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Ecology, Epidemics and Empires: Environmental Change and the Geopolitics of Tropical America, 1600–1825

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SUMMARY

In the Atlantic American tropics, from Florida to Brazil, yellow fever attacked different populations differently. It killed outsiders more easily than locals, whites more easily than blacks, adults more easily than children. This meant that, after yellow fever was firmly ensconced via an ecological reconfiguration connected to sugar (c. 1640–90) it underpinned a military and political status quo, keeping Spanish America Spanish. After 1780, and particularly in the Haitian revolution, yellow fever undermined that status quo by assisting independence movements in the American tropics.

Lately serious scientists, serious journalists, and even serious historians have warned us that environmental change threatens world order. New and deadly infections from tropical Africa, biodiversity loss around the globe, uneven population growth, intercontinental migration and a host of other developments spell danger for unprepared people and institutions, and for peace and diplomacy.¹ This may be so, but even if so, it is not new. It sounds a lot like the 17th century in the American tropics.

When sugar came to tropical Atlantic America in a big way, starting in the 1640s, it began a new chapter in the story of ecological transformation of the Americas. Here I will argue that it created new environmental conditions extremely propitious for the propagation of yellow fever, and that in so doing, it created a new set of governing conditions for international relations in the American tropics. A lot of Latin America stayed Latin despite Anglo (and others') ambitions because of these new ecological and epidemiological conditions. A lot of tropical America acquired independence after the 1770s because of these conditions. Those little Amazons, the female mosquitos *Aedes aegypti*, vectors of yellow fever, underpinned the geopolitical order of the American tropics from 1660 to 1780. After 1780 they undermined it.

With decisive help from Eurasian and African diseases, Spain acquired an empire in the Americas in the sixteenth century. By 1600, the lowland tropical parts of that empire were backwaters, as great riches flowed from silver found in the Andes and highland Mexico. But to get the silver to Spain, it had to pass through the tropical lowlands and the Caribbean Sea. That fact, and the hope that great wealth might lie elsewhere in the American tropics, inspired England, France, Holland and lesser powers to contest these Spanish dominions. They acquired several Caribbean islands by 1655, usually via conquest and settlement involving, initially, only a few hundred people. This was the age of buccaneers. It ended when three things came to the Atlantic American tropics: sugar, slaves, and sieges.

Sugar first made an impact in the Americas in northeastern Brazil. When the Portuguese expelled the Dutch (who controlled much of Brazil 1630-54), the Dutch (and Luso-Brazilian Sepherdic Jews) brought sugar and the latest in sugar technology to the Caribbean, beginning in Barbados. A social revolution followed, as the plantation complex (Philip Curtin's phrase) spread throughout suitable lowland regions. This involved creating slave societies, which introduced politically unreliable majorities into many zones, changing the nature of war and politics. The comparative scarcity of whites and their fear of arming blacks led to a pattern of warfare by European expeditionary force. To protect their colonies, all European empires upgraded their fortifications. Spanish silver and everyone's sugar made it possible to afford this in the 17th century, and made many colonies and ports too valuable not to fortify. Spain in particular relied on masonry and local militias, rather than naval power, for imperial defence. Thus the Vauban revolution in fortification came to the Americas, and with it, the necessity of siege warfare.

Siege warfare in the Atlantic American tropics proceeded under conditions very different from those prevailing in Europe or the European outposts elsewhere around the world. A Vauban fortress in Europe was intended to be able to hold out for 6 weeks, by which time, the theory went, relief columns might arrive. In the far-flung Portuguese, Dutch, and British strongholds in the Indian Ocean, relief could never arrive in time, and besiegers often succeeded. Command of the sea made the difference, so the Portuguese prevailed over the Ottomans' ambitions, the Dutch prevailed over the Portuguese, and finally the British over the Dutch. But in the tropical Atlantic, siege warfare after 1655 favoured the defenders.

