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Sub-imperial Globalisation and the Phoenix of Empire: Sugar, Engineering and Commerce in Nineteenth Century Cuba

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“I write hurriedly and very late as I have just returned from a 2 days jaunt ...of a ride of 108 miles in the hot sun alternating with tropical rains”, wrote Charles Edmonstone from Cuba in 1861:

Some of the agents here assert that neither storm or sun has an effect on me. I am so wiry that I have offered to bet that I will kill any 5 horses that can be brought me without rest to myself and one after another with fair fatigue. Today they find me at Cienfuegos, next day at Villa Clara, next day at Sagua and two days after at San Juan de los Remedios.¹

Edmonstone was a migrant engineer, one of many such skilled workers who came to Cuba in the course of the nineteenth century to install, run and maintain the steam-powered machinery that was being introduced into the Cuban sugar industry, helping to turn the island into the world's leading sugar producer.² Although British-born, the activities of Edmonstone – and others like him coming from the North Atlantic industrial centres – reveal an independence from the narrow national concerns of the respective imperial powers from which they came, happily filling orders “in the United States, England or wherever the buyer wishes to give his preference”.³ Just as do the diasporic merchants through whom much capital investment and foreign trade occurred,⁴ these migrants demonstrate the globalising processes, developing beneath the bounds of conflicting imperial projects, which were eroding Cuba's identity as a Spanish colony. However, at the same time that they were contributing to the island's liberation, they were also helping to lay the foundations for the rise of new manifestations of imperial control.

Despite the tendency for Cuban historiography to focus upon the developing national project, this has generally been done within an implicitly transnational context, with many historians seeing how the nation emerged not in isolation, but in reaction to competing imperial designs over the island.⁵ Others have focused on the economic aspects, in particular

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¹ Museo de la Ciudad, Havana (MC), Fondo Moreno Friginals (MF), 234/28/5.

² Jonathan Curry-Machado, *Indispensable Aliens: The Influence of Engineering Migrants in Mid-Nineteenth Century Cuba*, PhD Thesis, London Metropolitan University, 2003.

³ MC, MF 234/27/1.

⁴ Roland T. Ely, *Comerciantes cubanos del siglo XIX*, Havana, 1961; Philip D. Curtin, *Cross-cultural Trade in World History*, Cambridge: Cambridge University Press, 1984.

⁵ Herminio Portell Vilá, *Historia de Cuba en sus relaciones con los Estados Unidos y España*, 4 vols., Havana: Jesús Montero, 1938-41; Jorge Ibarra, *Nación y cultura nacional*, Havana: Editorial Letras Cubanas, 1981; Manuel Moreno Friginals, *Cuba/España; España/Cuba*, Barcelona: Crítica, 1995; Christopher Schmidt-Nowara, *Empire and Antislavery: Spain, Cuba, and Puerto Rico, 1833-1874*, Pittsburgh: University of Pittsburgh Press, 1999.

the island's dependency on sugar,⁶ and the imperialism resulting from this.⁷ The strongest analyses have looked beyond the national boundaries to take a regional approach,⁸ in which the geo-political rivalries of the Atlantic powers provides the context for understanding the history not just of Cuba, but of the Spanish Caribbean as a whole in the nineteenth century.⁹

In this paper I take such approaches further, through the case of the importation of foreign steam technology into Cuba in the course of the nineteenth century, and the experience of the migrant workers employed to operate it. Here the focus is not on Cuba as an isolatable entity, but existing in the context of transnational networks that were involving the island in processes of globalisation.¹⁰ However, rather than seeing these processes as the consequence of imperial designs, I argue that this was, at the outset, a 'sub-imperial' globalisation, operating independently, and implying liberation, from empire.

The growth in Cuban sugar production from the end of the eighteenth century saw the emergence of a creole elite that sought the development of the island. The search for new technologies to enable improvements in sugar production necessarily took them beyond the restricted possibilities of the Spanish empire, to the industrial centres of the United States, Britain and France. They were assisted in this both by the migrant engineers that accompanied the new machinery, and also the often foreign-born merchants who enabled the island's involvement in the transnational commercial networks through which sugar was exported and industrial goods imported. Such tendencies made Spanish dominion over Cuba increasingly irrelevant, and helped fuel the emergence of an independent Cuban identity.

However, the same globalising tendencies that were eroding Spanish empire were causing Cuba to fall into new forms of imperial domination. The increasing expense of the new steam technology led to a growing dependence upon investment from foreign merchant banks, which gradually assumed control over much of the island's production and trade. Despite some efforts to develop indigenous industry, Cuba remained dependent upon foreign technology. The same migrant engineers who had begun by assisting Cuban planters, took on the role of agents for foreign companies. Rather than contributing their skills, as one more group of migrants in a nation formed out of multiple migrations, engineers such as Charles Edmonstone asserted their foreign identity, and guarded their privileged position. They came to be seen as symbolic of the process by which Cuba shook off the Spanish yoke only to replace it with another.

Sugar and Technological Advances

Although sugar began to be produced in Cuba in the sixteenth century, this remained on a small-scale until the final years of the eighteenth century, when Cuba found itself particularly well-placed to benefit from the vacuum in the world sugar market resulting from revolution in

⁶ Ramiro Guerra y Sánchez, *Azúcar y población en las Antillas*, Havana: Editorial de Ciencias Sociales, 1970 [1927].

⁷ Oscar Zanetti, *et al.*, *United Fruit Company. Un caso de dominio imperialista*, Havana: Editorial de Ciencias Sociales, 1977.

⁸ José Benítez, *Las Antillas: colonización, azúcar e imperialismo*, Havana: Casa de las Américas, 1977.

⁹ Luis Martínez-Fernández, *Torn Between Empires: Economy, Society and Patterns of Political Thought in the Hispanic Caribbean, 1840-1878*, Athens & London: University of Georgia Press, 1994.

