The Tambora – Frankenstein Myth: The Monster Inspired

Alan Marshall, Kanang Kantamurapoj,
Nanthawan Kaenkaew, Mark Felix
Faculty of Social Sciences and Humanities,
Mahidol University
999 Phuttamonthon 4,
Nakhonpathum 73710, Thailand
Email: alan.mar@mahidol.ac.th

Abstract:

The link between the volcanic eruption of Mount Tambora in 1815 and Mary Shelley's composition of Frankenstein has attained mythic status. The myth uses a scientific frame to promote the idea that the Tambora event led to Mary Shelley's invention of the Frankenstein story because the eruption so altered the climate of Europe (lowering the temperatures, creating rainy electrical storms, producing frosts and floods, and generally darkening the landscape) that Shelley dreamt up the idea for her monstrous horror tale as a result. She was then imprisoned indoors by the volcanically-induced bad summer weather of 1816 and thus encouraged to craft the story into a full length gothic novel. This paper outlines the structure of this Tambora – Frankenstein myth and then attempts to investigate its roles, goals, and meanings as ascribed by various (mostly 'pop science' scholars) and journalists. An attempt is then made to elucidate the problems, failings, and miscalculations of the Myth.

Keywords: Frankenstein volcano; scientific myth; science fiction; gothic literature.

Introduction

In April 1815, on the island of Sumbawa in the East Indies, the 14,000 foot Tambora volcano underwent a massive eruption. Geologists now believe it was the biggest eruptive event in recorded history, thousands of times stronger than the eruptions of Mt St Helens (1980) or Vesuvius (79AD) and some ten to twenty times stronger than the famous Krakatoa eruption of 1883.[1] The Tambora eruption was so loud that many hundreds of miles away the British Governor of Java, Stamford Raffles, thought that an enemy fleet might have started a cannon battle somewhere off the coast.[2]

The eruption spewed up to 175 cubic kilometers of hot dusty ashy material into the sky to a height of some 40 kilometers. Some of it fell back to ground, pretty quickish, as huge molten lava boulders or pumice rocks but much of it entered the atmosphere as particulate ash and dust. This massive eruption also rapidly and drastically altered the appearance of Mount Tambora. For 5000 years, Tambora had stood upon a peninsula of Sumbawa as a stereotypical strato-volcano. However, after the explosion, Tambora lost a third of its height to become shield-shaped; a giant gentle mound instead of a towering cone.

The 1815 Tambora eruption was catastrophic for the East Indies[3]; wiping away the Kingdom

of Tambora and also impacting harshly upon Lombok, Bali, Java, and some other populated islands as well; firstly by causing the death of some 10,000 locals during the initial eruption, and then via the decimation of the agricultural and fishing capacity upon and around Sumbawa. Soon, there was large scale disease, hunger, and displacement. These impacts are estimated to have caused some 30,000 – 50,000 more deaths upon Sumbawa and the nearby islands within a few years of the initial eruption.

In the months following the eruption, the dust and ash particles spread high and wide across the northern hemisphere[4], lowering the amount of sunlight hitting the world's surface and forcing an average drop in temperature of about half – a – degree centigrade from seasonal norms. By 1816, the year after the initial eruption, parts of central Europe and parts of the Atlantic states and territories of the US and Canada were affected, perhaps severely. In these regions, the climate cooling and extreme cold weather events caused by the filtering-out of incidental sunlight had seemingly so impacted the 1816 harvests that famine, disease and displacement are thought to have caused an equal amount of death and disturbance in these regions as in the East Indies. In these affected regions, 1816 thence became known as the 'Year Without a Summer'.

Some scientists[5] have also suggested that Europe's most important geo-political event of 1815 was also partly determined by Tambora; this being Napoleon's defeat in the Battle of Waterloo. The argument goes that some of the electrically-charged ash dispersed high into the atmosphere would have 'short-circuited' the ionospheric environment in such a way so as to cause an unseasonal downpour upon the fields of Waterloo. Since all the fields of Waterloo were clogged up with mud, Napoleon couldn't readily put his favored tactical advantages into early affect against the British forces. Most notably, in fear of getting his cannon stuck in the wet morning mud, the French commander started the battle too late in the day to ensure victory. As history records, the fight was very close but ended with Napoleon scuttling away back to Paris just as his army was finally overcome. This defeat finally put to rest Napoleon's domination of Europe.[6]

Outside of geo-political arena, and into the post-Napoleonic era, the devastating Eurasian cholera outbreak of the 1820s has also been blamed on Tambora[7], since the epidemic is thought to have started as a result of Tambora-induced climate change in and around the Bay of Bengal in 1816. Like Europe and the Atlantic region of northern North America, the 1816 weather in Bengal was extreme: excessive rain, unusual flooding, and then agricultural degradation and starvation; all making a major disease outbreak more than likely.

