

The Little Ice Age and Europe's encounter with North America

[Book review by Malcolm Gaskill, published in *London Review of Books*, print issue of July 13, 2018](#)

Reviewing: *A Cold Welcome: The Little Ice Age and Europe's Encounter with North America*, by Sam White, published by Harvard U Press, Oct 2017, 361 pp, ISBN 978 0 674 97192 9.

In the following essay, writer Malcolm Gaskill challenges the view that societal disorders or breakdowns attributed to the modestly cooler temperatures in the Northern Hemisphere during the ebbs and flows of the 'Little Ice Age' (app 1300 to 1850, see 'The Little Ice Age', [in Wikipedia](#)) were not due to climate alone. Human intervention worsened or ameliorated the naturally occurring conditions. The lesson for today's warming world is that human intervention can lessen the worst of what rampant, capitalist industrialization and expansionism otherwise has in store for human civilization. Gaskill terms the consequences of global warming "the impending nightmare". -- A Socialist In Canada, Aug 13, 2018.

London Review of Books is published twice monthly. Subscription information is at the weblink above. Sample yearly subscription rate: U.S.\$50, CAN\$70.

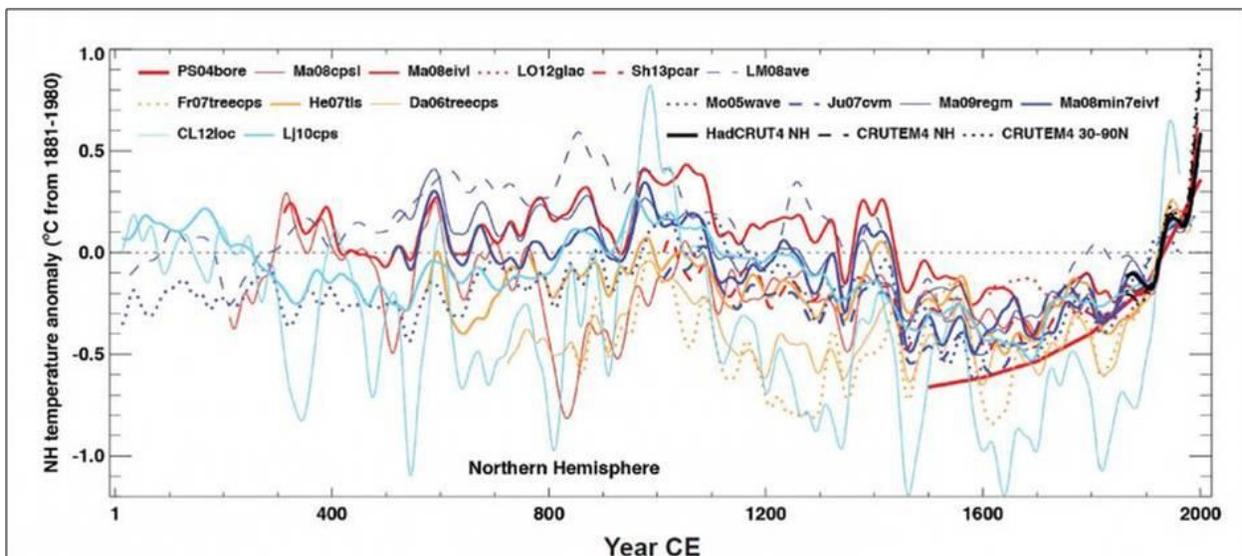
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When my editor asked for dust-jacket ideas, I said I wanted something with snow. My book was about 17th-century America, and for all the sweltering, maize-shrivelling summers, it was the winters that had stuck in my mind. I'd found the perfect image: George Henry Boughton's *Pilgrims Going to Church* (1867), a depiction of settlers in New Plymouth trudging through their first winter. Why the snow seemed important I'm not sure. Perhaps extreme cold, and unpreparedness for it, enhances the drama of history, pointing up heroism and hardship. In the time I was writing about there were snowflakes the size of shillings. Beards froze so that men couldn't get bottles to their lips; bread rattled on the communion plate. In December 1630, a shoemaker from Essex, desperate to find food, sailed a shallop down the New England coast accompanied by his young daughter and two others. A storm drove them to Cape Cod, where feet had to be chipped away from the ice in the boat. They tried to make a fire, but had no hatchet to cut wood. The party lay exposed to the cold all night. Everyone except the girl and one frostbitten man died. Their Indian rescuers hacked graves from the solid earth.