¹⁰ Jonathan Curry-Machado, 'Sin azúcar no hay país: the transnational counterpoint of sugar and nation in nineteenth century Cuba', *Bulletin of Hispanic Studies* (84:1), 2007.

neighbouring Saint Domingue.¹¹ Occurring at a time of growing world demand, with it becoming an increasingly important element of proletarian diets in Europe and North America,¹² sugar prices rose rapidly making an expansion in cane fields particularly attractive for Cuban planters who had previously devoted most of their land to coffee.¹³ The rise in Cuban sugar production was later assisted by the crisis in the British West Indies following slave emancipation,¹⁴ at a time when despite the outlawing of the slave trade the use of chattel labour in Cuba intensified.¹⁵

As a result, by the mid-nineteenth century Cuba had become the world's leading sugar producer, accounting for more than 40% of all cane sugar,¹⁶ with the island's importance seen not only in quantity but also in quality, "being of a dry, firm grain [and] therefore always sold readily and at good prices".¹⁷ The mid-nineteenth century saw the establishment of large numbers of new plantations and sugar mills, with the sugar frontier moving inexorably down the island.¹⁸ The scale of production likewise increased, with the average output per mill growing from just 72 tons a year in 1830 to 316 tons by 1860,¹⁹ with the largest producing as much as 3,000 tons in a single harvest.²⁰

Sugar not only came to dominate land use, but also Cuba's trade. Between 1827 and 1846, sugar and its derivatives made up almost two-thirds of the island's exports,²¹ bringing with it considerable wealth to those in a position to benefit. Although excluded from political power by the Spanish, prominent Cuban families, with fortunes accumulated from expanding sugar plantations, dominated not just rural society,²² but national life in general. This new economic elite was instrumental in the emergence of liberal, modernising bodies, in particular the *Real Consulado* and the *Sociedad Económica de Amigos del País*, through which enlightenment influences and scientific advances from Europe and North America found their way into Cuba.

They also went out of their way to facilitate the introduction of the latest advances in steam technology and sugar milling machinery, and in this it was immediately evident how irrelevant Spain had become to the island's development. For example, in 1851 attempts were

¹¹ Benítez (1977), pp.136-8; Julio Le Riverend, *Historia Económica de Cuba*, Havana: Editorial de Ciencias Sociales, 1967: 161; Sherry Johnson, *Social Transformation of Eighteenth Century Cuba*, Gainesville: University Press of Florida, 2001.

¹² Sidney W. Mintz, *Sweetness and Power: the Place of Sugar in Modern History*, New York: Penguin, 1985, pp. 74-150.

¹³ Louis A. Pérez Jr., *Cuba: Between Reform and Revolution*, 2nd Edition, New York & Oxford: Oxford University Press, 1995, pp.71-4.

¹⁴ Michelle Harrison, *King Sugar: Jamaica, the Caribbean and the World Sugar Economy*, London: Latin America Bureau, 2001, p.107; William A. Green, *British Slave Emancipation: the Sugar Colonies and the Great Experiment, 1830-1865*, Oxford: Clarendon Press, 1976.

¹⁵ Ramiro Guerra y Sánchez, et al., *Historia de la nación cubana*, Havana, 1952, p.78; Franklin W. Knight, *Slave Society in Cuba during the Nineteenth Century*, Madison: University of Wisconsin Press, 1970, p.24.

¹⁶ Moreno Fraginals, Manuel, *El Ingenio*, Vol.3, Havana: Editorial de Ciencias Sociales, 1978, pp.35-7; Alan Dye, *Cuban Sugar in the Age of Mass Production: Technology and the Economics of the Sugar Central, 1899-1929*, Stanford: Stanford University Press, 1998, p.27.

¹⁷ Richard McCulloh, *Reports from Secretary of the Treasury of Scientific Investigations in Relation to Sugar and Hydrometers*, Washington, 1848.

¹⁸ Marrero, Levi, *Cuba: economía y sociedad*, Vol.10, Madrid, 1973-86, p.278; Moreno Fraginals (1978).

¹⁹ Pérez (1995), p.75.

²⁰ Benítez (1977), p.200.

²¹ Marrero (1973-86), Vol.12, p.115.

²² Laird W. Bergad, *Cuban Rural Society in the Nineteenth Century: the social and economic history of monoculture in Matanzas*, Princeton: Princeton University Press, 1990.

made by the authorities to facilitate the purchase of a first class steam engine from Spain, out of a desire to stimulate Spanish rather than foreign industry,²³ news having reached them that engines were built there just as well and solidly as in other countries. However, when enquiries were made, the best they could come up with was a factory that boasted to be able to build any sugar mill, so long as they were given the details of the steam engine to be used – the implication being that they would be unable to supply this themselves.²⁴ The reality was that steam engines, and almost all other sugar machinery, had to be obtained from the industrial centres of Great Britain, the United States and France. New York, Glasgow, Liverpool and Le Havre, the port cities that together formed the nexus for nineteenth century Atlantic commerce, were also the principal centres for the engineering industry, and the source of most of the steam engines and other machinery imported into Cuba.²⁵

However, although the machinery came from the factories of such rival imperial powers, the initial impulse for its introduction into Cuba came not from attempts by these powers to challenge Spanish control over the island, but from Cuban planters seeking to satisfy Cuba's developmental needs by accessing the latest technological advances. Prominent landowners became students of milling and refining technology, eagerly learning from all such developments and exploring how to apply them to their own industry. In 1849, Joaquín de Ayesterán became the first planter to install centrifuges in a Cuban mill,²⁶ just five years after the first ever demonstration of the use of a centrifuge for separating sugar crystals, in Germany.²⁷ In 1850, he travelled to Europe, visiting Liverpool, Birmingham and Paris, and returning to Cuba with the materials and machines he needed to modernise his 'Amistad' estate.²⁸

During the mid-nineteenth century the use of steam in Cuba's sugar mills became generalised,²⁹ with 70% using steam engines by 1860 from just 20% in 1846.³⁰ Advances were introduced in all aspects of sugar production, so enabling the improvements in quality for which Cuban sugar became renowned.³¹ Accelerated sugar production also required improved transport, and this led to the development (again using mainly British and North American technology) of an extensive rail network – the sixth in the world to be constructed, several years before that in Spain itself –³² and steam boat routes. Although leading to the importation of large quantities of machinery, far from originating in a process of imperial penetration of the Cuban market by foreign producers, the initial impulse for this came from Cuba itself, through personally-established networks. Not only did this enable the development of Cuba's sugar production and infrastructure through inclusion in the globalising distribution of new technologies; but it also enabled the engineering companies themselves to further extend the reach of their products, far beyond the bounds of their respective national empires. In the initial years, this occurred not through the unequal exchanges characteristic of economic imperialism, but through the equal interchange between Cuban planters and foreign machine manufacturers, in a process that sidelined Spanish imperial control over the island.