In 1655 the English took Spanish Jamaica. This involved a force of some 7,000 men, far more than any previous invasion in the Caribbean. The days of buccaneers were passing, and the era of expeditionary forces beginning. It took Cromwell's legions a day to take the main Spanish settlement, and a week to control the entire island. But after this conquest, very few successful invasions took place in tropical America, despite repeated war and upwards of 50 attempts.² The main reason for this lies in another consequence of the plantation complex: yellow fever.

Yellow fever³ is a viral infection probably native to tropical Africa. Its symptoms can be mild or serious, and in classic cases consist of fever, headache, jaundice, and internal haemorrhage. It is primarily a disease of tree-dwelling monkeys. In vulnerable human populations, case mortality may be as high as 85%. Young men are the most at risk. The virus kills men more readily than women, adults more readily than children. Children normally experience it only mildly, and their prospects for survival are excellent. In survivors it produces lifelong immunity (vaccination has been available since 1936). The virus has long been endemic in tropical African forests, and is now endemic in tropical American ones as well, circulating among monkeys and species of mosquito that are not much attracted to human blood. It becomes epidemic when it circulates among urban populations via the vector *A. aegypti*, which does find human blood appealing.

Yellow fever's distribution is determined by characteristics of the vector. The female *A. aegypti* is a domestic mosquito that lives close to humans and breeds in water containers, preferably clay-bottomed ones.⁴ It rarely travels more than 300 metres from its birthplace, except on ships (or aeroplanes). It needs temperatures above 10°C to survive, above 17°C to feed, and above 24°C to prosper. It also needs water every few days. Hence yellow fever is a disease of the humid tropics, although it used to make seasonal forays to temperate ports in summer months.

Epidemic yellow fever has other requirements. The virus must establish a cycle that allows indefinite transfer from mosquito to human host to mosquito. This requires a lot of mosquitoes. Without them, the virus will not move from person to person rapidly enough: people have the disease only 7 to 10 days, and their blood is infective for only 3 to 6 days. The cycle also needs a favourable ratio of nonimmune to immune people available for mosquitoes to bite. To perpetuate the cycle, an infected *A. aegypti* must behave a bit like Count Dracula: it must find virgin blood and find it fast. The mosquito only lives a few weeks. Immune people are virus-killers: the cycle of transmission is broken when mosquitoes inject the virus only into immunised bloodstreams. So a yellow fever epidemic requires suitable vectors in sufficient quantity and susceptible hosts in sufficient quantity and proportion. From the virus's point of view, its opportunities are sadly limited by the fragility of this cycle. Indeed, despite the warmth and rainfall, conditions in the Atlantic American tropics before 1640 left a lot to be desired: not enough clay-bottomed water vessels, not enough (if any) *A. aegypti*, not enough human bloodstreams, and among those bloodstreams, not enough who spent their childhoods in places where cold temperatures precluded exposure and therefore immunity to the virus.⁵

But after 1640 sugar and geopolitics set the table very nicely for the yellow fever virus. Sugar wrought an ecological revolution upon dozens of islands and numerous patches of adjacent continental lowlands. Soon armies of slaves hacked down and burned off millions of hectares of forest in order to plant cane. Their efforts led to multiple ecological changes.⁶ Soil erosion accelerated.

Wildlife vanished. As plantations replaced forest, conditions came to favour the vector of yellow fever. Fewer birds meant fewer predators for all mosquitoes. But more important for mosquito population dynamics are breeding conditions. Plantations made excellent *A. aegypti* incubators.⁷

Sugar production in the 17th and 18th century involved initial refining on the spot. Part of the process required putting partially crystallised sugar in clay pots for a few months to let the molasses drain out. A small plantation needed hundreds of clay pots. A big one used tens of thousands of them. They were empty except for 3 or 4 months after the harvest. Presumably they often broke, as they were of clay and roughly handled by people who had no interest in their preservation. Clay pots and fragments of clay pots caught the rain and made ideal homesteads for *A. aegypti*.⁸ Eventually many ports (and forts) were ringed by plantations producing tons of sugar and clouds of *A. aegypti*. The mosquito – an African by origin – may have successfully colonised the Atlantic American tropics before 1640, but in any case after 1640 appropriate breeding grounds were far easier to find.

