

## The butterfly effect in action; or the tale of the volcano and the mosquito. *The Peter J. Parish Memorial Lecture 2025*

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*Foreword: I am delighted to give the Peter Parish Lecture this year. Peter was one of the examiners of my PhD in Cambridge back in 1996, and, of course, I knew him as a member of BrANCH. Peter was a fair but exacting examiner – pointing out areas of my thesis where I perhaps let my enthusiasm get the better of me, and his critique of it undoubtedly turned it into a better book when it was finally published a few years later. Over the years, I knew him, I appreciated his advice and support and I am sure he'd be touched at having a keynote lecture named in his honor by an organization that was close to his heart.*

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At the end of 1820, the citizens of Savannah, Georgia, might justifiably have looked back on the departing year as what Queen Elizabeth II once memorably described, their own “annus horribilis.” In January, a fire had devastated the city’s central business district, causing damage estimated at up to ten million dollars.<sup>1</sup> Then, in the late summer, the city had endured the worst yellow fever epidemic in its history, and, just to prove the old adage that troubles always come in threes, in October, while the epidemic still raged, an Atlantic hurricane had rolled by just offshore, destroying yet more of the city and its environs.

It is perfectly possible to write the history of Savannah in 1820 as microhistory, exploring the tiny details of how the residents coped with these disasters, and demonstrating how decisions made on the ground affected events. But as this is the Peter Parish Memorial Lecture, and Peter was one of my PhD examiners back in 1996, I want to take on board some advice he gave me many years ago, to look up from the micro- and embrace a broader perspective. In fact, I want to go as broad as possible and explore the ordeal of Savannah in 1820 through a global lens. While I hope that we have moved away from viewing American history as existing in its own unique bubble, the whole idea of Atlantic history, after all, is no longer new, we sometimes do not raise our eyes to scan horizons even further afield. So, I am going to start this tale with a volcano more than ten thousand miles away from Savannah.

On 5 April 1815, Mount Tambora in the Dutch East Indies began five days of spectacular eruptions. The largest explosions in recorded history were heard more than 2000 miles

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away and reduced the height of the mountain by 5000 ft. For context, Tambora was about ten times as explosive and twice as deadly as the eruption of Krakatoa in 1883 (about 900 miles west of Tambora). The immediate impact of Tambora was local, with pyroclastic flows, ashfall, and tsunamis killing many thousands in the immediate vicinity. A visitor to the region shortly after the eruptions found “villages almost entirely deserted,” while the “extreme misery” of the survivors was “shocking to behold.”<sup>2</sup> But the long-term effect was perhaps even greater. Tambora lowered global temperatures by about half a degree centigrade, which was already a historically cool decade, and was the major reason why 1816 came to be known as “the year without summer” in both Europe and North America. In England, July 1816 still holds the record as the coldest July ever recorded in a temperature series that dates back to 1659.<sup>3</sup> It was not just cold, it was also much wetter in Britain than usual, with one farmer near Sheringham recording “incessant rains” all summer.<sup>4</sup> To make matters worse, the summer of 1817 was little better with heavy rain in August and September. Late frosts, a lack of sun and extremes of rainfall stunted or destroyed crops and inevitably exerted pressure on food resources. One poor harvest was manageable, but two together were a disaster. The price of grain in Europe doubled between 1815 and 1817, and it is little surprise, therefore, that there was a notable and consequent rise in poverty and destitution across much of the continent.<sup>5</sup>

A few short months after the Tambora eruption, on 18 June 1815, Wellington and Blücher defeated Napoleon in Belgium at the Battle of Waterloo. The victory accelerated Britain’s military de-mobilization program (which had begun, a little prematurely as it turned out, the year before when Napoleon was exiled to Elba) as the state sought to slash the size of the British army from its wartime peak of c.650,000 men.<sup>6</sup> Over 300,000 men were discharged from the army in 1816 and 1817 to compete for whatever jobs might be available, all while receiving pensions that amounted collectively to about £5 m a year, funded by adding to an already historically high tax burden.<sup>7</sup> During the war, the army had grown rapidly, disproportionately relying on men from the Celtic fringe of the British Isles, as well as from Europe. More than 150,000 Irishmen served in the British Army during the Napoleonic Wars.<sup>8</sup> Once the army began a program of reductions, the principle of last in – first out came into operation with the newest regiments being much more likely to be de-mobbed, while the oldest (and most prestigious) regiments, such as the cavalry and the life-guards, were retained. In the years after 1815, ten foot regiments were disbanded entirely, and most others were reduced in size. As a result, many thousands of former soldiers returned home, and more returned to Ireland than anywhere else in the British Isles.<sup>9</sup>