As well as global politics and global health, the Tambora eruption is said to have impacted upon the world of art.[8] Weird red skies were supposedly produced by the volcanic dust in the atmosphere over Europe during 1816 and are said to have been captured in the paintings of William Turner in England and Caspar David Friedrich in Germany.[9]

The art story we are most interested here, though, is the Tambora - Frankenstein link.[10] In 1816, Mary Shelley, daughter of the famous proto-feminist thinker Mary Wollstonecraft, was sojourning around Europe with her longterm lover, the poet Percy Bysshe Shelley. (At the time of conceiving *Frankenstein*, Mary was going by her maiden name, Mary Godwin, taken from her well-

known philosopher father, William Godwin). Before year's end, Mary and Percy would be married but in the meantime, they were travelling about Europe rather scandalously as unwed lovers to and from the Swiss chalet of the (even more scandalous) poet Lord Byron. Though Byron was celebrated and adored by many literary fans in his English homeland, in the summer of 1816 he was living in self-imposed exile near Geneva, Switzerland (with his physician-writer friend John Polidori) in order to avoid the many scandals and debt problems he had made for himself back in England. Altogether Byron, Polidori, and the Shelleys all fancied a summer of excessive exploratory leisure and pleasure upon the shores of Lake Geneva.[11] The Shelleys were keen, also, to explore the region surrounding the lake, too, and planned many walks through the nearby mountains and valleys but because the weather was often inclement – with frequent rainstorms plus many bitter days and icy nights – they spent more time indoors than they had originally intended: "It proved a wet, ungenial summer and incessant rain often confined us for days to the house".[12] In Byron's chalet, the group of writers gossiped about, and argued over, many of the important intellectual and political issues of the time. Yet, so dismal was the cold and wet weather, they eventually exhausted these topics by mid-summer and then started reading scary ghost tales to each other. However, they quickly exhausted this resource as well; after which Byron issued a challenge to see who amongst them could to write the scariest story.

In the wake of this, Byron and Percy Shelley soon got bored and returned to their poetry but Polidori ended up penning *The Vampyre*, now celebrated as the first modern vampire novel, whilst Mary Shelley had written down the framework of her *Frankenstein* novel.

Frankenstein was eventually published a few years later; featuring lots of icy landscapes, both glacial and polar; which advocates of the Tambora – Frankenstein myth say is a direct reflection of the icy weather of 1816.

The disastrous weather had also impacted upon the farmlands of central Europe, ruining harvests and dramatically increasing the price of rural produce. This precipitated a food crisis along with an unemployment and displacement crisis plus also high rates of hunger and disease. So outstanding were these impacts, according to the Tambora – Frankenstein myth, that the Shelley's must surely have been emotionally affected by the poverty-stricken peasant families lying and dying on the rural roadways of Switzerland and France as they travelled to and from Geneva. Indeed, it's been noted by some[13] that the Frankenstein monster is a metaphor for these poor wretched abandoned castaways with their horrific appearance and forlorn faces. Because of these various links, the weather of 1816 has been advanced by some Tambora – Frankenstein mythmakers as the single most important influence upon *Frankenstein*'s creation.

The Problems with the Tambora Explanation

The Tambora – Frankenstein myth has appeared across the spectrum of popular science media from science blogs to science magazine articles and into radio broadcasts and TV shows dealing with either science or the history of science.[14] In a moment, we shall explore why the myth is a problem – if you take it seriously. Just before that, let's explain how the Tambora eruption, as a

historic event, might have been oversold before even dragging *Frankenstein* into the debate since many of the claims are more controversial and speculative than the claimants imply.