So was good food. *A. aegypti* prospered after 1640 because human blood got easier and easier to find. Sugar meant slaves, and population growth. Caribbean population had crashed after 1492, and by 1640 was perhaps 200,000. By 1800 it was over 2 million. Beyond blood, *A. aegypti* can also eat sucrose. It likes sweet fluids, the sweeter the better. It can live off honey or sugar indefinitely, although that diet is insufficient to sustain ovulation. So while individual mosquitoes can live off sugar alone, *A. aegypti* populations require blood as well. After 1640 there was more and more sugar, more and more human blood, and more and more clay-bottomed water vessels in the Atlantic American tropics. For that matter, there were more and more slave ships arriving from West Africa, bringing as stowaways more mosquitoes. Things were looking up for *A. aegypti*.

For the yellow fever virus too, with one catch that geopolitics soon addressed. More mosquitoes, more human bloodstreams, and more ships from Africa favoured the establishment of the yellow fever virus in the neotropics. Indeed, the first clear epidemic of yellow fever in the Americas came in 1647, striking Barbados – the main sugar island – first, and over the ensuing months and years, Guadeloupe, St. Kitts, Cuba, the Yucatan, and the east coasts of Central America generally. It killed perhaps 20-30% of local populations. But after this outbreak, yellow fever disappeared for almost 40 years.⁹ Presumably, it worked its way through the susceptible hosts, leaving behind a high proportion of immunes. It could not flourish again without a sufficient proportion of nonimmunes. This, for the yellow fever virus, was problematic.

The virus' problem was compounded by the resistance of West Africans. Yellow fever confers immunity upon all survivors. Almost all slaves arriving in the Caribbean from Africa had grown up in endemic yellow fever zones, and hence were virus killers. Beyond that, West Africans and people of West African descent almost certainly carry an inherited partial immunity to yellow

fever whether or not they carry conferred immunity.¹⁰ So while the population growth of the sugar zones helped the mosquitoes, it did not much help the virus because so many of the people bitten by mosquitoes were West Africans or of West African descent. What the virus needed was an influx of inexperienced immune systems. This is what expeditionary warfare provided.

Participants and observers in the interimperial wars of 17th and 18th centuries regarded yellow fever epidemics as acts of God. Modern military historians tend to see them as random events. But differential immunity made yellow fever partisan. It went easy on entire populations that included numerous individuals with either conferred or inherited immunity. In this way a large contingent of Africans or, somewhat less effectively, of American-born whites, could serve as a shield for individuals highly vulnerable themselves to yellow fever, by interrupting the transmission cycle ('herd immunity' to epidemiologists). Yellow fever strongly favoured local populations over invaders, strongly favoured populations with blacks as opposed to those without them, and even favoured populations with children and women as opposed to those composed exclusively of adult men. Yellow fever was most dangerous to unadulterated populations of young adult European men: its speciality was mass production of dead white males.¹¹

After the one-week conquest of Jamaica in May of 1655, the English troops fell victim to disease. By November, 47% were dead, and half the remainder were ill.¹² Henceforth British garrisons in Jamaica died off at a rate of about 20% annually, almost entirely from diseases (malaria and others as well as yellow fever). But in 1655 they conquered the island before it conquered them. After 1655, the reverse was the rule.

Beginning in the 1680s, in the context of the struggles between England and Louis XIV's France, expeditions to the West Indies became frequent. Before 1713, Spain was often on the British side, but after the accession of a Bourbon king, Spain allied with France against Britain. Most West Indies expeditions were British, but some were French especially before Louis XIV scaled back his navy in the 1690s. Almost all were failures. After the successes, victors usually evacuated quickly, suffering from epidemics, and at the next peace treaty conquered ports were restored to their previous masters.