Ireland, therefore, faced an influx of returning soldiers, all of whom were now looking for work, at a time when the “year without a summer” placed new and additional strains on the ability of the land to sustain life. Ireland is well-known as a moist country – it is called the Emerald Isle for a reason – but in 1816, the rain was “unprecedented,” with more than four times the rainfall of the previous year in some places.<sup>10</sup> The waterlogged ground meant that peat, widely used in Ireland to heat homes and cook with, would not dry sufficiently to burn. It was also much colder than usual, and the farmers were still trying to bring in the harvest in late October. Unsurprisingly, the wheat and potato harvests largely failed, leading to widespread hunger.<sup>11</sup> It became, as one historian describes it, Europe’s “last great subsistence crisis” where even middle-income households

struggled.<sup>12</sup> Hard on the heels of famine was disease. One Belfast physician thought the cause of an outbreak of typhus in 1818 “to have been the great and universal distress occasioned among the poorer classes, by the scarcity which followed the bad harvest of 1816.”<sup>13</sup> Lack of food made people vulnerable to illness, he correctly surmised, while itinerancy caused by people looking for food and work simply helped infections to spread.

Why does all this matter for our study of Savannah in 1820? Well, these two things, a lack of food, largely caused by the volcano’s effect on the atmosphere, and a lack of good employment caused by an oversupply of labor following the end of the Napoleonic war, combined to recreate two classic migratory push factors. Just as it had been doing for two centuries already, North America beckoned as an alternative. There was a significant shift in Irish migration in the five years after the end of the Napoleonic Wars. Migration to America had always been strongest from Ulster and ran at the rate of a few thousand people per year, when not disrupted by minor hiccoughs like the War of 1812. But 1818 marked something of a sea change when the numbers emigrating from Ireland more than doubled, to c.20,000, and departures from southern Irish ports, such as Dublin, Limerick and Waterford began to rise rapidly.<sup>14</sup> Destinations across the Atlantic were also changing. Between 1815 and 1819, New York saw more arrivals from Ireland than any other port, but arrivals peaked in 1816 and declined rapidly thereafter as the British government incentivized trade and migration to Canada. By 1819, three times as many ships from Ireland landed in New Brunswick as in New York.<sup>15</sup> Not that they all stayed in Canada, of course. St Andrew’s in New Brunswick is on the US border, and it was comparatively easy to head south once across the Atlantic. Overall, about 85% of ships carrying migrants from Ireland to North America landed north of Philadelphia, but we should not ignore the fact that about 15% headed directly from Ireland to southern US ports, including 20 vessels to Charleston in 1819 alone.

What did these Irish immigrants find once they stepped ashore? As we might expect, despite the presence of Hibernian and Irish Friendly Societies in most ports to help immigrants with housing and job seeking, life for many new arrivals was tough. Jobs were not that plentiful, and the winters were brutal. As one contemporary put it “The first enterprises of these unfortunate Foreigners, were made at the North; but finding that the rewards for labor were small and that the inducements presented in the Southern cities were stronger, they launched a second time on the sea of adventure, and came in crowds to the southern ports.”<sup>16</sup> Another believed that “labouring foreigners, and especially Irish” people had been diverted South by “commercial embarrassments” in the North, which is probably a reference to the over-extension of the Second Bank of the United States that culminated in the Panic of 1819.<sup>17</sup>