To start with, it is not at all clear from either historical studies or climatic studies that 1816 was too much colder or rainier or icier than the years preceding it or following it. The decades of the late 18th and early 19th century were possibly all a little colder than earlier decades anyhow; part of what's now known as the Dalton Minimum solar cycle set between 1790 and 1820 (and even this proposed 'spell of cold decades' was set within the little Ice Age that ran from about 1700 to 1850).[15] These chronic colder years (colder by fractions of a degree, that is) may have done far more to induce slow speed continuous hardship and disaster across Europe's farming hinterlands than any one outstanding cold season (such as the summer of 1816).[16]

With regards to Switzerland, where Mary Shelley began writing *Frankenstein*, the 1816 cooling is sometimes said to be greater than anywhere else; up to and around 2.5 degrees centigrade. However, perhaps only a little bit of this, around 0.7 degrees can be attributed directly or indirectly to the 1815 Tambora volcanic event. The rest comes from other climate effects (such as the Dalton Minimum or the Little Ice Age) and the unpredictable internal variability of the European climate system. At least this is what's suggested in a special report on Tambora's impacts written by Swiss experts.[17] The same report also goes on to state Tambora's impact on poverty and hunger in 1816 was arguably minor.

Furthermore, the fixation with the volcanically-determined poverty in 1816 Europe forgets or negates the impact of social and political events. Here we must refer to the Napoleonic Wars, first and foremost. From 1897 to 1815, France and much of Europe was on a war footing with the economy devoted to support for, or defense against, Napoleon Bonaparte's French imperialism.[18] By 1815, the calamitous state of European trade (with banks and businesses routinely collapsing, with trade routes blocked and broken, and with inflation soaring) made it difficult for the petit bourgeoisie to make a good living and also for the commercial elite and the landed gentry to conduct their standard business practices. This would've then greatly impacted upon the peasantry and laborers in turn. These impacts had hardly abated by 1816 because millions of returning soldiers competed with civilian jobless for scant employment opportunities. Many involved in Napoleon's war economy found it nigh-on impossible to resettle into the decimated agricultural and manufacturing sectors; especially with a bankrupt government at the helm.[19]

Those who support the Tambora – Frankenstein myth sometimes indicate that, maybe, it was the Napoleonic Wars working *in tandem* with the cooled weather[20] that explains all the famine and disease and general social and environmental darkness in 1816 Europe. But even if some conjunction between the two ideas, 'war impact vs climate impact' is worked out by saying they interacted to produce high poverty, this does not mean that Tambora should be uncritically accepted as a prime weather-maker for 1816 (for the reasons suggested in the above paragraphs).

And in Mary Shelley's home nation, England (where she finished composing the *Frankenstein* novel during 1816 and 1817), it was not so much the weather that made life harder than usual during

1816. It was more to do with the introduction of the Corn Laws the year before[21] whereby the UK parliament heavily taxed the import of cheap foodstuffs in order to protect British grain growers -- even when harvests were poor and the price of domestic food was very high.

We might also question the idea that the inclement weather of 1816 was the direct cause of the poverty that Mary Shelley might have witnessed travelling through continental Europe that year. For the early decades of the 19th Century, a waxing and waning background level of poverty would have been extant.[22] This is true even if we take into account the economic effects of the Napoleonic Wars, and especially so if we note that social welfare was chronically haphazard and inadequate whilst also acknowledging the episodic 'boom and bust' cycles that involved vacillating periods of over-production and under-consumption, and also the disrupting and dislocating effects of the burgeoning Industrial Revolution.[23]

If it seems too much to blame Tambora for the bad weather of 1816, and thence to also blame Tambora for European poverty and misery, then you might rightly balk at the way the eruption supposedly led to the creation of a piece of literary art that is the *Frankenstein* novel. (If you want to hear a primal reaction from the 21st century literati at first encounter with the myth, you can try listening to Melvyn Bragg's reaction in one of his 'In Our Time' BBC radio features.)[24]

If the Tambora eruption was a factor in the creation of *Frankenstein*, Mary Shelley herself was, of course, completely unaware of it whilst writing the novel since the scale of the eruption was little explored until 20th century volcanology came along. So any 'cause and effect' relationship between Tambora and Frankenstein was from beyond Shelley's own agency. As for the weather, it's true that the *Frankenstein* novel at times broods with stormy and frosty scenery[25] and it's also true that Mary Shelley was occasionally affected by the inclement weather of Lake Geneva during her 1816 summer residence:

> We watch them [the thunderstorms] as they approach from the opposite side of the lake, observing the lightning play among the clouds in various parts of the heavens, and dart in jagged figures upon the piney heights of the Jura mountains, dark with the shadow of the overhanging cloud, while perhaps the sun is shining cheerily upon us. One night we enjoyed a finer storm than I had ever before beheld. The lake was lit up – the pines on Jura made visible, and all the scene illuminated for an instant, when a pitchy blackness succeeded, and the thunder came in frightful bursts over our heads amid the darkness.[26, 27]

However, even if there were more than the usual number of storms crashing over Lake Geneva for Mary Shelley to be awed by, anybody that's spent a full summer in central Europe will know summer rainstorms as a common, sometimes daily, phenomenon. During a typical summer in Switzerland, for instance, most of the rain falls in this exact way; in the form of sometimes very heavy thunderstorms. These storms can also sometimes bring heavy hail and snowfall to the alpine zones nearby. So, if stormy weather plus ice and snow were essential factors in pushing the ambience of *Frankenstein* toward darkness and frigidity, Shelley would have been exposed to such weather on any given (non-volcanic affected) summer on the shores of Lake Geneva. As an example of this,

consider that during the summer of 2019, a violent storm hit Lake Geneva so hard that a few boat-going tourists were drowned.[28] This tragic event occurred on almost the same corresponding June day that Shelley conceived the Frankenstein story – and of course without any initiating volcanic eruption.

Incidentally, it was a violent summer storm in which Percy Bysshe Shelley met his death. A few years after their Geneva experience, the Shelleys again toured to Europe to visit Lord Byron, this time in Italy. In July 1822, in the Gulf of Livorna, Byron and Percy set sail in their respective yachts to race each other across coastal waters whence a great storm hit them. Though Byron made it through safe and well, Shelley's boat was lost at sea, his body washing ashore a few days later.[29] Again, just in case you are wondering, no huge East Indies volcano had erupted the year before.

Whilst in Geneva during the 'Year Without a Summer', the Shelley's also enjoyed sojourns to the icy glaciers in the mountains nearby.[30] But the fact that they could travel to the mountains to view the icy scenes meant the summer wasn't one continuous dark and dismal episode but instead a mixture or cold days and warm days, stormy and fine. The sun keeps making an appearance at least periodically. And although there were record floods in and around Lake Geneva late in the summer[31] which might have given *Frankenstein* an even more tempestuous resonance, the Shelley's had left Switzerland by then.

In any case, we might reasonably ask 'how many lightning storms did Shelley have to witness in Geneva during the summer of 1816 before it sparked *Frankenstein* into her thoughts'? Did she require an above-average number – as is implied by the Tambora – Frankenstein myth? Or maybe just the average number due for any typical Geneva summer? Or just one?

Or maybe none since surely a big part of the writing craft is to utilize imagination and memory to provoke new scenes and events into words that the writer may never have witnessed personally. If we assert that Mary Shelley somehow didn't have the imagination to conjure up a brooding, dark and icy ambience – without witnessing them first hand – then we might be left wondering how many dead human bodies she had to witness being dug up, chopped to bits, and stitched back together in order to come up with her idea of the monster. Conversely, if we are to give Tambora credit for *Frankenstein*, then we might wonder which massive geological catastrophe deserves credit for Shelley's next half-a-dozen major works; most of which were also infused with dark fantasy.[32]

The Tambora – Frankenstein myth also claims that Tambora is responsible another recurring subtheme in the novel; its fixations with human misery.[33] According to the myth, Shelley inflects so much misery and dislocation into the novel only because Tambora created such misery and dislocation right there in Europe right in front of her face as she wrote. However, it's probable that Shelley would have had enough opportunity to observe misery and destitution and dislocation either in central Europe or in her English homeland without having endured the Year Without a Summer. After all, human misery was a common theme of study for most politically-inclined writers of the times, most especially with respect to the works of Mary Shelley's famous philosopher parents, William Godwin and Mary Wollstonecraft, and also with respect to Percy Bysshe Shelley's ideas as well.[34] And also, Mary Shelley had had the chance to witness European poverty with her own eyes

on her first pre-Tambora trip to Europe in 2014 whence she said: "The distress of the inhabitants, whose houses had been burned, their cattle killed and all their wealth destroyed, has given a sting to my detestation of war."[35]