²³ *Anales de las Reales Junta de Fomento y Sociedad Económica de la Habana*, Tomo IV (1851), p.247.

²⁴ Archivo Nacional de Cuba (ANC), Gobierno Superior Civil (GSC), 372/14200.

²⁵ Paul Butel, *The Atlantic*, London & New York: Routledge, 1999, pp.223-33.

²⁶ Manuel Moreno Fraginals, *The Sugarmill: the socio-economic complex of sugar in Cuba, 1760-1860*, New York & London: Monthly Review Press, 1976, p.117.

²⁷ Geoffrey Fairrie, *Sugar*, Liverpool: Fairrie & Co., 1925, p.168.

²⁸ Biblioteca Nacional 'José Martí', Havana (BNJM), Lobo 108, Vol.3, File 2.

²⁹ Martínez-Fernández (1994), p.98; Bergad (1990), p.90.

³⁰ Marrero (1973-86), Vol.10, p.159.

³¹ Moreno Fraginals (1978); Dye (1998); Curry-Machado (2003a).

³² Oscar Zanetti & Alejandro García, *Caminos para el azúcar*, Havana: Editorial de Ciencias Sociales, 1987.

Migrant Engineers and Transnational Development

This new machinery required specialised labour for its installation, operation and maintenance, and Cuba lacked workers with the necessary skills.³³ As a result, “with steam engines came mechanics, who were mostly foreigners”:³⁴

[E]very mill, every steam boat, every train locomotive has to have with it an intelligent foreigner to direct and inspect the engine.³⁵

Such skilled workers were generally looked for in the same countries that produced the machinery. Often orders included a condition that appropriate technicians be sent at the same time “to put together that machinery and remain in charge of it”.³⁶ For example, when two steam boats to be used in Matanzas bay were bought in New York from the Novelty Iron Works, it was stipulated that the factory should provide two trustworthy engineers skilled in their operation.³⁷ Likewise, when locomotives were acquired from Philadelphia for the Cárdenas to Bemba railway in 1839, it was requested that they should come with “a man who knows how to direct them”.³⁸

Even when there were engineering workers available locally, there was often a preference shown by planters to engage those recommended by the manufacturers, and who had proven experience with the specific machines that they were installing. They would also be recruited on behalf of planters and other employers through agents placed in countries such as Britain and the United States. In 1838, the chief engineer of the Havana-Güines line ordered four locomotives from Britain. He requested that Alexander Robertson, who was acting as both the chief investor and British agent of the rail company, also find, along “with duplicates of machinery”, four engineers “and as many machinists or men who understand the repair and construction of Locomotives”.³⁹

The number of engineering workers in these countries increased greatly during the nineteenth century;⁴⁰ and although such workers were amongst the better paid, lived in less cramped conditions and had least recourse to the workhouse,⁴¹ for many poverty and job insecurity continued to be a threatening presence.⁴² With the exportation of machinery around the world came an extension of the well-established tramping tendencies of engineering workers.⁴³ While there were many who travelled to Cuba intentionally, often with pre-arranged jobs, others arrived almost by accident, as they pursued journeys from one job and place to another. For example, William Bisby had passed through a wide selection of jobs in

³³ Bergad (1990), pp.121-2.

³⁴ Fé Iglesias García, ‘The Development of Capitalism in Cuban Sugar Production, 1860-1900’, in Manuel Moreno Fraginals, Frank Moya Pons & Stanley L. Engerman (eds), *Between Slavery and Free Labor: the Spanish-speaking Caribbean in the Nineteenth Century*, Baltimore: Johns Hopkins University Press, 1985, p.58.

³⁵ Francisco de Paula Serrano, in *Memorias de la Sociedad Económica de la Habana*, Tomo IX (1840), p.240.

³⁶ British Parliamentary Papers 1841 (I) vii, pp.88-9.

³⁷ Archivo Histórico Nacional (Madrid) (AHN), Ultramar, Cuba/Fomento, 35/2, No.35.

³⁸ *Diario de la Habana*, 24 November 1839.

³⁹ ANC, Real Consulado y Junta de Fomento (RCJF), 131/6412.

⁴⁰ Eric Hobsbawm, *Industry and Empire*, London: Penguin, 1969, p.117.

⁴¹ Geoffrey Crossick, *An Artisan Elite in Victorian Society: Kentish London, 1840-1880*, London: Croom Helm, 1978, pp.110-3.

⁴² John Belchem, *Industrialization and Working Class: The English Experience, 1750-1900*, Aldershot: Scolar Press, 1990, p.156.