We now know that it really was much colder back then. The early modern period, c.1500-1750, coincided with the Little Ice Age, an era of plummeting temperatures that succeeded the Medieval Warm Period, which lasted from the 10th century to the mid-13th. Opinion is divided about what caused these fluctuations, and before the work of Hubert Lamb, founder of the Climatic Research Unit at the University of East Anglia, in the 1960s and 1970s, it wasn't clear they had happened at all. The assumption for a long time was that after the Ice Age ended 11,700 years ago temperatures had been relatively stable. Thanks to Lamb, a different picture emerged, clarified by scholars in other fields, notably the great French historian Emmanuel Le Roy Ladurie, whose *Times of Feast, Times of Famine* was published in 1971. A decade later, Robert

Rotberg and Theodore Rabb published a trailblazing volume of essays, *Climate and History*, their mission to explore ‘an exciting frontier for reading and research’.

Recently, the geologist Gifford Miller and his team at the University of Colorado-Boulder have argued that the Little Ice Age had two phases, 1275-1300 and 1430-55. In the first of these, volcanoes blasted dust and sulphur dioxide into the stratosphere, which respectively blocked and bounced back the sun’s rays. The abrupt change this caused was extended by ‘sea-ice/ocean feedbacks’, which cooled summers long after the skies had cleared. It remained very cold between 1600 and 1850, with only gradual warming. Building on work done in the 1920s by the geophysicist Milutin Milanković, some climate scientists saw the cause of the cooling in alterations in the Earth’s orbit and axial tilt, which moved us further from the sun. Others stress cyclical patterns of solar irradiance, namely the Spörer Minimum of 1460-1550 and Maunder Minimum of 1645-1715, both linked to global cooling. Changing ocean currents and temperatures may also have contributed.



Studies of temperatures in Northern Hemisphere during past 2,000 years (published by National Oceanic and Atmospheric Administration)

Then there is human activity. Hubert Lamb argued not only that our ancestors probably experienced climate change but that they may, in part, have caused it. The palaeoclimatologist William Ruddiman has suggested that people started assaulting the ozone layer with greenhouse gases about eight thousand years ago, when farming began to replace hunting and gathering. Deforestation carried out by a growing population may have made the world colder by increasing the area of reflective snow-covered land, an effect only partly counteracted by increased levels of carbon dioxide. The demographic dip caused by the Black Death in the mid-14th century led to another drop in temperatures, as reforestation allowed more carbon dioxide to be absorbed. Certainly, by the year 1400, Atlantic pack ice had dramatically increased in volume and farmers could no longer depend on warm summers. Two centuries later, the planet was a chillier place than it had been for hundreds, perhaps thousands, of years.

The social, economic and political effects ranged from inconvenience and discomfort to catastrophe. Might bad weather have caused a rise in depression? In 1967 Hans Neuberger, a

German-American meteorologist, had the bright idea of grading the blueness of skies in 12,000 paintings dating from 1400. They were darkest, he concluded, between 1550 and 1849. According to one estimate, when Henry VIII became king in 1509 there were 139 vineyards in England and Wales, all on the verge of steep decline. The impact of lower temperatures was felt across the northern hemisphere. Farmers in the Chinese province of Jiangxi, for instance, found they could no longer grow oranges.