Those convinced of the Tambora – Frankenstein myth often cite the effect that the eruption had on the other arts to bolster their idea that culture could, theoretically, be 'volcanically-determined'. For instance, the red-sky paintings of Turner and Caspar mentioned above.[36] However, unlike Mary Shelley, who was imagining and constructing her own narratives of a complicated social and natural environment, Turner and Caspar were merely recording the environment as they saw it. And if Tambora is thought to be so significant so as to cast a shadow over the artistic mind of Europe; pushing writers and artists into dark romanticism; we should note that the moody gothic genre epitomized by *Frankenstein* started well before Tambora with the likes of late 18th century literature by Horace Walpole, Clara Reeve, Ann Radcliffe and William Thomas Beckford.[37]

As well as this, we should probably also point out that European history is replete with many "Years Without a Summer", including 1529, 1588, 1601, 1618, 1628, 1675 and 1813[38] and so the foreboding and horrific climatic/artistic uniqueness of 1816 might be called into question.

What really made Frankenstein?

Apart from Mary Shelley's fertile and active imagination, a whole host of commonly external causative factors have been acknowledged to have inspired the creation and character of the *Frankenstein* novel. We'll briefly outline these below, so that you might note how all of these seem far better candidates for inspiring the story than the faraway Tambora event.

It's long been thought that *Frankenstein* is a comment upon the French Revolution in some manner. For instance, the dreaded monster is thought to emote the horror felt by the French aristocracy (and the Church as well) as the unrefined and unholy peasantry revolted against them. The novel could also be read as a comment on the way Napoleon Bonaparte transformed the French Revolution to meet his own horrific imperialist ambitions since what began as a social movement with high minded goals soon turned into civic terror and expansionist war on a scale maybe hitherto unknown.[39]

Other literary critics have suggested that *Frankenstein* is a fractured reflection of a rebellion much closer to Shelley's English homeland than the French Revolution – that of the Luddite uprising. The Luddites were textile worker communities rebelling against the introduction of textile machines into their industry which were threatening them with unemployment – and thusly impoverishment and destitution. During the years 1811-1816, some Luddites chose to smash the offending machines. In response, the British parliament introduced the death penalty for such acts. Lord Byron -- before he moved to Geneva -- criticized this draconian measure in an eloquent speech to the House of Lords and, years later, he crafted a poem that brazenly defended Luddism. If Mary Shelley were fashioning *Frankenstein* to empathize with the Luddite movement[40], it would certainly add to the reading of the novel as a prescient warning against the invention of repugnant and irresponsible technologies.

A further contributory factor in the making of the Frankenstein story was the Shelley's European travels. As indicated above, their 1816 trip to Geneva wasn't their first or last sojourn through Europe. In 1814, the two had run away together in a scandalous elopement across the English Channel to France and up the Rhine all the way to mountain-straddled Lucerne. One locale they stopped off at was near Darmstadt, not far away from a decaying castle going by the name of 'Frankenstein'. Within this castle, there once lived an alchemist called Conrad Dippel who is commonly thought to have engaged in experiments on dead bodies in order to find the elixir of life. It's long been asserted that Mary Shelley's scientist in *Frankenstein* owed something to the life and works of Conrad Dippel.[41]

Beyond Dippel, another experimentalist that has been noted as inspiring Shelley's *Frankenstein* was Luigi Galvani, who in the late 18th century often zapped dead frogs with electricity during public lectures so as to surprise and entertain his audience as the legs of the frogs spasmed and twitched, as though the frog was somehow coming to life.[42]

Mary Shelley's fondness for travel[43] is itself a likely contributory factor in the development of *Frankenstein*. The novel certainly has a road movie feel to it, stressing the emotional turmoil of an expedition, of voyage, of discovery, of dislocation, of transgression of social and legal norms, and of abandonment – all set against the backdrop of ever-changing towns and cities and landscapes. Since Geneva was one of Mary Shelley's 'bases' in her travels, it logically became the hometown of the scientist Frankenstein.