In 1689 an English expedition against Guadeloupe failed, losing half its men to diseases. In 1692, Commodore Wren's force lost more than half its number to yellow fever. In 1693, another expedition lost 50% of its soldiers and sailors in failing to take Martinique. In 1695 a combined English and Spanish force lost 61% of the soldiers it disembarked in a doomed effort to dislodge the French from settlements that would at the next peace treaty (Ryswick 1697) be recognised as St. Domingue. In 1697 a French expedition under Baron de Pointis failed to take Cartagena from Spain, losing 24% of its men to disease.¹³ Thus ended the inglorious history of expeditionary warfare in the American tropics during the War of the League Augsburg (1689-97).

The War of the Spanish Succession (1701-13) was a Spanish success in the American tropics. France and Britain mounted 19 cruises or expeditions; serious disease mortality hampered or destroyed at least 14 of them, possibly as many as 18. Of only one is there clear evidence that fewer than 10% of the troops died from disease. The War of Jenkins' Ear and the War of the Austrian Succession (together 1739-48) presented much the same picture. In a famous expedition in 1739-42 Admiral Edward Vernon took Portobelo and Chagres, ill-defended ports each of which surrendered within two days of sighting Vernon's fleet. He arrived in November, well before the rains, and he had the largest force ever seen in these seas (nearly 25,000 counting sailors and soldiers). In April 1741 he tried to take Cartagena but lost 41% of all men under his command, 70% of all disembarked soldiers, and 77% of those hailing from Britain (3,600 colonial troops fared slightly better). About 650 died in combat. Fleeing Cartagena, Vernon attempted to take Santiago de Cuba as a consolation prize, and lost 50% of his remaining troops to yellow fever. In all Vernon lost about three-quarters of the men under his command in 1740-42; fewer than 1,000 of these died in combat.¹⁴

The Seven Years' War, the War of the American Revolution, and the Napoleonic Wars included numerous further episodes along these lines. I will mention only two, one for its anecdotal quality and the other because it is an important exception to the grisly rule. The anecdote comes from a British expedition against what is now Nicaragua in 1780. Fevers killed 77% of its men and forced the abandonment of an initially successful campaign. One of the survivors was 21-year old Horatio Nelson, hero of Trafalgar: among his other strengths, it seems, was his immune system, equal to simultaneous malaria and dysentery. The exception came in 1762, when Admiral George Pocock and 14,000 men besieged Havana. In 9 weeks they were masters of the city. The Spanish governor, Juan de Prado, surrendered just as yellow fever took hold among the besiegers.¹⁵ Shortly after the conquest, Pocock had lost 41% of his men, mainly to yellow fever (only 7-8% died in combat or of other causes), and another 37% were ill. Only 21% were fit to bear arms. Samuel Johnson wrote: 'May my country be never cursed with such another conquest!'¹⁶ Yellow fever worked its destruction here too: but not in time to save Havana (of course the British gave it back at the Peace of Paris in 1763).

The power of yellow fever was such that defenders, if comprised of local troops with hardened immune systems, generally had only to hold out for 3-6 weeks to be assured of victory. Their chances improved if the siege took place during the rainier parts of the year (May-November in the Caribbean) when mosquito strength peaked. Expeditionary fleets tried their best to avoid the hurricane season (July-October) in the American tropics. Strategists in Europe well knew (at least from the 1690s) that prospects for success receded if one failed to get the troops to the scene between December and May. But organising and victualling a force according to schedule was no easy business in an age of

private contracting and uncertain stocks of food and ships. Finding men willing to take the king's shilling proved especially challenging if prospective recruits thought their destination might be the Caribbean. Hence many expeditions arrived later than planned, and suffered the consequences. At any time of year, one had to be quick. As Admiral Charles Knowles wrote, 'Whatever is to be effected in the West Indies must be done as expeditiously as possible, or the climate soon wages a more destructive War, than the Enemy'.¹⁷ Amphibious expeditions and siege warfare worked in the Indian Ocean, where there was malaria but no yellow fever. In the Caribbean, with rare exception, it did not work.