The price of wheat and rye soared as yields dropped, especially after the eruption of Huaynaputina, a Peruvian volcano, in 1600. More snow, lying longer, prevented sheep and cows from grazing, forcing farmers to slaughter them once stocks of hay ran out. In Alpine regions clergymen prayed at the foot of glaciers, the spread of which into the valleys, tax records show, wiped out whole communities. Hungry peasants ate weeds and ground nutshells to eke out barley flour and oats. Many died from hypothermia. Witches, who were associated with weather magic (summoning crop-flattening hailstorms, for example), were blamed by their anxious neighbours. The historian Wolfgang Behringer has suggested that the Little Ice Age was a fundamental cause of the European 'witch-craze'. Migration into towns and cities led inevitably to overcrowding, disease, crime and social unrest. The biting French winter of 1709 triggered riots against profiteering grain merchants in several cities. A priest reported seeing cockerels' combs freeze and fall off.

The consequences of the cold weather were so serious that they couldn't be contained politically. In a 2013 study, the historian Geoffrey Parker argued that the 'general crisis' of the 17th century, a litany of wars, invasions, rebellions, massacres, epidemics and famines, can be explained by the Little Ice Age. Others have seen the origins of the French Revolution in climate change, when a period of poor harvests acted as what the anthropologist Brian Fagan has called 'a subtle catalyst' for the insurrection. The tone of Antonio Stradivari's violins has been attributed to the denser wood that trees lay down in cold weather. Incessant rain confined several English Romantics to Byron's Swiss villa in 1816 – the 'year without a summer' – where Mary Shelley channelled a widespread perception of nature in chaos to write *Frankenstein*.

In his new book, Sam White adds the mishaps and muddles of American colonisation to the rap sheet. Most early colonial ventures, he argues, failed because they were bedevilled by false assumptions, the chief one being that climate was similar along a particular global latitude. In addition, extreme weather conditions, especially after 1600, caused shipwrecks and crop failure; they also stirred up trouble with native peoples. Many colonies in the Americas proved tricky to establish and impossible to sustain.

Portuguese mariners dabbled for most of the 15th century in Madeira, the Azores, the Gold Coast and elsewhere until the Treaty of Tordesillas, in 1494, split the New World between the two Iberian nations. Within a generation, the Spanish had established the vice royalties of New Spain and Peru. New Spain included Puerto Rico, Jamaica and Cuba, colonised in 1509-11; Mexico, after the conquest of the Aztecs in 1521; and most of Central America. The vice royalty of Peru comprised all of South America except Brazil, which belonged to Portugal: at its heart was Peru itself, seized from the Incas in 1535. (In this century 250,000 Spaniards emigrated, mostly to Mexico and Peru, feeding a burgeoning imperial machine.) By the 1540s the French were establishing themselves in Quebec, and a couple of decades later there were Huguenots in South Carolina, Florida and near Rio de Janeiro. English navigators were eager to join in, but Elizabeth

I wasn't much interested: since England was fighting Spain, as it was from 1585 till the end of her reign, it could pinch treasure from Spanish ships rather than scratching around in foreign lands looking for gold and pearls and dodging spears.

Creation myths exaggerate successes and edit out failures. The U.S.'s exceptionalist legends don't stint on the harsh conditions and calamities endured by early migrants, but that's mainly to show the way fortitude triumphed over adversity. The settlers at Jamestown had a terrible time – insubordination, martial law, massacre and starvation – but in the end Virginia flourished. More obscure is the Sagadahoc colony in Maine (founded in 1607, the same year as Jamestown), which lasted less than a year, the hopes of its English colonists 'frozen to death'. The also-rans matter historically, not just to debunk myths but to demonstrate the way a spirit of optimism fuelled colonial adventures – an optimism that proved surprisingly durable whenever things went wrong. White writes about 'extreme seasons and untimely weather, misfortune and perseverance', in the period bracketed by Columbus's first voyage to the Americas in 1492 and the arrival of the Mayflower in 1620. It is, he says, 'a true horror story: a tale filled with violence, starvation, disease and death'.

