates about patents during the 1850s, arguing that their colonial competitors were undercutting them with pirated technologies and that patents should be abolished to create a level playing field in a sector that was already exposed to competition from foreign planters in Cuba and Brazil.¹⁰² The multinational patent system was thus breaking down in the

¹⁰⁰ Graham, ‘Falmouth’, 322.

¹⁰¹ For copyright law, see Barnes, *Authors, Publishers and Politicians*; Bentley, “‘Extraordinary Multiplicity’”, 169-187, quotation on p. 194; Seville, *Internationalisation*.

¹⁰² Coulter, *Property in Ideas*, 50-92, 167-180; Dutton, *Patent System*, 34-65. This emerges from the responses given to the 1851 Patent Committee: see PP (1851) 486, *Select Committee ... to consider bills for amendment of the law touching letters patent for inventions*, 18, 42-5, 65, 98, 145-54, 196, 269-70, 281, 305-6, 318, and the evidence collected by the Colonial Office in *Abstract of replies [in 1853] ... on the subject of the extension of patents for inventions to the colonies* (London, 1859) and

1850s as the spread of technology outside the British Empire placed new pressures on what had been a self-contained system. Rather than try to salvage and reform the colonial clause, the landmark 1852 Patent Act in Britain abolished it entirely, leaving each colony to pass their own law and contributing to the disorder which the Board of Trade tried to reverse with a resurrected British Empire patent in 1901.

Because of the transatlantic nature of this system and these complaints, this meant that its colonial aspects likewise came under close scrutiny, as West Indian planters likewise complained that they themselves were being undercut by these foreign planters, who had cheap slave labour and were also paying lower prices for pirated British technologies. The self-interested views of a small group of sugar planters and refiners in Britain were transmitted to Jamaica, and manifested themselves in the 1850s as opposition to the patent system. Parroting the views of his council, the governor told the Colonial Office in 1853 that patents had 'done as much harm as good' and should be replaced by public rewards.¹⁰³ Jamaica and Barbados each passed acts in 1852 requiring British patentees wishing to enforce their patent to secure a further local patent rather than merely enrolling their grant, confirming the breakdown of the imperial patenting system.¹⁰⁴

Abstract of replies [in 1856] ... calling for information as to the form of the application to be made by persons desirous of obtaining patent rights in the colonies (London, 1861). For the economic situation, see above n. **Error! Bookmark not defined.** For piracy in foreign jurisdictions, see below n. 115.

¹⁰³ *Abstract of replies [in 1853]* p. 28

¹⁰⁴ *Abstract of replies [in 1856]* pp. 28-30; *Colonial Standard and Jamaica Despatch*, iii, 107, 19 November 1852, 'Proceedings of the Assembly'

When the Jamaica Society of Arts was set up by the planters in 1854 it embodied this new attitude, declaring that it would arrest the economic decline of the island by using grants to help develop a new industry for processing plant fibres.¹⁰⁵ Unusually, a petition to the house for a patent for a plant fibre process in 1855 failed to pass, indicating a growing level of hostility to both imperial and colonial patents.¹⁰⁶ A committee of the Society met in 1857 to examine the patent laws in Jamaica, and recommended that they be reformed along English lines ‘to evoke that spirit of competitive ingenuity and encourage that originality of conception which are found to exist in a greater or less proportion among all classes of men’, but on a purely national basis, and with additional local clauses ‘to guard the public against spurious or unworthy claims’ and audit the petitions of foreign inventors to check ‘the novelty, utility and originality of such specifications ... [and] to guard against foisting on the community stale and exhausted inventions’.¹⁰⁷ The imperial patent system therefore broke down in 1852 after it was assaulted on both sides of the Atlantic for what were ultimately narrow and self-interested reasons, leading to its decomposition into a more limited series of parallel national systems through the passage of acts such as the Jamaica Patent Act of 1857, which remains in force today as the basis of Jamaica’s intellectual property law.¹⁰⁸

VI. Conclusion

¹⁰⁵ *Transactions of the Jamaica Society of Arts* (1856) ii, 1-2, 7-8.