Unstated, but almost certainly an additional factor in the minds of some recently arrived Irishmen, was that the impact of Tambora had been felt in the United States as much as in Ireland. In Virginia, the *Richmond Enquirer* was reporting on “extraordinary” frost as late as June 1816, while in New England frost continued through the so-called summer.<sup>18</sup> Harvests were weak, or failed entirely, raising the prices of essential foodstuffs, and while conditions in the US were probably not quite as bad as in Ireland we should not be surprised that at least some newly arrived migrants in New Brunswick, New England, or New York immediately headed for warmer climes that had not been affected so badly by the year without a summer. In southern towns and cities, the new arrivals looked for work, either as skilled artisans or as unskilled laborers. In the winter of 1818, Savannah residents

claimed they saw white men, for the first time, working as draymen and porters in occupations that had previously been the preserve of the enslaved.<sup>19</sup> This claim is easily disproved by the city records that document white men working in a variety of manual trades before this date, including some as general laborers, but the general point holds true in that the number of white men employed as common laborers rose rapidly from around 1818. Savannah's city death registers also prove that these men were mainly Irish. Between 1803 and 1815, the Irish-born accounted for under 3% of deaths in the city, but between the start of 1816 and the end of 1819, they accounted for 12% of the deaths. This Irish population was heavily skewed in terms of gender, with Irish-born men outnumbering women by a ratio of 9:1 in the city's death records. While the men did a variety of manual trades, we know almost nothing about what these women did. One was described as a shopkeeper, another as a seamstress, but the majority were either listed as a "wife of" or "widow of," or the occupation box was just left blank.<sup>20</sup>

So far, the impact of both Tumbora and the migration of Irish people into the United States on the city of Savannah itself had been fairly limited. The late frosts and poor weather of 1816 seen in New England and the mid-Atlantic coast did not really reach as far as Savannah, and while there had been some immigration of Irish people into Savannah, it was comparatively limited, probably no more than a hundred people. All that was to change in the early months of 1820. In the early hours of Tuesday, January 11th, a fire broke out in the Baptist Square. Fanned by a strong north-westerly breeze, the fire swiftly consumed nearly 400 buildings, including the Exchange, the Custom House, and the Public Market, before being brought under control. One resident lamented that "not a barber's, or apothecary's shop, a hardware, dry good, stationary, crockery or clothing store [is] left." The editor of the Savannah Republican estimated the loss at over \$10 m.<sup>21</sup>

Within days, the task of rebuilding the commercial heart of the city began. Some property was insured, but other people were forced to sell their lots to speculators who no doubt picked up a bargain. Given the scale of the task, it was immediately obvious that the local labor force would struggle to meet demand, within days newspapers in Philadelphia and New York were re-printing notices from Savannah that "carpenters and bricklayers will get 2 ½ dollars per day until July."<sup>22</sup> This compares to about \$1.50 per day that the same workers were getting in New York.<sup>23</sup> The pay was evidently enough to attract a significant new flow of workers from the large northern cities to Savannah. By March, one resident delighted in the fact that he had "never seen such evidence of industry before" in the city. But not everyone benefited from such an overabundance of labor. Some newly arrived workers sent warnings back to their friends in New York about the "disagreeable situation so many of my fellow mechanics are placed in here, not having met with that employment they calculated on." As a result, this man warned, "there are hundreds here out of employ and in very distressing circumstances," and men back home should be discouraged from traveling to Savannah under "erroneous impressions."<sup>24</sup>

As spring turned into summer, the situation of these "unfortunate foreigners," who had come to Savannah looking for highly paid, skilled work, became truly desperate. They clearly lacked the funds to return to the North, and many were "without money, and without conveniences – destitute of proper clothing, food, or bedding – gathering in throngs of 15 or 20, in narrow wooden buildings" on the eastern edge of the city.<sup>25</sup>

Such living conditions would already have made these people vulnerable to disease, especially if malnourished, but nothing could have prepared them for the onslaught that was about to hit.