The geopolitical significance of yellow fever changed toward the end of the 18th century. The restiveness of slave populations acquired more political forms and more often led to organised violence. An illustrative example of this came in Surinam in the 1770s. There Dutch planters had lived sumptuously amid a slave majority, but by 1772 maroon communities had grown powerful enough to threaten plantation society. The Dutch government sent 1,600 men in two contingents to do battle with the maroons. They succeeded in driving the maroons deeper into the forests and away from the plantations, but only about 200 soldiers lived to return to Europe.¹⁸ A Scot who served with the Dutch in Surinam observed that by the end 'not 20 were to be found in perfect health...' He also detected the impact of differential disease immunity, noting that: 'amongst the Officers and Private men who had *formerly* been in the West Indies, none died at all, while amongst the whole number of near 1200 together I Can Recollect one Single marine who Escaped from Sickness...'¹⁹ Once people of West African descent began to make war on their own behalf in the American tropics, their relative immunity to yellow fever (and to *falciparum* malaria), if shrewdly exploited, magnified their power. That power soon shook the foundation of imperial order in the American tropics.

The maroons of Surinam lived to fight another day but did not their independence. In Haiti, both the scale and the agenda were larger. There ex-slaves engineered a revolution which the British attempted to undo. In 1794 redcoats occupied the major ports. They found themselves, together with Spanish troops, at war with Toussaint L'Ouverture and his Haitian army. In the course of their stay, British forces lost about 50,000 men, the majority from yellow fever. Britain lost about 65-70,000 in all West Indian campaigns, 1793-96.²⁰ After the British gave up, the French tried to reclaim Haiti. In 1802 Napoleon sent his brother-in-law to subdue Toussaint. Over the next 11 months, 40,000 Frenchmen died in Haiti, and almost none of the original expedition of 25,000 returned. Toussaint was no fool: he knew that if he did not give battle yellow fever would destroy the French, as it had done the British. His lieutenant and successor, Jean-Jacques Dessalines, knew it too: he told his followers to take courage, that 'The French will not be able to remain long in San Domingo. They will do well at first, but soon they will fall ill and die like flies'.²¹ And this is

exactly what happened. Toussaint and Dessalines would have been poor commanders indeed not to shape their strategy to exploit the overwhelming power of their insect and viral allies. France finally recognised Haitian independence in 1825.

The vulnerability of expeditionary forces to tropical infections also helped create the United States. Britain fought the American Revolutionary War (1776-82) with an expeditionary force that the rebels could not match. They did not have to. Here malaria, rather than yellow fever, took sides. The installation of an irrigated rice economy, based on West African techniques, in the Carolina coastlands in the eighteenth century helped improve conditions for malarial mosquitoes. Malaria (and yellow fever) became common scourges in the hot and wet months of July through September. In 1780 British forces occupied the port cities of the Carolinas, hoping to ignite the spirit of Loyalists against the Revolution. They prudently campaigned in the spring, aware of the enhanced disease toll of the hotter months, taking Savannah and Charleston by April. They found the summer lethal. In 1781 Lord Edward Cornwallis moved most of his army away from its supply lines, to 'the upper parts of the Country, where alone I can hope to preserve the troops from the fatal sickness, which so nearly ruined the Army last autumn'.²² Fear of fevers sent Cornwallis into the Carolina Piedmont, where his troops lost more battles than they won, and put him on the road to Yorktown, where in late 1781 he surrendered, effectively ending the war. Patriot troops, although affected by disease in the Carolina campaigns, enjoyed relatively stronger immunities, especially those who had grown up in the southern colonies.²³ Armies did not have to contain large numbers of blacks to exploit differential disease immunity (although it helped); they did not have to understand what they were exploiting (although that helped too); they did not have to have yellow fever on their side. White armies with seasoned immune systems could profit in the same way, if less reliably and less thoroughly.

A grass from New Guinea (sugarcane), a mosquito and a virus from Africa, after the mid-17th century wrought an ecological transformation that stabilised the geopolitics of the Caribbean basin. They kept the Spanish Empire intact after 1655, and prevented first France and then Britain from acquiring a choke hold on Spanish silver and a near monopoly position on American sugar. Either one might have made Louis XIV more successful in his bid for European hegemony, or Georgian Britain still more successful in its subsequent expansion. After the 1770s, differential disease immunity assisted insurgent populations of the American tropics (and sub-tropics) as they sought to end European empires in the New World. In the environmental and epidemiological changes these empires wrought they sowed the (slow-germinating) seeds of their own destruction. A century later, after 1898, a new empire arose in the Caribbean, made possible (or at least inexpensive) by further environmental and epidemiological change: the mosquito control and yellow fever prevention undertaken by the US Army.