¹⁰⁶ TNA, CO 140/153 (*Votes*, 1854-6) pp. 248-50, 415, 423, 430, 449, 460, 465, 478

¹⁰⁷ *Transactions of the Jamaica Society of Arts* (1856) ii, 34, 37, 42; Coulter, *Property in Ideas*, 100-135.

¹⁰⁸ Jamaica Act No. 283 (1857), ‘Patent Act’; TNA, CO 140/156 (*Votes*, 1857) pp. 98, 183, 206-7, 216, 238

The American and French patent acts of the 1790s, and the British act of 1852, helped to entrench a system of 'parallel' national patent regimes, but the British imperial and colonial patent system before 1852 operated along different lines on the basis of 'tiered' rather than 'parallel' national regimes. Innovators in both Britain and Jamaica faced numerous challenges in profiting from their inventions, and a system of national patents would not have suited either. This 'tiered' or multi-layered system of patenting allowed British inventors to secure their proprietary rights in England and to obtain further powers in any individual colony only when they needed additional protection and support or for legal convenience. It also allowed colonial inventors to protect their invention as they developed it before seeking an English patent, or to manage its introduction into what remained a relatively small colonial marketplace. The powers given within the colonies were greater, so the degree of oversight and prior examination was also higher, but it is clear that quite a number of British and Jamaican inventors felt that this was an acceptable trade-off.

The ultimate impact of this tiered patent system on the economic development of Britain's colonies in the earliest phases of global capitalism and industrialisation will be established by further studies. As I have shown, even in the eighteenth century inventors and entrepreneurs in Britain and the colonial world were making active use of the imperial and colonial patent systems in ways which suggest that it was a valuable adjunct to their efforts. This development was concentrated for much of the colonial period in the plantation colonies of the Caribbean and American South, where the interplay of high profits and the search for increasing productivity created

a demand for invention. Comparable patent structures did not exist in French or Spanish colonies until 1820, but emerged in Cuba under similar conditions, with the rise of a highly mechanised sugar industry dependent on steam-driven mills and vacuum-pan technology, and companies such as Derosne & Cail took out multiple patents in France, Britain, Jamaica and Cuba in the early nineteenth century to protect their products from piracy.¹⁰⁹ The system of imperial and colonial patenting and grants that existed in the British empire supported substantial investments in invention and technological diffusion, as complementary parts of a mixed economy of innovation in the British Atlantic during the early industrial revolution.

¹⁰⁹ Fernandez de Pinedo, Petel and Saiz, 'Patents', 46-62; Curry-Machado, *Cuban sugar industry*, esp. pp. 95-9; Tomich, 'World slavery'. For Derosne, see TNA, CO140/121 (*Votes, 1831-2*), 43 and Woodcroft, *Titles* vol. ii, 886, 897; Curry-Machado, *Cuban sugar industry*, 23-39; Ortega, 'Machines', 1-25.

References

Acts of Assembly Passed in the Island of St. Christopher from the Year 1711 to 1769

(St Kitts, 1769).

Allen, R. C., *The British Industrial Revolution in Global Perspective* (Cambridge, 2009).

Barnes, J. J., *Authors, Publishers and Politicians: The Quest for an Anglo-American*

Copyright Agreement, 1815-1854 (London, 1974).

Barton, J. H. 'Issues Posed by a World Patent System', *Journal of International*

Economic Law 7, no. 2 (2004), pp. 341-357.

Ben-Atar, D. S., *Trade Secrets: Intellectual Piracy and the Origins of American*

Industrial Power (New Haven, CT, 2004).

Bently, L. 'The "Extraordinary Multiplicity" of Intellectual Property Laws in the British

Colonies in the Nineteenth Century', *Theoretical Inquiries in Law* 12, no. 1

(2011), pp. 161-200.

Berg, M., *The Age of Manufactures, 1700-1820: Industry, Innovation and Work in*

Britain (London, 2nd ed. edn, 1994).

Boomgaard, P. and Oostindie, G. J. 'Changing Sugar Technology and the Labour

Nexus: The Caribbean, 1750-1900', *Nieuwe West-Indische Gids / New West*

Indian Guide 63, no. 1/2 (1989), pp. 3-22.

Bottomley, S., *The British Patent System and the Industrial Revolution, 1700-1852:*

From Privilege to Property (Cambridge, 2014).