Around the end of April, an *Aedes aegypti* mosquito hatched out of an egg. Let us call her Molly. Molly had overwintered in a pool of stagnant water just to the east of the city, where the rice fields and marshes met the bluff on which Savannah sits over the river. The unusually warm and wet weather in the spring of 1820 encouraged Molly and her brothers and sisters to multiply rapidly. In early May, Molly fed on 9-year-old Peter Broughton, and a few days later, he died of yellow fever, a particularly nasty hemorrhagic fever that originated in West Africa.<sup>26</sup> How did a West African disease end up in Savannah? The obvious explanation is via the transatlantic slave trade. The thousands of ships that completed the middle passage from the sixteenth to the early nineteenth centuries transported some *Aedes aegypti* mosquitoes to the New World, alongside some crewmen infected with yellow fever. The mosquitoes survived the voyage by breeding in the barrels of fresh water that all ships carried. Gradually, the mosquito populations became established in the Americas, piggy-backing on the trade ships that connected ports throughout the West Indies, Central and South America, and parts of the southern United States.

We can use the notorious case of the *Hankey* to illustrate just how easily yellow fever spread to the Americas. In 1792, the *Hankey* spent several months anchored at Buloma Island, off the coast of West Africa, while its philanthropic British passengers attempted to establish a free labor colony. Unbeknownst to them, the island was home to a new, more virulent strain of yellow fever that, after just four months on the island, killed 85% of the colonists.<sup>27</sup> Giving up on the idea of colonization, the survivors followed the prevailing trade winds and currents across the Atlantic to the West Indies, arriving in the spring of 1793. The *Hankey* was moored in Grenada for several months between February and July 1793, allowing the virus to infect not only the islanders, killing more than 10% of the population of the capital St. George's, but also all the other ships riding at anchor, which subsequently dispersed throughout the Caribbean. As the Governor of Grenada reported back to London, the "constant communication" between islands led to the "almost unavoidable" spread of the disease.<sup>28</sup> Migrants fleeing the Haitian Revolution eventually brought it to Philadelphia, where it killed about 5000 people.<sup>29</sup>

In the West Indies and in New Orleans, yellow fever became endemic, but in both Savannah and Charleston, the winter was just a little bit too cold for it to circulate all year round. The disease had to be introduced to the city, and it was most likely introduced by a human, since humans are so much more mobile than mosquitoes. Molly the mosquito was not much of a traveler. In her entire life, she flew perhaps 200 meters. Most likely, someone from the West Indies, New Orleans, or Charleston brought yellow fever into Savannah. Although yellow fever was not endemic in Charleston, the city carried on a much more extensive trade with the West Indies than Savannah, meaning the disease was introduced there with regularity from the late seventeenth century onwards. It might have been Peter Broughton himself who was patient zero, since we know he was originally from South Carolina. What we can state with certainty is that after feeding on Peter, Molly was now carrying the yellow fever virus, and as she buzzed around the small patch of Savannah that was her entire world, she fed again and again, and each person she fed on received a small dose of the virus.

Now, Molly was quite a conservative mosquito; she did not like staying up late, when all decent mosquitoes should be in bed. Instead, she only fed in the daytime, and the best sources of fresh blood during the daytime were those who obligingly displayed a large amount of skin covered in the sweat that Molly found so irresistible. Those happened to be the young men who were industriously laboring to rebuild the city after the fire. Savannah in the spring can easily reach temperatures in the 80s Fahrenheit, and men laying bricks, sawing lumber, and carrying supplies, naturally stripped off excess outer layers. White women, by contrast, were not stripping off outside, and far more likely to be observing nineteenth-century codes of modesty with long sleeves and ankle-length dresses.

And it was not just Molly who found these young men irresistible: all of Molly's sisters joined her in this feeding spree (male mosquitoes do not bite humans, instead living off nectar), ensuring that the men were getting multiple doses of the virus from numerous mosquitoes. As yellow fever is a virus, there was – and is – no treatment for it. We now have a vaccine, but we still cannot cure someone who actually has the disease. We rely on the body's immune system to do that. The best help outsiders can give even now to someone with yellow fever is nursing care, ensuring the body has enough fluids and food to fight off the infection. A key factor in determining survivability is the viral load; the immune system takes time to kick into action, and if the viral load is high at the start, it is much more likely that the immune system will be overwhelmed before it can fight back.<sup>30</sup>

It would be easy to blame Molly and her sisters for the spread of yellow fever through the city, but that would be unfair. While mosquitoes are the vector that transmits the disease between humans, Molly herself barely traveled at all in her short lifetime. Rather, it was humans who carried the virus in their bodies from the eastern suburbs to the heart of the city, and once there, they became lunch for another mosquito. Let us call her Polly. Polly would never have had the yellow fever virus if a human had not brought it to her; she did not head into the eastern edges of the city looking for an infected person; rather, he came to her. Once Polly had the virus, she was able to pass it on to other men rebuilding the burnt section of the city, and they then took it back to their own lodgings, some of which were in the western suburbs. They were then bitten by mosquitoes living in that part of the city and thus, over time, the disease became well established all over the city.