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A certain kind of man appears again and again in the history of colonisation: excitable, avaricious, invincible (until his premature death), and prone to believing bullshit, his own as well as others'. In the 16th century most of these men were Spanish. Lucas Vázquez de Ayllón was fifty when the Holy Roman Emperor Charles V mandated his expedition to Chicora, in present-day South Carolina, which slave raiders claimed was a 'New Andalusia'. Ayllón funded the voyage himself, banking on future dividends. Like other colonisers he hoped to establish a silk industry, since silk was a staple of aristocratic wardrobes and an expensive import.

These shining visions faded fast after Ayllón left Santo Domingo in 1526. His flagship ran aground, the native guides did a bunk and his food stocks shrank with alarming speed. Chicora, or Santa Elena as it had been renamed, didn't seem much like Andalusia. The drinking water was rank with sewage and the explorers became feverish. When Ayllón died that October, his men mutinied and headed home. It was bitterly cold: the frozen flesh on one wretch's legs came off with his breeches. Three-quarters of Ayllón's six-hundred-strong contingent died that winter. Two years later a mission to the Gulf Coast resulted in what White calls 'complete catastrophe'. Pánfilo de Narváez and most of his men died in the space of 18 months, worn down by hurricanes, maritime idiocy, hunger, disease and hostile natives. The survivors ate their horses, then set off on rafts. Of the men who washed up on the coast of Texas, only four (of the original six hundred) made it back to New Spain. The rest were killed by Indians, or expired, even in Texas, as a result of the intense cold. One survivor described seeing fish frozen in the sea.

Subsequent expeditions between the 1530s and 1560s were also blighted by icy weather. But 'the notion of a "New Andalusia",' White notes, 'clung on in spite of all evidence to the contrary.' An absence of realism, and a lack of supplies, dogged every expedition. Sailors and settlers dreaming of utopias and cornucopias soon found themselves huddled in bivouacs, nibbling acorns if they were lucky and one another if they weren't. By the 1570s Juan López de Velasco, an official chronicler of imperial disaster, was peppering his accounts with words like 'poor', 'miserable', 'sterile' and 'very cold'.

Scholars were starting to explore the possibilities of empirical inquiry – evidence-based deductive reasoning – but change was slow, and ancient models of harmony and meaningful correspondence remained in place. The idea that illness was caused by imbalance between the four bodily humours, attributed to Galen, was mirrored and magnified by the Ptolemaic global scheme. Whereas the heavens were perfect, Earth, despite its central position in the universe, was a work in progress. Planetary rotations, it was supposed, sucked wet ‘vapours’ and dry ‘exhalations’ from the ground, which then were heated by the sun to form atmospheric layers and geographical zones: ‘frigid’ at the poles, ‘temperate’ nearer the equator and finally ‘torrid’ in the blisteringly hot belt of ocean and land between the tropics of Cancer and Capricorn.

As White notes, this was ‘mostly wrong and very incomplete’; experience made contemporaries doubtful too. Entering South American waters, José de Acosta ‘laughed and jeered at Aristotle’s meteorological theories and his philosophy, seeing that in the very place where, according to his rules, everything must be burning and on fire, I and all my companions were cold.’ Yet explorers had no better way of explaining atmospheric circulation. This mattered not just because it meant they sailed blithely into ice storms in their shirtsleeves, but because they were never really sure where they were going. Longitude was a mystery until the invention of the marine chronometer in the 18th century, which meant a perilous reliance on latitude and its correspondence to climate. Navigators had to make educated guesses about the way places lined up, and about how far they had travelled. This imprecision was compounded, White argues, by falling temperatures. Juan Ponce de León was dismayed to find the climate of La Florida – Spain’s name for much of south-eastern North America – ‘different’ from his imagining and ‘unsuitable’ to his needs. The Mediterranean was the measure of all seas and seasons. In America, without clearly defined wet and dry periods, Ponce de León’s crops rotted in the fields and his colonists starved: La Florida was blamed.