———. 'Patenting in England, Scotland and Ireland During the Industrial Revolution,

1700-1852', *Explorations in Economic History* 54 (2014), pp. 48-63.

Bracha, O., *Owning Ideas: The Intellectual Origins of American Intellectual Property, 1790-1909* (Cambridge, 2016).

Bugbee, B. W. 'The Early American Law of Intellectual Property: The Historical Foundations of the United States Patent and Copyright Systems', University of Michigan, 1961).

— — —, *Genesis of American Patent and Copyright Law* (Washington, OR, 1967).

Burnard, T.G., *Planters, Merchants, and Slaves: Plantation Societies in British America, 1650 - 1820* (Chicago, IL, 2015).

Burnard, T. G. and Garrigus, J., *The Plantation Machine: Atlantic Capitalism in French Saint-Domingue and British Jamaica, Early Modern Americas* (Philadelphia, PA, 2016).

Burrell, R. and Kelly, C. 'Public Rewards and Innovation Policy: Lessons from the Eighteenth and Early Nineteenth Centuries', *Modern Law Review* 77, no. 6 (2014), pp. 858-887.

— — —. 'Parliamentary Rewards and the Evolution of the Patent System', *The Cambridge Law Journal* 74, no. 3 (2015), pp. 423-449.

Cateau, H. 'Conservatism and Change Implementation in the British West Indian Sugar Industry, 1750-1810', *Journal of Caribbean History* 29, no. 2 (1995), pp. 1-36.

Chaplin, J. E., *An Anxious Pursuit: Agricultural Innovation and Modernity in the Lower South, 1730-1815* (Chapel Hill, 1993).

Coulter, M., *Property in Ideas: The Patent Question in Mid-Victorian Britain* (Kirkville, MO, 1991).

- Crothers, A. G. 'Agricultural Improvement and Technological Innovation in a Slave Society: The Case of Early National Northern Virginia', *Agricultural History* 75, no. 2 (2001), pp. 135-167.
- Curry-Machado, J., *Cuban sugar industry: transnational networks and engineering migrants in mid-nineteenth century Cuba* (NY and London, 2011)
- Deerr, N. and Brooks, A. 'The Early Use of Steam Power in the Cane Sugar Industry', *Transactions of the Newcomen Society* 21, no. 1 (1940), pp. 11-21.
- Drescher, S., *Econocide: British Slavery in the Era of Abolition* (Pittsburgh, PA, 2010).
- Dutton, H. I., *The Patent System and Inventive Activity: During the Industrial Revolution 1750-1852* (Manchester, 1984).
- Edwards, B., *The History, Civil and Commercial, of the British Colonies in the West Indies*. 3 vols (London, 1793-1801).
- Eisner, G., *Jamaica, 1830-1930: A Study in Economic Growth* (Manchester, 1961).
- Encaoua, D. and Madiès, T. 'Dysfunctions of the Patent System and Their Effects on Competition', in T. Madiès, D. Guellec and J.-C. Prager eds., *Patent Markets in the Global Knowledge Economy: Theory, Empirics and Public Policy Implications*, (Cambridge, 2014), pp. 125-171.
- Fernandez de Pinedo, Nadia; Pretel, David; Saiz, Patricio, 'Patents, sugar technology and sub-imperial institutions in nineteenth-century Cuba', *History of Technology* 30 (2010) pp. 46-62
- Graham, A. 'The Colonial Sinews of Imperial Power: The Political Economy of Jamaican Taxation, 1768-1838', *Journal of Imperial and Commonwealth History* 45, no. 2 (2017), pp. 188-209.