⁴³ Eric Hobsbawm, *Labouring Men: Studies in the History of Labour*, London: Weidenfeld & Nicolson, 1986.

the United States, before accepting a position on a steam ship. This opened up to him the possibility of travelling overseas in search of work, prompted by the unstable prospects he had experienced back home, eventually leading him into employment in Cuba.⁴⁴

A lively internal labour market for engineering workers quickly developed in Cuba, as burgeoning sales of steam engines and steam machinery brought a rapid increase in their demand. Those already established in the island provided a route in for others eager to work there, often seeking out opportunities for them. It was in this way that William Whitehorn left Britain “in order to fit up machinery in Cuba”, contracted by the veteran engineer Edward Beanes.⁴⁵ Joel Watts travelled to Cuba having been assured by Henry Elkins, who was already established on a sugar estate, that he would have secure employment there. On his arrival this job proved not to exist, but he nevertheless found work in the foundry in Havana.⁴⁶

By the 1860s this job market was well-established, with migrant engineering workers often passing from one job to another based on word-of-mouth recommendations,⁴⁷ placing adverts in the local press, or directly approaching potential employers. As more and more gained experience of Cuba, their presence made the necessity for the engine manufacturers to provide artisans less pressing. As early as 1838, the planter Pedro Diago told William Kemble of the West Point Foundry that he would not need him to send out anybody with his new machinery, since he was already in agreement with the man who had mounted the machinery of a neighbouring mill, “and this one has the advantage for me that he speaks Spanish, and has experience of this country”.⁴⁸ Although Baring Brothers intended to send a favourite engineer of theirs, to oversee the installation of the new steam engine and mill on the ‘Arroyo’ estate,⁴⁹ he himself declined the position, recommending that they should simply employ the engineer already working there, “saying he knew he was as competent as any man we could find”. Besides, he had no need to accept since he had more than sufficient engagements to keep him occupied.⁵⁰

So long as the machinery was running smoothly, the job of a sugar mill engineer was a relatively relaxed one. Even during the grinding season, when they supposedly had little free time because their full attention was required (and even more so during the other six months of the year when there was relatively little work to be done at the mill, beyond routine maintenance), such workers had much opportunity to turn their attention to more than merely keeping existing engines in operation. Their time in Cuba provided them with the knowledge and experience necessary to make contributions to further technological development. For example, Ezra Dod invented, while working on Cuban sugar estates, a “tubular juice heater”, which “worked with the exhaust steam of the mill engine as the estate had no multiple effect”; an “upright tube vacuum pan”; and a new housing for the mill, successfully demonstrating the advantages to be gained by placing the cane carrier in such a way as to ensure that the cane entered at right angles to the mill rollers.⁵¹

Seasonal employment also enabled them to divide their time between work in Cuba, and leisure in the United States or Europe. It was very common for planters to take advantage

⁴⁴ ANC, Comisión Militar (CM) 51/1, pp.416-29.

⁴⁵ Public Record Office, London, (PRO), FO 72/830, No.6); PRO, FO 72/830, No.24.

⁴⁶ ANC, CM, 51/1, pp.277-8.

⁴⁷ BNJM, Sociedad T.34, No.1a.

⁴⁸ BNJM, Lobo 111, Vol.3.

⁴⁹ Barings Archive, London (BA), LB 22, No.231.

⁵⁰ BA, HC 4.6.10, No.65.

⁵¹ *Louisiana Planter & Sugar Manufacturer*, 7 February 1914 & 11 September 1915.

of such trips to use them as agents charged with placing orders with factories for new machinery and parts.⁵² Although most planters had commercial agents representing them, it was felt that these skilled workers were most effective in such a role, since they could give very precise specifications to the manufacturers.⁵³ Thus when Henry Elkins travelled back to Britain in 1843 to spend the summer, he placed orders directly with the leading Liverpool firm of sugar machine manufacturers, Fawcett Preston.⁵⁴ In June 1840, Frederick Shuck, who worked on Francisco Diago's 'Caunabaco' estate, left for the United States carrying a letter of introduction from his employer to the latter's commercial representative in New York, who he requested to place an order at the West Point Foundry according to the specifications given by Shuck, who was to return to Cuba in September.⁵⁵

Thus although the initial stimulation for Cuba's involvement in the technology-driven globalisation that was underway in the nineteenth century came from the desire of Cuban planters to develop sugar production, and with it increase their own fortunes; the migrant engineering workers that this required quickly became the agents through whom such networks became strengthened and extended, motivated primarily by considerations of technological and commercial advantage, rather than furthering economic imperialist interests. They assisted Cuba's entrepreneurs in their break from Spanish monopoly, to the free selection of where best to take their business, apparently liberated from commitment to any particular national or imperial interests.

Merchants and Transnational Commercial Networks

An important role was played in the importation of machinery, as well as the contracting of the necessary skilled workers, by merchant houses based in the island, often founded by foreign-born merchants who did much to improve Cuba's place within the international commercial networks. While the majority of merchants operating in Cuba were from Spain,⁵⁶ there was an important hard core of non-Spanish traders who dominated much of the island's import and export business, and were highly influential in the development of the island's connections with Europe and North America.⁵⁷ This was a group that showed little commitment to specific national interests. Although Drake Brothers & Co. was founded by the British émigré James Drake in the 1790s, they traded more heavily with Spain, France, Russia and Germany than with Britain.⁵⁸ In the mid-nineteenth century, in addition to the sons of Drake, the house's partners included a Spaniard, a North American and a Swiss.⁵⁹

Foreign merchants brought with them a spirit of speculation into Cuban commerce that was otherwise lacking.⁶⁰ As a result of their good contacts with merchants and manufacturers in Europe and North America, these traders were able to claim that they could "execute orders more advantageously";⁶¹ or else gain advantage through their superior

⁵² BNJM, Lobo 111/1.

⁵³ Glasgow University Archives and Business Records Centre (GUABRC), UGD 118/1/2/3.

⁵⁴ ANC, CM 51/1.

⁵⁵ BNJM, Lobo 109/3.

⁵⁶ Roland T. Ely, *Cuando reinaba su majestad el azúcar*, Havana: Imágen Contemporánea, 2001 [1963], p.317.

⁵⁷ Ely (1961).

⁵⁸ MC, MF, 235/1/24.

⁵⁹ Ely (1961), pp.83-140.

⁶⁰ BA, HC 4.6.1, Nos.4-5.