This is the yellow fever cycle, and it only stops when one of two things happens. Either every human has had yellow fever and survived (and hence become immune) or died, or a frost has come that kills off the mosquitoes. The weather is actually crucial to the yellow fever cycle: the warmer the weather, the faster the mosquitoes reproduce, and they require stagnant water to lay their eggs; therefore regular rainfall also helps to facilitate the breeding cycle.<sup>31</sup> Savannah in 1820 was both unusually warm and rather wet. Timing is also important in the case of Savannah. Since yellow fever needed to be imported into the city then the earlier it appears, the longer and more severe the epidemic. Conversely, if yellow fever appears late in the season, the epidemic does not really have time to get going before the frost. In 1820, the introduction of the virus in the spring, with the first death on May 9, contrasts with 1854 when the first recorded death from yellow fever occurred on August 7. The actual mortality in 1820 was

roughly similar to 1854, but as the population was three times smaller in 1820, the proportional impact was significantly higher.<sup>32</sup>

Most epidemics grow exponentially, very slowly at first, but very rapidly at their height. It is no different with yellow fever: the more people with yellow fever mean the more people for the mosquitoes to bite, and in turn, there are more mosquitoes carrying the disease to new people. There was no discussion of yellow fever in Savannah among residents or the press until August 1820, despite what one doctor later recorded as fourteen deaths in June and thirty-nine more in July. There was almost certainly an element of wishful thinking on the part of the residents, the city council and the city's board of health in ignoring the growing death toll. But a leap in August from an average of just over one to nearly four deaths per day was too much. On August 15th the Columbian Museum and Savannah Gazette broke ranks, reporting that "Although our Health Committees and Medical Societies are silent on the subject, we are induced to believe that a pestilential disease, of no very mild character, rages to a considerable extent in certain portions of our city." There was, the paper alleged, a deliberate decision to "inspire confidence by sending abroad favorable but delusive reports" while leaving the public uninformed as to the "real danger."<sup>33</sup> The Savannah Republican responded that evening, in full support of the city council's position that the "diseases were too evidently the effects of individual wants or dissipation to make it a subject of alarm."<sup>34</sup> Nothing to see here. City newspapers continued to downplay the situation over the next few weeks, with the Georgian reporting that "the number of our sick is not greater than has been usual at this season of the year, nor is the character of the disease much more aggravated."<sup>35</sup> Responding on September 5th to reports in out-of-state newspapers that "a malignant disease is raging" in the city, the Savannah Republican claimed "This report is utterly groundless."<sup>36</sup>

Private residents were much more forthcoming about the real situation in the city. One citizen reported eight to ten deaths per day in the middle of August, while another reported to a friend in New York,

Our city is sickly, much more so, it is generally acknowledged, than it has been known to be at this season of the year for many years past . . . . There have been many cases of black vomit. In almost every instance, the disease has been fatal, and very rapid in its progress.<sup>37</sup>

Perhaps because the deaths of more than one hundred people were not so easy to ignore, the city council gradually began changing its tune. In the last week of August, the city council established a Board of Health to gather accurate medical data throughout the city and on August 29th, the city held a Day of Humiliation and Prayer "to supplicate Almighty God to avert present or other calamities which may visit our people."<sup>38</sup> In the same issue where the Savannah Republican was calling reports of an epidemic "groundless" Mayor Thomas Charlton issued a notice telling those "who very prudently and properly left the city at the beginning of the disease, not to be tempted to return [until] malignant fever no longer prevails."<sup>39</sup>

But honest communication with the public remained shameful. Only on September 14th did the Mayor finally announce "that a mortality prevails in this city, never before experienced," recommending "any person, who can make it convenient, to remove beyond the limits of the city's atmosphere."<sup>40</sup> Physicians in the city had been telling patients to flee for several weeks before this, and, of course, the impact of this advice

was selective. Long-term residents, with well-established channels of local information, quickly spread the word among their friends and families. Many had places in the countryside to which they could decamp, where, unless they happened to be already infected, they would be safe. With the Mayor's formal encouragement, hundreds left within days, leaving the town "quite deserted."<sup>41</sup> Deserted by businessmen and elite society, that is. The poor lacked refuges where they could flee to, as well as means to leave.