NOTES

¹ Paul Kennedy, *Preparing for the 21st Century* (New York, Vintage Books, 1993); Robert Kaplan, 'The Coming Anarchy', *Atlantic Monthly* (February 1994), 44-76; Mark Lytle, 'An Environmental Approach to American Diplomatic History', *Diplomatic History* 20 (1996), 279-300. For an example of worried scientists, Paul Ehrlich, Anne Ehrlich and Gretchen Daily, *The Stork and the Plow* (New York, Putnam's, 1995).

² Military details are covered in the greatest detail by Christian Buchet, *La lutte pour l'espace caraïbe et la façade atlantique del'Amérique centrale et sud* (Paris, Librairie de l'Inde, 1991), 2 vols; and in Juan Zapatero, *La guerra del Caribe* (San Juan, Instituto de Cultura Puertorriqueña, 1964).

³ See George K. Strode (ed.), *Yellow Fever*, (New York, McGraw-Hill 1951); Donald Cooper and Kenneth Kiple, 'Yellow Fever', in Kiple (ed.), *The Cambridge World History of Human Disease* (New York, Cambridge University Press, 1993), 1100-1107.

⁴ This crucial detail comes from A. Ramenofsky, 'Diseases of the Americas, 1492-1700', in Kiple (ed.), *The Cambridge World History of Human Disease* (New York, Cambridge University Press, 1993), 325.

⁵ Had yellow fever established itself in Brazil prior to 1630, it is unlikely that the Dutch conquest of half of the captaincies of Brazil could have taken place, because the Dutch West India Company sent thousands of non-immunes to the port cities of Brazil.

⁶ David Watts, *The West Indies: Patterns of Development, Culture and Environmental Change since 1492* (Cambridge, Cambridge University Press, 1987), 219-23, 399-405, 434-443.

⁷ It is likely that the deforestation and soil erosion associated with sugar increased the amount of swampland too, which would have improved conditions for the anopheles mosquito, the vector of malaria.

⁸ James Goodyear, 'The Sugar Connection: A New Perspective on the History of Yellow Fever', *Bulletin of the History of Medicine* 52(1978), 5-21.

⁹ Historical diagnoses are difficult. It is possible that yellow fever outbreaks occurred in San Juan (Puerto Rico) in 1598 and in Brazil in 1623. See K. Kiple, 'Disease Ecologies of the Caribbean', in Kiple (ed.), *Cambridge World History of Human Disease*, p. 499. Francisco Guerra, 'The European-American Exchange', *History and Philosophy of the Life Sciences*, 15 (1993), 313-27, asserts yellow fever struck Yucatan in 1523 and Guadeloupe in 1635 and again in 1640.

¹⁰ Medical science has not detected any mechanism for this, as it has for inherited immunity to falciparum malaria. But the circumstantial evidence, in the form of differential morbidity and mortality among blacks and others in yellow fever epidemics is overwhelming. K. Kiple, *The Caribbean Slave: A Biological History* (NY, Cambridge University Press, 1985), 163.

¹¹ To be more exact, the most vulnerable were populations of young adult males who had grown up, and whose ancestors for millennia had grown up, outside of yellow fever zones and possible dengue fever zones. There is some evidence that southern Chinese, who have no experience of yellow fever, but have survived dengue fever, are more resistant to yellow fever.

¹² Buchet, *La lutte pour l'espace caraïbe*, II, 1129.

¹³ These figures are for deaths. Far more men fell ill and were useless as soldiers or sailors. The data come from Buchet, *La lutte pour l'espace caraïbe*, II, 730, 783-4.