⁶¹ BA, HC 4.6.12, No.141.

knowledge of modern commercial methods.⁶² Hence although Adot, Spalding & Co. had “no property outside of their business capital which is supposed not to be large”, they were much sought after, and had a very good credit rating both in Cuba and the United States, where they had “many good friends”.⁶³

These were the merchants through whom the transnational commercial networks reached into Cuba. It was common for partnerships to include one member living in the island, with the other in another country. Thus the dry goods business of Tennant & Clark was made up of Tennant in Havana and Clark in England;⁶⁴ and the Matanzas-based merchant Florentio Huertas teamed up with James Baring (British-born) in Wiesbaden (Germany).⁶⁵ Where they did not have a formal partner, they allied themselves closely with particular individuals, such as Henry Coit in the United States, who acted as an agent on behalf of many Cuban-based merchants and planters, in combination with the merchant bankers Moses Taylor of New York.⁶⁶

It was through these commercial networks that Cuba’s import and export trade was carried out. Merchant houses like Drake Brothers opened up trading routes that ranged as far afield as New York, Spain, Britain, Belgium, Trieste and St Petersburg.⁶⁷ They actively encouraged leading Cuban planters to consign their crops through such merchant bankers as Baring Brothers in London,⁶⁸ or Moses Taylor in New York. These merchant bankers would, in turn, help to ensure the penetration of Cuban products into more distant markets.⁶⁹

Technology and the Merchant Banks

By the end of the 1840s large amounts of capital were being invested by Cuban planters in machines, and this tended to increase through the century as more advances were made. By 1873, the British Consul at Havana was reporting:

The machinery and engines on the Cuban estates are generally of an expensive and superior character.... [I]mmense capital is invested solely in the ‘manufacture’; and sugar, far superior in quality to the ‘muscavado’ of Jamaica and Demerara, is made here on the estates themselves.... [E]verything has been done, at vast cost, to supersede or supplement manual labour.⁷⁰

Such outlays required finance, and since initially there were no banks operating directly in the island, and no system of government securities, planters, and the Cuban economy in general, quickly became highly dependent upon the foreign-led commercial networks, and in debt to foreign bankers.⁷¹ Although the Cuban financial system did gradually develop through the mid-nineteenth century, such that by 1857 there was one principal bank with deposit and

⁶² BA, HC 4.6.1, No.1.

⁶³ BA, HC 4.6.8 (Part 3), No.307.

⁶⁴ BNJM, Lobo 113/1.

⁶⁵ BA, HC 4.6.12.

⁶⁶ BNJM, Lobo 113.

⁶⁷ (Ely, 1961: 83-140)

⁶⁸ BA, HC 4.6.8 (Part 1), No.19.

⁶⁹ BA, HC 4.6.2 (Part 2), Nos.216-8.

⁷⁰ *Greenock Sugar Trade Review*, 2 April 1873.

⁷¹ Ely (2001 [1963]), p.300; Susan J. Fernández, *Encumbered Cuba: Capital Markets and Revolt, 1878-1895*, Gainesville, University Press of Florida, 2002.

discount facilities, empowered to issue bank notes, and several other banks in operation,⁷² these were themselves often underwritten by foreign bankers.⁷³

These foreign bankers were increasingly underpinning most of Cuba's commerce and economy, and the door was opened to them by the foreign merchant community. In 1832, George Knight proposed that Baring Brothers become his sleeping partners.⁷⁴ Though he was keen for them to leave him to manage his own affairs in the island, this enabled the merchant bankers to gain a foothold in Cuba, which would gradually turn into a stranglehold. When Knight ran into financial difficulties a few years later, he was forced into bankruptcy by Barings, who readily extended their credit facilities to Knight's successor,⁷⁵ drawing the latter deeper into debt through the granting of additional credits.⁷⁶

Such credits were soon also being made to Cuban planters. As Roland Ely notes:

Credit was the life blood of the island's system for the commercialization of sugar. Without improvements in production and without long-term loans, few planters would have been in a condition to feed and clothe their workers, buy agricultural implements and necessary machines, cultivate new land or satisfy their personal pleasures.⁷⁷

The same merchants who had initially been the channel bringing foreign investment into Cuba, came to act as the conduits through which control by the foreign bankers was applied. Mortgages became more and more common, "often in the form of loans secured against the earnings of future crops".⁷⁸ Economic crises, or simply a poor crop, would lead to defaults in payments, as a result of which ownership of Cuban plantations began to fall into the hands of foreign bankers. Two-thirds of Cuba's sugar industry had become mortgaged in this way by the 1860s, with some 95% of estates at least partially so.⁷⁹ Their policy was "that of a usurer," commented the Cuban planter Betancourt Cisneros, "who little by little provides means to a youthful fool until he places him on an unrepayable debt, and then proceeds to embargo his real estate".⁸⁰ Planters, particularly those of small to middle-sized estates, would thus lose their plantations, administration of which was turned over by the bank to merchant companies resident in Cuba.⁸¹ The banks were not content simply to sit back and receive whatever profits accrued. Baring Brothers regularly sent agents to Cuba to inspect their newly acquired property,⁸² and would continually pressure the merchants representing their interests to ensure "the most rigid economy" on the estates. This helped to push Cuban plantations towards lowering the quality of sugar produced.⁸³ All management decisions now had to be approved by the bank, as for example when the manager of the 'Arroyo' plantation requested an increase in his salary, the merchants who administered the estate on

⁷² BA, HC 4.6.8 (Part 2), No.185.

⁷³ BA, HC 4.6.8 (Part 3), No.333.

⁷⁴ BA, HC 4.6.2 (Part 1), No.26.

⁷⁵ BA, HC 4.6.2 (Part 2), No.213a.

⁷⁶ BA, HC 4.6.2 (Part 2), No.239.

⁷⁷ Ely (2001 [1963]), p.301.

⁷⁸ Louis A. Pérez Jr., *Winds of Change: Hurricanes and the Transformation of Nineteenth-Century Cuba*, Chapel Hill & London: University of North Carolina Press, 2001, p.96.