The 1590s, a decade of feeble summers, are critical to White’s story. Imbalanced atmospheric pressure between eastern and central Europe swept freezing winds across the continent, bringing rain and snow of an intensity and duration unprecedented in living memory. ‘Out of every corner of the woods and glens they came creeping forth upon their hands, for their legs could not bear them,’ Spenser wrote of the poor in Ireland. ‘They looked like anatomies of death, they spake like ghosts crying out of their graves, they did eat the dead carrion.’ Famine also struck in Scotland, Finland and Italy: the River Arno froze in Florence. A pamphlet published in London in 1596 has a ring of wartime rationing about it – eat acorns, peapods etc – though the pamphlets of the Second World War never suggested eating dirt, or that ‘a man may live 10, or 12 daies by sucking of his owne bloud.’ The irony is that an economic crisis lasting two or three decades persuaded thousands of Europeans to emigrate to plantations where they almost invariably discovered that conditions were as bad or worse. According to the explorer Samuel de Champlain, if the famished colonists huddled at Tadoussac in Quebec learned one thing from the winter of 1600-1, it was ‘the thorough difference between France and Tadoussac’.

By now Spain’s days as top nation were numbered, and imperial glory – as well as ignominy and disgrace – was shared with France, the Netherlands and, especially, England. Elizabethan voyages of exploration, like that led by Martin Frobisher to search for the Northwest Passage, or Humphrey Gilbert’s ill-fated trip to Newfoundland, made some modest gains (in knowledge if not in wealth). But mostly they conformed to the Spanish and French tragedy of errors model. In 1578 Frobisher rewarded the confidence of the Cathay Company, which had invested an eye-

watering £25,000, by delivering more than a thousand tons of worthless rock, which he believed to be precious ore. Dozens had died digging it out. Gilbert, whose personal Latin motto translated as 'why not?', used classical cosmology to infer that Newfoundland's climate was much like England's. He was wrong, and his ship was swallowed by a storm. The rest of his fleet either ran aground, or limped back to England, where the survivors had to explain themselves to furious investors. As ever, failure boosted enthusiasm as much as quelled it: the advantage lay in heeding lessons.

Enter the Virginia Company and the foundation of Jamestown, initially a fortified camp on a soggy peninsula on the James River, forty miles from the sea. Two joint stock companies, one in London, the other in Plymouth, sold shares and secured a charter from James I in 1607, an improvised scheme contrasting starkly with the imperial élan and bureaucratic grip of the Spanish viceroyalties. Like his Tudor predecessor, James I gave his blessing but not his money. William Kelso, the leading archaeologist of the Jamestown site, believes this 'is where the British Empire began' – but then, recalling John Seeley's famous dictum, this was to be an empire acquired 'in a fit of absence of mind' rather than as the result of state-sponsored design. The Virginia Company's leaders, in England and America, were baffled, not least by the humid weather, which, like so many other inconveniences, they pretended wasn't a problem for as long as they could. Elsewhere White has described them as 'America's first climate change deniers'. They certainly got a lot wrong, though Karen Ordahl Kupperman, in her 2007 study of the colony, offered the same revisionist perspective applied these days to the battles of the First World War: leaders learned quickly from their mistakes and so things worked out in the end. White agrees that they mustered 'the most highly regarded ideas and best information available to them at the time'.

The winter of 1607-08 was extraordinarily bad, even by the standards of the age. Captain John Smith, Jamestown's leader in waiting, wrote of 'extreame sharpe' weather, which caused the James River, as broad as it was brackish, to freeze almost completely; many European rivers, as far south as Greece, did the same. The Thames became a 'frost fair' for 'those who delighted in the novelties of the times', as a contemporary put it. By spring half of Jamestown's men had succumbed to malnutrition, illness and exposure. This was also an era of sustained drought, which combined with the harsh winters to ensure that the English couldn't grow much and the Indians had little to share. When the colony leaders plonked a base-metal crown on Chief Wahunsenacawh's head, it either failed to impress him or, as Smith supposed, made him 'much overvalue himself'. Either way, Jamestown's settlers were on their own, and a couple of years later were eating dogs, cats, snakes and rats, even boiled collars (for the starch), belts and shoes. Between the winter of 1609 and the following summer, three-quarters of the 240 inhabitants starved to death. The recently excavated skeleton of an adolescent girl is scored with butcher marks, including cuts to the skull made to remove her brain and tongue.