- . 'Technology, Slavery and the Falmouth Water Company of Jamaica, 1799-1805', *Slavery & Abolition* 39, no. 2 (2018), pp. 315-332.
- Green, W. A., *British Slave Emancipation: The Sugar Colonies and the Great Experiment, 1830-1865* (Oxford, 1976).
- Hall, D., *Free Jamaica 1838-1865: An Economic History* (New Haven, CT, 1959).
- Hall, R., ed., *Acts Passed in the Island of Barbados, from 1643 to 1762 Inclusive* (London, 1764).
- Hoppit, J. 'Patterns of Parliamentary Legislation, 1660-1800', *Historical Journal* 39 (1996), pp. 109-131.
- Hrdy, C. A. 'State Patent Laws in the Age of Laissez Faire', *Berkeley Technology Law Journal* 28, no. 1 (2013), pp. 45-113.
- Jeremy, D. J., *Transatlantic Industrial Revolution: The Diffusion of Textile Technologies between Britain and America, 1790-1830s* (Oxford, 1981).
- Journals of the House of Assembly of Jamaica*. 14 vols (Kingston, Jamaica, 1808-26).
- Khan, B. Z., *The Democratization of Invention: Patents and Copyrights in American Economic Development, 1790-1920* (Cambridge, 2005).
- . 'Inventing Prizes: A Historical Perspective on Innovation Awards and Technology Policy', *Business History Review* 89 (2015), pp. 631-660.
- The Laws of the Island of Antigua ... With, Prefixed to Each Volume, Analytical Tables of the Titles of the Acts; and, at the End of the Whole, a Copious Digested Index*. 4 vols (London, 1805).
- Lerner, J. 'Science and Agricultural Progress: Quantitative Evidence from England, 1660-1780', *Agricultural History* 66, no. 4 (1992), pp. 11-27.

Long, E., *The History of Jamaica, or, General Survey of the Antient and Modern State of that Island*. 3 vols (London, 1774).

MacLeod, C., *Inventing the Industrial Revolution: the English Patent System, 1660-1800* (Cambridge, 1988).

———. 'The Paradoxes of Patenting: Invention and Its Diffusion in 18th- and 19th-Century Britain, France and North America', *Technology and Culture* 32, no. 4 (1991), pp. 885-910.

———, *Heroes of Invention: Technology, Liberalism and British Identity, 1750-1914* (Cambridge, 2007).

McCloskey, D. N., *Bourgeois Equality: How Ideas, Not Capital or Institutions, Enriched the World* (Chicago, IL, 2016).

McCusker, J. J. 'The Economy of the British West Indies, 1763-1790: Growth, Stagnation or Decline', in J. J. McCusker ed., *Essays in the Economic History of the Atlantic World*, (London, 1997), pp. 205-217.

McCusker, J.J. and Menard, Russell R., *The economy of British America, 1607-1789* (Chapel Hill, NC, 1991)

Mokyr, J. 'The Intellectual Origins of Modern Economic Growth', *Journal of Economic History* 65, no. 2 (2005), pp. 285-351.

———, *The Enlightened Economy: An Economic History of Britain, 1700-1850* (New Haven, CT, 2009).

Ortega, José Guadalupe, 'Machines, modernity and sugar: the Greater Caribbean in a global context, 1812-50', *Journal of Global History* 9:1 (2014), pp. 1-25

Pretel, David, and Fernandez de Pinedo, Nadia, 'Circuits of knowledge: foreign technology and transnational expertise in nineteenth-century Cuba', in

- Leonard, Adrian, and Pretel, David, eds, *The Caribbean and the Atlantic world economy: circuits of trade, money and knowledge* (Basingstoke, 2015)
- Roberts, J., *Slavery and the Enlightenment in the British Atlantic, 1750-1807*, 2013).
- Roberts, W. I. 'American Potash Manufacture before the American Revolution', *Proceedings of the American Philosophical Society* 116, no. 5 (1972), pp. 383-395.
- Robinson, E. 'James Watt and the Law of Patents', *Technology and Culture* 13, no. 2 (1972), pp. 115-139.
- Rosenberg, N. 'Factors Affecting the Diffusion of Technology', *Explorations in Economic History* 10, no. 1 (1972), pp. 3-33.
- Satchell, V. 'Steam for Sugar-Cane Milling: The Diffusion of the Boulton and Watt Stationary Steam Engine to the Jamaican Sugar Industry, 1809-1830', in K. Monteith and G. Richards eds., *Jamaica in Slavery and Freedom: History, Heritage and Culture*, (Kingston, Jamaica, 2002), pp. 242-258.
- , *Sugar, Slavery and Technological Change: Jamaica, 1760-1830* (Saarbrücken, 2010)
- Schumpeter, Joseph A., *The theory of economic development: an inquiry into profits, capital, credit, interest, and the business cycle* ed. John Elliott (London, 1980)
- Seville, C., *The Internationalisation of Copyright Law: Books, Buccaneers and the Black Flag in the Nineteenth Century* (Cambridge, 2006).
- Sheridan, R.B., *Sugar and Slavery: An Economic History of the British West Indies, 1623-1775* (Barbados, 1974).