⁷⁹ Martínez-Fernández (1994), p.106, citing Moreno Fraginals.

⁸⁰ Cited by Martínez-Fernández (1994), p.128.

⁸¹ Guerra y Sánchez (1970 [1927]).

⁸² BA, HC 4.6.10, No.88.

⁸³ BA, HC 4.6.10, No.67.

behalf of Baring Brothers had to make representations to the bank in London for this to be approved.⁸⁴

It has been argued that by the mid-nineteenth century merchants in Cuba had displaced the old Creole landowning class “from the pinnacle of Cuban prosperity”.⁸⁵ However, even the foreign-born merchants who played such an important part in opening up Cuba to the wider commercial networks had themselves fallen under the control of the increasingly powerful foreign merchant bankers. As with the planters, they were dependent upon the success of the sugar harvest, and its trade, for their own survival.⁸⁶ Having started as innovators, they quickly took on the role of debt collectors. This ensured that not just Cuban trade, but increasingly land ownership and production fell under foreign control. This would come to be exacerbated after 1868, when the Cuban wars of independence led to a far greater weakening of the position of the Cuban landowners, and a far greater penetration of foreign capital and ownership.

Migrant Engineers and Frustrated Nationalism

With the foreign engineering workers playing such an important part in the technological development of Cuba’s sugar industry, it might be expected that their presence would have been seen to have a positive influence upon the island. However, so connected to the introduction of steam engines and other machinery were the increasing debts that were leading to the island falling inexorably into foreign hands, that the engineers themselves came to be seen as symbolising the new foreign economic domination that Cuba was beginning to become subjected to. Having begun as contributors to the process by which, through new globalising technologies, Cuba was gradually shaking off imperial Spanish control, the migrant engineers became representatives of the flip-side of this liberation through which new forms of imperial subjection were being imposed.

When large numbers of foreign engineering workers first began to arrive their presence was seen as beneficial. In 1838, Francisco Diago commented that it “suited all of them that there should be abundant engineering workers in the Island”;⁸⁷ and Francisco de Paula Serrano declared in 1839:

Small matter that they be foreigners who at present direct the machines; my principles are not founded on such absurd nationalism.⁸⁸

Such support was not simply because of their technological contributions, but also because, in a culture in which manual labour was looked down upon by many whites who felt that manual labour was racially demeaning, the migrant engineers helped to make it acceptable to get your hands dirty. They were also exceptionally well paid, and this more than anything demonstrated just how respectable this was as a career for a young white Cuban. It became a valued prize to secure an apprenticeship in a North American foundry. In the late 1850s, it cost between \$20 and \$30 a month for a Cuban to be placed with a North American

⁸⁴ BA, HC 4.6.10, No.16.

⁸⁵ Anton L. Allahar, ‘Slaves, Slave Merchants and Slave Owners in 19th Century Cuba’, *Caribbean Studies* 21:1-2 (1988), p.174.

⁸⁶ Ely (2001 1963).

⁸⁷ BNJM, Lobo 109/3.

⁸⁸ *Memorias de la Sociedad Económica*, Tomo IX, 1840, p.240.

engineering firm,⁸⁹ and hence those who sought advancement in this way had either to be from reasonably well-off families, or have a wealthy sponsor.

With so many foreign engineers working in the island, it would have been more logical if apprenticeships could be served directly with them, without any need to leave the country. However, there was considerable resistance amongst the foreigners to take such a responsibility seriously, despite official attempts to enforce it. The *Sociedad Económica* (which oversaw many of the economic and infrastructural improvements of the period) felt that foreigners opening workshops in Cuba should be obliged to take on local apprentices, to teach them their trade – and there was growing resentment that many of them declined so to do.⁹⁰ Engineering was a trade with a long tradition of craft-exclusiveness, access to which was often closely guarded. Juan Angel Echerri discovered this on being apprenticed to the machine workshop of the foreign engineers Keen and Lochkurd in Cienfuegos. He spent four years in the workshop, in which time his foreign masters paid little attention to his education in the trade, using him and others as little more than cheap labour. They finally refused to qualify him, because he “was a blockhead incapable of learning”, though it would seem that in fact they had simply not bothered to train him in the necessary skills.⁹¹

Such intransigence fed a growing opposition to their presence in Cuba, augmented by jealousy of the privileges extended to them, and paranoia of the possibly detrimental political and cultural role that they were thought to be playing. This contributed to the finger of suspicion being pointed at several foreign engineers in the 1840s, accused of complicity in revolutionary conspiracies and slave uprisings.⁹² In the 1850s, such was the atmosphere of paranoia that surrounded the migrant engineering workers that an official order was sent out by the island’s Governor to his officials in the provinces to keep a careful watch and account of all such foreign engineers, their absences and movements, with the clear implication that this groups should be especially suspected of subversive involvement.⁹³

Attempts were also made to establish specialist schools in the island to train indigenous engineering workers. By so doing it was hoped to end the skills shortage that had made the immigration necessary in the first place. The first suggestion for the establishment of such a school came in the late 1830s, not long after the immigration of foreign engineering workers had begun in earnest. It was an increasing concern for the authorities in Havana that, as more and more steam engines, mills and other high-tech equipment poured into the country’s plantations, the country was finding itself not only dependent upon foreign capital, but also upon the physical presence in the island of many foreign skilled workers. They were not so concerned about the carpenters, masons, or even boilermakers who arrived. From the start, they were disproportionately preoccupied about the foreign engineers. As Cubans travelled abroad to learn the necessary skills, and returned to the island, there were attempts locally to pass such knowledge on to their countrymen. In 1845, the following proposal to establish a school in Matanzas was advertised in the press:

The desire to have schools of mechanics, as applied to the steam engines of the sugar mills and railways, is about to be satisfied. A native of Matanzas, educated

⁸⁹ BNJM, Lobo 135/2.

⁹⁰ *Memorias de la Sociedad Económica*, 1843 (2), pp.7-9.