In the early summer of 1609 William Strachey, a gentleman who had frittered away his inheritance hanging out with London's literati, set sail for Jamestown on the Sea Venture, the flagship of a supply fleet. On 2 August the sky turned black, 'like an hell of darknesse', and the wind started whistling through the rigging. When the hurricane struck, waves crashed over the decks and passengers were hurled around like dolls. 'We could not apprehend in our imaginations any possibility of greater violence', Strachey wrote. The ship sprang a leak, filling the hold with nine feet of water, frantically baled and pumped out by all hands. After three days

and nights the captain dropped anchor at what Strachey called ‘the dangerous and dreaded Iland ... of the Bermuda’. But it turned out to be nice. Since there were no human inhabitants the animals were tame, which made it easy to barbecue them. The castaways ate like kings: eggs, pigs, turtles, fowl. Some resented the determination of Sir Thomas Gates, the expedition leader, to press on to their destination.

Within a few years, European visitors had wrecked Bermuda’s ecosystem. Native creatures were hunted nearly to extinction, and the island was overrun first with rats, then cats and dogs (introduced to kill the rats), which together ate the colonists’ crops. Smith marvelled that ‘from such a Paradise of admiration ... should spring such wonders of afflictions’. The only obvious good to come of this episode was that Strachey’s memoir almost certainly inspired Shakespeare, a theatrical acquaintance, to write *The Tempest*.

White also offers fascinating scientific asides, and mostly keeps his promise to explain things simply. Climate history involves splicing and comparing evidence from the written record with the findings of paleoclimatologists, dendrochronologists, zooarchaeologists and others, who extract ‘climate proxies’ from the physical environment. Since modern records of global temperatures, precipitation, wind strengths and sea currents are barely a century old, we need ingenious ways to look further back in time. One standard technique is to measure the width of tree rings. Tree rings in arctic Canada and Scandinavia indicate that summer growth was attenuated in the late 16th century, and even more so after 1600. The arrival of English settlers in Roanoke in 1585 coincided with the onset of ‘the deepest regional drought of the last eight hundred years’. The driest spell was from 1606 to 1612 – Jamestown’s grim fledgling years. The diminished flow of the James River drew in water from the Atlantic, adding salt to the effluent drunk by the colonists. Mineral deposits extracted from Virginian caves confirm this, and show that dry summers were interspersed with cold winters.

Other techniques include drilling into Scottish stalagmites, comparing ratios of carbon and oxygen isotopes in seashells, measuring growth in coral algae, and analysing underwater sediments (in oceans for traces of temperature-sensitive micro-organisms and in lakes for varying amounts of identifiable elements). Pollen grains in lakes in Quebec, Ontario and the Midwest point to time-specific changes in vegetation growth, and indicate that temperatures were falling by the 1590s. The Caribbean seabed bears the scars of storms, which combined with records of shipwrecks, prove that the period between the mid-16th and early 17th centuries ‘witnessed the highest average levels of hurricane activity for at least the past five hundred years’. Ice cores also offer clues. Evidence trapped in glaciers in Greenland suggests that the growing season shortened in the late Middle Ages, which would explain the disappearance of the Norse colonies there. It’s likely that Viking settlers in Greenland were completely cut off between the 1410s and 1720s. Conditions were almost as extreme further south. In the last fifty years of that period, sea ice may have extended as far as 25 miles from the coast of the Netherlands. More traditional archaeology also plays its part. Bones and teeth excavated in Virginia tell us that Indians were better nourished than the English, though with signs of increasing malnutrition and traumatic injuries. Bones dating to 1601 found in New Mexico indicate that colonists whose maize had been ruined by drought and then frost were forced to eat livestock before they had a chance to breed. At Sagadahoc, archaeologists have found few solid foundations, bearing out a contemporary claim that settlers lived in ‘ill-built and bleak cottages’.