- . 'Changing Sugar Technology and the Labour Nexus in the British Caribbean, 1750-1900, with Special Reference to Barbados and Jamaica', *Nieuwe West-Indische Gids / New West Indian Guide* 63, no. 1/2 (1989), pp. 59-93.
- Smith, S. D. 'Sugar's Poor Relation: Coffee Planting in the British West Indies, 1720-1833', *Slavery & Abolition* 19, no. 3 (1998), pp. 68-89.
- Sokoloff, K. L. 'Inventive Activity in Early Industrial America: Evidence from Patent Records, 1790-1846', *Journal of Economic History* 48, no. 4 (1988), pp. 813-850.
- Sokoloff, K. L. and Khan, B. Z. 'The Democratization of Invention During Early Industrialization: Evidence from the United States, 1790-1846', *Journal of Economic History* 50, no. 2 (1990), pp. 363-378.
- Sullivan, R. J. 'The Timing and Pattern of Technological Development in English Agriculture, 1611-1850', *Journal of Economic History* 45 (1985), pp. 305-314.
- . 'England's "Age of Invention": The Acceleration of Patents and Patentable Invention During the Industrial Revolution', *Explorations in Economic History* 26 (1989), pp. 424-452.
- Tann, J. 'Marketing Methods in the International Steam Engine Market: The Case of Boulton and Watt', *Journal of Economic History* 38, no. 2 (1978), pp. 363-391.
- . 'Borrowing Brilliance: Technology Transfer across Sectors in the Early Industrial Revolution', *International Journal for the History of Engineering & Technology* 85, no. 1 (2015), pp. 94-114.
- Tann, J. and Breckin, M. J. 'The International Diffusion of the Watt Engine, 1775-1825', *Economic History Review* 31, no. 4 (1978), pp. 541-564.

- Thomson, R., *Structures of Change in the Mechanical Age: Technological Innovation in the United States, 1790-1865* (Baltimore, MD, 2009).
- Tomich, Dale, 'World slavery and Caribbean capitalism: the Cuban sugar industry, 1760-1868', *Theory and Society* 20:3 (1991), pp. 297-319
- Trimble, M., *Global Patents: Limits of Transnational Enforcement* (Oxford, 2012).
- Votes of the Honourable House of Assembly of Jamaica* (Spanish Town and Kingston, Jamaica, 1825-57).
- Wadlow, C. 'The British Empire Patent 1901-1923: The "Global" Patent That Never Was', *Intellectual Property Quarterly* 4 (2006), pp. 311-346.
- Walterscheid, E. C., *To Promote the Progress of Useful Arts: American Patent Law and Administration, 1798-1836* (Littleton, CO, 1998).
- Ward, J. R. 'The Profitability of Sugar Planting in the British West Indies, 1650-1834', *Economic History Review* 31, no. 2 (1978), pp. 197-213.
- — —, *British West Indian Slavery, 1750-1834: The Process of Amelioration* (Oxford, 1988).
- Warde, P. 'Trees, Trade and Textiles: Potash Imports and Ecological Dependency in British Industry, c. 1550-1770', *Past & Present* 240 (2018), pp. 47-82.
- Wood, H. T., *A History of the Royal Society of Arts* (London, 1913).
- Woodcroft, B., ed., *Titles of Patents of Invention, Chronologically Arranged, from March 2, 1617 (14 James I) to October 1, 1852 (16 Victoria)*. Vol. 2 (London, 1854).
- — —, *Patents for inventions: abridgements of specifications relating to sugar* (London, 1871)

Zahedieh, N. 'Colonies, Copper, and the Market for Inventive Activity in England and Wales, 1680-1730', *Economic History Review* 66, no. 3 (2012), pp. 805-825.