⁹¹ ANC, GSC, 1608/81938.

⁹² Jonathan Curry-Machado, ‘Catalysts in the Crucible: kidnapped Caribbeans, free black British subjects and migrant British machinists in the failed Cuban revolution of 1843’, in Nancy Naro (ed.), *Blacks and National Identity in 19th Century Latin America*, London: ILAS, 2003.

⁹³ ANC, GSC, 1285/50277.

abroad, where he has been a director of large establishments, and has constructed railroads, wishes to give to his homeland the precious gift of educating its sons and so free them from a foreign contribution.⁹⁴

The greatest efforts for establishing an engineering school were in Havana, where the need for such specialist training coincided with the drive by the *Sociedad Económica* to improve working class education in general. In 1845 they opened an *Escuela de Maquinaria* (School of Machinery).⁹⁵ Although they were only able to admit fifty students, due to the size of the building they were provided with, within a year they were boasting success, claiming that many landowners, for whom the students had worked during the year, were returning to contract them for the coming grinding season:

because they have not been able to avoid feeling heated by that holy patriotic fire that is always to be found in the breasts of the Spanish, when they so visibly perceive happy results.⁹⁶

Encouraging as this no doubt was for the patriotically minded, and important as it was as a first step in Cuba towards the development of industrial skills, the School made little real impression, at least in the short term, on the country's need for foreign workers. The latter were quite scathing of the efforts of the School:

One very grave [obstacle] has been that the opinion of the foreign engineers has constantly been opposed to [the School], and without knowing nor even visiting it, they have declared the impossibility that good operatives could be produced by an establishment that does not belong to them, and which is not in France or England but in Havana.⁹⁷

They may have had a point. Since the numbers graduating from the School were hardly a threat to the job prospects of the foreign engineers, given the ever-increasing demand for such workers and the general shortage of them, it is unlikely that such criticism was motivated by selfish reasons. It seems that the sponsors and organisers of the School underestimated the degree of training needed to be able to take personal charge of the equipment of a sugar mill, dealing with all eventualities. The foreign engineers generally began their education in the trade in early adolescence. Having served an apprenticeship lasting several years, they qualified to become journeymen. Their training did not stop there. If they aspired to become masters, they not only had to work their way up the workshop hierarchy, but also obtain specialist technical education. Even though many of them may have travelled to Cuba in the hope of short-circuiting the craft exclusiveness that may have prevented them from advancement in their home countries, the average age on arrival of the foreign engineers was 31 years old.⁹⁸ Supposing they had begun in the trade around the age of 14, they had thus already an average of 17 years experience before being employed in Cuba.

This was something that does not seem to have been fully appreciated. Many of the Cubans who studied in the School of Machinery, and their families, seem to have believed that "they could be, and that they are, complete engineers in a year".⁹⁹ Often driven by the prospect of the high earnings they dreamed of obtaining (and which they saw the foreigners

⁹⁴ *El Faro Industrial de la Habana*, 10 April 1845.

⁹⁵ *Memorias de la Sociedad Económica*, Tomo 36, 1848 (1), pp.31-4.

⁹⁶ *Memorias de la Sociedad Económica*, Tomo 33, 1846 (2), p.359.

⁹⁷ *Memorias de la Sociedad Económica*, Tomo 36, 1848 (1), pp.31-4.

⁹⁸ ANC, Miscelánea de Libros (ML), 11080, 11397 & 11910.

⁹⁹ *Memorias de la Sociedad Económica*, Tomo 36, 1848 (1), pp.31-4.

claiming), this failure to understand the slow, incremental path of formation needed not just by aspiring engineers, but by the country as a whole in its attempt to develop the skills needed by its economy, led to a high dropout rate from the School. Not surprisingly, this provoked considerable scepticism on the part of the foreign engineers. However, by seeking to protect the standards of their craft, which they saw being undercut by the School, while at the same time generally showing little interest in playing a positive role in the development of native engineers, they exacerbated the feelings of hostility shown towards them, and fuelled the impulse that led to the establishment of the School in the first place.

In 1851, coinciding with heightened official paranoia concerning the presence of so many foreign engineers in the country, the *Junta de Fomento* took control of the School, “so that it may succeed in the important and primordial objective of satisfying our local necessities without the help of foreign hands”.¹⁰⁰ For the Captain General and Governor of Cuba, José Gutiérrez de la Concha, this was more a patriotic undertaking than one of economic necessity. Whereas, in its original conception the school was intended to provide training for the brightest of the urban working class; priority was now to be given to “the orphans of military families and servants of the State, and particularly those who lost their lives and fortunes in the defence of Spain in our old American possessions.” They would form a bulwark against the foreign engineers “who, spread about our sugar mills and on the railroads, are a seed for propaganda in the ideas of secession, and who are internal enemies that it is essential that we free ourselves from”.¹⁰¹

The change was a disaster. The school moved away from the modest planting of seeds whose fruit the country would be able to gather at some point in the future, gradually improving the foundation of skills upon which the island’s economy could be developed. The new directors attempted to turn it into a “large industrial enterprise.” Rather than simply providing subsidised training for those who would go to work in the mills and railways, teaching them the theory that they would put into practice in their employment; expensive foreign machinery was purchased, and the students turned into apprentices, learning quite advanced applications of steam technology through construction. While the result was a workshop of which the State could be proud, this attempt to rival in Havana the great foundries of the United States, Britain and France was doomed to failure. The school had originally been started with the simple project of providing whatever training was necessary for native engineers to replace the foreigners. They now found themselves saddled with an institution which wished both to provide highly trained technicians, and produce its own machines at the same time: and to do so overnight, without the pre-existing industrial infrastructure and skills base that the industrial metropolises possessed.¹⁰²

Far from freeing Cuban planters and rail companies from the necessity of contracting foreign engineers, if anything the School accentuated the reliance on these outsiders. Although by the 1850s there was a small but growing number of suitably skilled natives, they were not sufficient to meet the increased demand for such workers as the use of steam engines and mills became not only generalised, but extended, with the sugar frontier pushing inexorably eastwards. The debacle of the school experiment was unlikely to inspire confidence amongst the majority of planters, who were driven more by economic than patriotic concerns, and were anyway more likely to be prejudiced in favour of employing ‘superior’ foreign technicians. Just as their foreign-built engines and mills held pride of place

¹⁰⁰ AHN, Ultramar/Cuba/Fomento, 30/2, No.32.