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White concludes his study – ‘a story of such accidents, contingencies, and, above all, misfortunes of weather’ – in 1610. That ‘above all’ doesn’t seem quite right. White stresses complexity: the Little Ice Age caused problems more because of the unpredictability of conditions than because of the sheer cold, and climate interacted with other factors. Hurricanes weren’t so bad if you knew to expect them: ‘They ceased to be awe-inspiring and providential, instead turning into practical challenges for adaptation and administration.’ Some men, enterprises and nations were better equipped than others to handle bad weather. The Canadian winter of 1535-36 was ‘not necessarily exceptional for the Little Ice Age’; it was just that the mariner Jacques Cartier and his men ‘were exceptionally vulnerable’. The scurvy that afflicted them was easily cured with tiny amounts of ascorbic acid, a source of which Cartier found thanks to the Stadaconan Indians, who cured scurvy with a tea made from needles from an evergreen tree, probably the balsam fir.

Scurvy, like many of the misfortunes chronicled in this book, had little to do with the weather; its significance for the history of colonisation lies in its relationship with things that did. To suggest otherwise would be to privilege one factor – as White does with climate change. Yet a thesis could be made by emphasising other factors: a dangerous obstinacy in the pursuit of profit; poor planning and administrative blunders; wavering royal support for colonial adventures and a reluctance to fund them; economic and logistical problems of supply (food, adequate clothing and manpower sufficient in skill, quantity and gender balance). Ribault’s Charlesfort, in what is now South Carolina, failed because settlers were sick and riotous, a state exacerbated by cold and hunger but not obviously caused by it. The story was essentially the same at Roanoke and Jamestown. Official inquiries of 1573 and 1576 into Spanish Florida’s underachievement cited three main deficiencies: supplies, defence and morale. Spain’s imperial retrenchment after 1600 was due more to politics than climate: Philip III had been bankrupted by European wars. Around the same time, French colonial ambitions in Canada were thwarted by ‘fiscal turmoil, political factionalism and sectarian conflict’ – White’s own summary. Finally, many transatlantic projects failed due to difficult relations with Native Americans. European settlers rarely exploited local knowledge as quickly or as fully as they might; they patronised and antagonised their hosts; they simultaneously depended on and resented their presence; they conspired and beguiled, cheated and stole; they warred, ruthlessly and relentlessly, until the Indians’ land became their exclusive property.

In the end, what colonists couldn’t change they adapted to. The ninety years of the 17th century not covered by White were also astonishingly cold, and progress in that time was remarkable. Boston went from gorse-covered mudflat to genteel provincial capital in twenty years. White speculates that had the weather been better and explorers wiser more might have happened sooner. Does it matter? Probably. But as with most counterfactuals, it’s unclear how or why. The Little Ice Age meant ‘the path that history actually took was not the only or even most likely one’. But this is to assume history ever follows a likely path, and to treat some factors as constants and one as the rogue mutation that alters the course of an otherwise straightforward evolutionary journey. Surveying the parlous economic state of early modern Europe, White concedes that ‘we cannot blame all of this misery directly on the Little Ice Age.’ The disclaimer seems to betray a desire to make climate the golden key to an infinitely complicated lock.

White doesn't say much about global warming in our own time, but naturally he's aware of the challenges. The long time sequences of climate history can also be extrapolated into the future. A shallow, erratic graph tracing a fall in temperatures contrasts sharply with a steeper, straighter one showing things heating up. Even by 1600, smelting at a Spanish silver mine at Potosí in Bolivia had dispersed so much mercury vapour into the atmosphere it shows up in glaciers thousands of miles away. Quebec was petrifyingly cold in the late 16th century, and its average temperatures remained consistently low until the 1990s when they started going up. It's now predicted that the Northwest Passage, just north of Quebec, will be completely open by 2050 – a dream for the navigator Henry Hudson, who in the summer of 1610 was idling south of Baffin Island 'troubled with much ice', but for us an impending nightmare.