However, it was not long before the finger of blame for the epidemic, or at least for its high death toll, was pointed at the very newcomers who had been invited to rebuild the city earlier in the year. When these people, who were "foreigners and strangers to our climate," became sick, the Board of Health blamed their own "carelessness," a "lack of nourishment," as well as an unwillingness to seek timely medical help, for the fact that so many cases terminated fatally.<sup>42</sup> Dr Joshua White asserted it as "a well-established fact, that strangers from cold or northern countries, emigrating after the constitution has been formed, are less fitted for a healthy residence in tropical countries." Particularly vulnerable, it seemed, were "The most healthy and vigorous."<sup>43</sup> As if fulfilling his own prophecy, Dr White, born in Pennsylvania, succumbed to the epidemic himself age of forty-five on August 26th. The Mayor joined in this blame game. Savannah had always been prone to autumnal diseases, he said, and people had been cautioned about arriving during the summer,

yet the misfortunes, enterprise, or avarice of hundreds, will lead to this city, or any other, where labour is well paid for, and industry rewarded ...the late conflagration, having thrown within our precincts, perhaps upwards of four hundred persons emphatically called non-residents, and all of them more or less subjects of disease from their exposure day and night. It is amongst this unfortunate class that the late and present mortality has made such terrible inroads.<sup>44</sup>

According to his study of the death registers, non-resident victims outnumbered residents by a ratio of 5:1. While it was true that the first cases clustered in the eastern and western fringes of the city, in the newly built but low-cost housing that was affordable for immigrants, it was not the case that the disease only affected strangers. One resident confirmed that "those who have been in the habit of spending the summer here, and natives, are not exempt from attack."<sup>45</sup> Indeed, had local residents been confident about their own immunity, they would surely have stayed rather than fleeing. The real reason for the disparity in infection and mortality rates between natives and immigrants is firstly that natives were not laboring outside in construction jobs and were therefore less likely to be bitten by Molly and her friends, and secondly, they were more able to leave. Like many illnesses then and now, yellow fever was a class disease.

With the existence of the epidemic now openly acknowledged, the hitherto recalcitrant city papers joined private citizens in describing a truly dreadful situation. Unaware of the role mosquitoes played, the disease seemed frighteningly random, being both contagious and not contagious at the same time. You could safely nurse someone with yellow fever without becoming infected, provided there was not a mosquito in the room with you. Yet no medical treatment made any difference, despite there being plenty of recommended remedies. Some patients recovered, but many did not. Mortality in September was between 15 and 20 per day, and one resident thought "there are nineteen chances out of twenty that the subjects taken down by the fever

do not recover." Others commented that "Whole families are swept away before it" and "we have had two instances of husband, wife & child being born to the grave at one time."<sup>46</sup> In one of the rare mentions of the impact of the epidemic on the enslaved community, many of whom were left behind to care for property in the city when elite whites fled, one letter reported "the sickness is equally fatal amongst the negroes; [but] as the number of deaths amongst them is not kept, I cannot give them to you."<sup>47</sup> While it is true that people imported directly from West Africa would most likely have been immune to yellow fever, having had the disease as a child, the vast majority of the enslaved population of the city by 1820 had been born in the United States and, therefore, lacked any such immunity. Perhaps indicative of the relative value placed on the lives of black people compared to white by the city's authorities, there was no accurate count of the number of enslaved people who died in 1820. Contemporary sources limit themselves to reporting it as a "considerable number," while a recollection from more than thirty years later put the number at about 200.<sup>48</sup>