¹⁰¹ AHN, Estado, 8044/7.

¹⁰² *Memorias de la Sociedad Económica*, Tomo 46b (1855-9).

in their plantations, with their power shown off to visitors, so employing a foreign engineer was also not just a necessity, but something of a status symbol. They may have been able to pay a native engineer less for the same job, but most were happy to pay a premium to ensure foreign quality, leaving the Cuban engineering workers to find employment in the poorer plantations.

But the island's reliance on foreign engineers continued to rankle. In 1857, the *Compañía Española de Fundición y Mecánica* (Spanish Foundry and Machine Company) was formed. Its founder argued that:

The establishment of this Society is evidently useful and even necessary because in the material of Foundry and Mechanics we depend on foreigners imposing the law.¹⁰³

The following year, Manuel Hernández Aranda invented a sugar train that he advertised as being specifically 'Cuban'. His application for a patent and privilege for his invention reads more like a nationalist treatise, than a blueprint for a contribution to technology:

Our emerging agriculture demands a great help so as to remove it from that rachitic state in which it finds itself, and to elevate it to its peak, given that, without the necessity of begging from foreigners, there exists in our country extraordinary elements with which to achieve this.

Showing the same excess of patriotic optimism that had doomed the School of Machinery to ineffectuality, Hernández Aranda believed it possible for Cuba not only to be on the same level as the industrial countries, but even to rival and surpass them, and all that they would need was the desire to do so.¹⁰⁴

Conclusion

Hernández Aranda and his Cuban sugar train symbolise the shift that had occurred during the nineteenth century. The same spirit for advancement that the early promoters of new technology in Cuba had shown, and which had represented a break with the Spanish imperial past and self-confident hopes for a more independent future, was also demonstrated by Hernández Aranda, only this time as something of a forlorn hope against the by then irrepressible forces of technological advancement that were being led and controlled by foreign powers, exerting ever-increasing control over the Cuban economy and production. The introduction of steam engines, and related machinery, along with the skilled workers required to operate them, was not simply an example of this process, but was central to it, along with the commercial networks with which they were so associated.

Both the spread of steam technology in the nineteenth century, and international trade from a lot earlier, are examples of how globalising processes were well underway long before the coining of the term in the late twentieth century. This has long been recognised, as seen in Immanuel Wallerstein's concept of world systems in understanding the interconnected development of the planet's economy and society, as a necessity for tracing the history of the

¹⁰³ ANC, GSC, 1594/81606.

¹⁰⁴ ANC, RCJF, 207/9310.

emergence of the global capitalist system, presided over by European hegemonic powers.¹⁰⁵ Similarly, Eric Hobsbawm has shown how the interdependence of every part of this world system reveals how individual nations come to emerge not just as historically contingent, but within the constraints imposed by wider, transnational forces.¹⁰⁶ Although the machines that were increasingly revolutionising production worldwide were mainly built in the core industrialising countries, the technological developments themselves were the result of the interconnection between manufacturers and their clients, such as Cuba's sugar planters. The actors through which this was made possible were the skilled migrant workers who, like Charles Edmonstone, were using their presence in the field to stimulate further developments, so as to better meet the needs of local production. As David Jeremy has argued, migrant engineering workers were the "by far the most important vehicle of technology transfer":

[T]hey were able to interact with the technological system on the one hand, with the natural and cultural environment of the receptor society on the other hand, and so make the multitude of adjustments that were necessary in accommodating a new technological system to fresh, cross-cultural surroundings.¹⁰⁷

What this Cuban case shows is that the globalising tendencies that were in motion were not brought about by the imperial designs of powerful nations, intent upon extending their global influence. At the outset, the impulse came beneath the shadow of conflicting empires, inspired by the needs and aspirations of local actors, with the collaboration of migrant artisans and merchants who facilitated Cuba's entry into the transnational networks that were extending themselves globally during the nineteenth century. It is for this reason that I have characterised this as 'sub-imperial' globalisation.

However, as Cuba's history shows, for all that it may be necessary to look beyond the political boundaries imposed by empires – so as to see the much more complex social interactions that lay beneath – this is not to deny the dominating role played by imperialism. The sub-imperial globalising tendencies described here were instrumental in the weakening of the Spanish empire's hold over Cuba. Yet, with terrible ironic inevitability, out of the flames that consumed one empire, stepped the figure of empire reborn. The technological advances that so inspired the Cuban planters led them into new forms of subjugation, which would lead at the end of the nineteenth century to freedom from Spain being replaced by domination by the United States. Thus the compelling figure of Charles Edmonstone riding through all weathers to spread new machinery to Cuba's sugar plantations hides the story of how engineering advances, spreading independently of imperial projects, could at the same time be the cause both of the weakening of old imperialisms, and the emergence of new ones.

¹⁰⁵ Immanuel Wallerstein, *The Capitalist World Economy*, Cambridge: Cambridge University Press, 1979; and *The Modern World System*, 3 vols, New York & London: Academic Press, 1974-89. Also Terence K. Hopkins, & Immanuel Wallerstein, *World Systems Analysis, Theory and Methodology*, Beverley Hills & London: Sage, 1982.

¹⁰⁶ Eric Hobsbawm, *Nations and Nationalism since 1780: Programme, Myth, Reality*, Cambridge: Cambridge University Press, 1990.

¹⁰⁷ David J. Jeremy, *Artisans, Entrepreneurs and Machines*, Aldershot: Ashgate, 1998, p.19.

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