¹⁴ Richard Harding, *Amphibious Warfare in the Eighteenth Century: The British Expedition to the West Indies, 1740-1742* (London, Royal Historical Society, Studies in History

No. 61), 3-4. Buchet, *La lutte pour l'espace caraïbe*, I: 515-26. Julián de Zulueta, 'Health and Military Factors in Vernon's Failure at Cartagena', *Mariner's Mirror* 78 (1992), 127-41, takes the view that yellow fever did not decide the battle, which was won by Spanish tenacity and lost by British blundering. He argues that yellow fever became truly serious among British troops only after they had failed in an attempt to take one of Cartagena's forts by storm. True enough, but they attempted it rashly, without proper preparation, because of Vernon's dread of the building epidemic. The mortality among the colonials continued after Cartagena. In Alan Galloway (ed.), *Colonial Wars of North America 1512-1763, An Encyclopedia* (New York, Garland 1996), 105, it says less than 10% of the colonials returned home. Among the survivors under Vernon's command was a Virginian named Lawrence Washington, whose plantation – Mt. Vernon – he named for his Admiral before he passed it on to his half-brother George.

¹⁵ Forty-four letters from de Prado are in Seville's *Archivo General de Indias*, Sección Ultramar, legajo 169. His siege diary appears in Jacobo de la Pezuela (ed.), *Diccionario geográfico, estadístico, histórico de la Isla de Cuba* (Madrid, Mellado, 1863) Vol. 3, 27-51.

¹⁶ S. Johnson, 'Thoughts on the Late Transactions Respecting Falkland's Islands', in his *Political Writings*, ed. Donald Greene (New Haven, Yale University Press, 1977), vol 10., p. 374.

¹⁷ British Library, Additional Mss. 23,678, fol. 17 (1747).

¹⁸ Figures vary. These come from Richard Price and Sally Price, 'Introduction', to John Gabriel Stedman, *Narrative of a Five Years Expedition against the Revolted Negroes of Surinam* (Baltimore, Johns Hopkins University Press, 1988), xxvi and lxxxvi. Stedman himself (p. 607) thought that only a hundred of 1,200 survived. The Dutch forces numbered closer to 1,650 than 1,200. Wim Hoogbergen, *The Boni Maroon Wars in Suriname* (Leiden, E.J. Brill, 1990), 104.

¹⁹ Steadman, *Narrative of A Five Years Expedition*, 607.

²⁰ These figures are from Christopher Duffy, *Soldiers, Sugar, and Seapower: The British Expeditions to the West Indies and the War Against Revolutionary France* (Oxford, Oxford University Press, 1987), 334. Duffy notes that battle deaths were trivial compared to disease deaths, and that yellow fever was the greatest killer of all.

²¹ Quoted in C.L.R. James, *The Black Jacobins* (New York, Vintage Books, 1989), 314. See p. 299 for Toussaint's statement: 'the rainy season will rid of us of our foes'. Denis Laurent-Ropa, *Haiti: Une colonie française, 1625-1802* (Paris, L'Harmattan, 1993), 323 gives 54,000 as the total number of French troops lost in Haiti, with 8,000 survivors. A contingent of Swiss mercenaries some 800 strong lost all but 11 men; Swiss mercenaries never consented to go overseas again. Danielle Anex-Cabanis, 'Mort et morbidité aux Antilles lors de l'expédition de Saint-Domingue: Notes à propos des mercenaires suisses', In *Mourir pour les Antilles* ed. Michel L. Martin and Alain Yacou (Paris, Editions Caribéennes, 1991), 187.

²² Cornwallis to Clinton, 10 April 1781, Clinton Papers, Clements Library, University of Michigan.

²³ Sylvia R. Frey, *The British Soldier in America: A Social History of Military Life in the Revolutionary Period* (Austin, University of Texas Press, 1981), 38-43. Interestingly, although yellow fever haunted the Carolina lowlands before 1763, and after 1793, it apparently spared the American colonies for the three decades in between. John Duffy, *Epidemics in Colonial America* (Baton Rouge, Louisiana State University Press, 1953), 162.