As September gave way to October, the situation did not improve. Several letters confirmed that the epidemic had not abated; indeed, one letter dated October 8th lamented that "The sickness is now worse than at any former period."<sup>49</sup> And to add insult to injury, on October 1st, an Atlantic hurricane brushed by, bringing "excessive rains" and "a tremendous gale." Numerous ships then at anchor in the city and at Tybee were either run aground or sunk, homes lost their roofs and trees were blown over.<sup>50</sup> The next morning, "the city presented a dismal scene," and the Mayor, fearful that "the effects of vegetable decomposition" would exacerbate the epidemic, was obliged to order the clearance of "leaves, berries, and fragments of trees scattered in our streets by the late gale."<sup>51</sup>

Presumably, the Mayor expected enslaved people to do this clearing up, because by now more than half the white population had left Savannah. The federal census of 1820 had counted 7,523 inhabitants of Savannah, 3,866 or 51% of whom were white. A city census conducted in mid-October counted just 1,494 white people. There was no count of black residents. The mortality data, with more than 400 burials from fever in September and October alone, has to be read in the light of that much-reduced population and suggests a mortality rate of over 20%.

The impact of the hurricane on mortality was, in the end, probably not that great. There are no reports of injuries or deaths caused by fallen trees or damaged buildings, and while the heavy rain would have created new pools of stagnant water where mosquitoes could breed, in the end, it did not really matter. On 23 October, relief finally arrived in the form of a cold front from the northwest, bringing a frost that night and for several nights afterward. The frost killed the mosquitoes, removing the vector that transmitted yellow fever between humans. Within a week, the health committee was reporting the city "appears to have recovered its health" and by 7 November, the press was reporting that

Vessels from European and northern ports are every day arriving, freighted with merchandize and crowded with passengers. Our wharves are again lively with the hum of business, and our streets present the gladdening spectacle of a cheerful and renovated population.<sup>52</sup>

The city death registers reveal the full extent of the impact on the white population. In total, 641 white people died of fever between May and the end of the year, but the impact was selective. Only 7% of the victims of yellow fever were children aged under ten,

despite them forming about 20% of the population, and indeed, a characteristic of the disease is its comparatively mild manifestation in children and low rate of mortality. Women accounted for just a quarter of victims, so clearly there was a considerable upside to wearing long sleeves and dresses in a Georgia summer when yellow fever came to visit. The newly arrived Irish male population suffered more than any other group. One in four of the victims was born in Ireland, more than any other single nation, and more than those born in Georgia and South Carolina combined. Of the Irish dead, 80% were men. While people from all social classes succumbed to the epidemic, including doctors, teachers, merchants, lawyers and accountants, 40% of the victims worked in the building trades as carpenters, masons, bricklayers and laborers, and among the Irish victims, all but one was working in a manual job.

An unfortunate series of global events combined to make Savannah's yellow fever epidemic truly dreadful. Without the Tambora explosion in 1815, the global climate would not have shifted so much in 1816 and 1817. Without the end of the Napoleonic Wars, there would not have been so many young Irishmen looking for work. Without these two things combined, the number of Irish emigrants to North America probably would not have risen so rapidly in 1818 and 1819. Without the fire in January 1820, there would not have been the inducement of so much well-paid work on offer for laboring men in Savannah. Without the slave trade, yellow fever probably would not have made its way to the Americas. Without a patient zero who imported the disease to the city, there would have been no epidemic at all. At any stage, the chain of events that led to the deadliest epidemic in Savannah's history might have been broken. Yellow fever might have still arrived in the city that summer, but without so many easy victims, the mortality would have been much lower.

The story of the volcano and the mosquito shows that Savannah, a comparatively small and unimportant city on the eastern seaboard of the United States, was directly affected by global events that had occurred many thousands of miles away, several years beforehand. The 1820 yellow fever epidemic might have happened in Savannah, but its origins lie in Indonesia, in Africa, in New York, and above all in Ireland.

## Notes

1. *Boston Commercial Gazette*, January 27, 1820.
2. Sophia Raffles, *Memoir of the Life and Public Services of Sir Thomas Raffles* (London: John Murray, 1830), 248–9.
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## Disclosure statement

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## Notes on contributor

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