Further to the theme of geography, and also in regard to the cold icy gloom of the novel, some literary experts believe Shelley was actively critiquing the Arctic explorations of the British Admiralty as she wrote about how both Frankenstein, the scientist, and Frankenstein, the monster, met again and again in such environs.[44] Of course, according to the Tambora - Frankenstein myth, the icy environs so prevalent in *Frankenstein* were forced upon Shelley's mind because of the 'Year Without a Summer', yet the icy/snowy misadventures and landscapes that abound in *Frankenstein* were familiar to readers of early 19th Century British newspapers which were avidly following the exploits of British explorers as they attempted to conquer many regions of the world, including the Arctic Ocean.

Another inspiration for *Frankenstein* was Mary Shelley's experiences with childbirth.[45] By the time she had completed the novel, Shelley had already been pregnant twice; the first ending in with the death of a baby born premature. *Frankenstein* might well have been a reaction to the desire to bring her dead baby back to life as well as a reaction to the background emotional worries about giving birth to a sick or malformed infant.[46]

Further to the theme of parenting and family; some literary critics have suggested that Frankenstein was somehow inspired by the personality of Mary Shelley's fiancé / husband Percy.[47] Percy Bysshe Shelley was an ambitious 'libertine' genius who took pride in stretching the limits of creativity and of personal freedom -- including sexual freedom. As with the scientist in *Frankenstein*, this occasionally meant riding roughshod over the feelings of others and digressing from social convention. Also, the way that the scientist Frankenstein so readily abandoned his creature after he'd

brought it into existence might be Mary Shelley's reflection on the way Percy so quickly and easily recovered from the death of their first child.

As well as this, the *Frankenstein* novel was probably equally inspired by Mary Shelley's other family troubles.[48] Firstly, Mary Shelley may have felt responsible regarding the death of her celebrated writer mother, Mary Wollstonecraft, who died of childbed fever days after Mary's birth.

Secondly, when Mary Shelley had run away to elope in Europe with Percy in 1814; it was only just after Percy had abandoned his pregnant wife in England. Mary might well have been expressing her own guilt about this situation as she wrote about of the Frankenstein monster complaining about being the abandoned son of a careless creator.

Thirdly, during one of their sojourns around Europe, Percy Bysshe Shelley may have also fathered a child with Mary Shelley's half-sister Claire Clairmont. Though, when the baby was born, Byron was named the father and the Shelleys migrated all the way to Venice to deliver it to him. (Alas, he left it at a convent where it would die within a few years). If *Frankenstein*'s monster is somehow the representation of an innocent child left forsaken without fatherly care, Mary Shelley would've hadmore than the average number of emotional experiences to draw upon.

If we accept that *Frankenstein*'s monster is an 'abandoned child' character, it can readily be noted how Mary Shelley writes into the creature her appreciation of the great Genevan philosopher Jean-Jacque Rousseau[49], who she'd avidly read during her time in Switzerland. Most traditionalists of the time believed that all children were 'born evil' or else born totally selfish and uncivilized. They could only be 'made good' by learning the manners and norms of polite society. Mary Shelley, in contrast, was trying to convey the spirit of Rousseau (and one might add, of the French Revolution) in advancing the belief that all children are born good and kind and are only turned bad through neglect or by a harsh social environment. Given this, then, one moral of the story seems to be that Frankenstein's creature could easily have been a 'good monster' instead of a 'bad monster' if only someone, his scientist/creator/father most notably, had shown him some care and guidance.

Given these multifarious and interlocking inspirations for the *Frankenstein* novel, it seems the Tambora link is but one factor with negligible (or likely nil) influence on the creation of either the *Frankenstein* the novel or the Frankenstein characters. One problem with the Tambora – Frankenstein myth is the attention it takes away from these other inspirations and origins. In many films and articles given over to the history of *Frankenstein*, the Tambora – Frankenstein myth takes up an underserved percentage of the story; often leaving little or no explication of these other factors. Readers and viewers around the world, especially those of 'popular science', are thusly either short-changed or thoroughly led astray when they hear about the intellectual and social background of the culturally significant Frankenstein story.

Lessons of the Tambora – Frankenstein link

Why has the Tambora – Frankenstein link reached mythic status? The answer lies with the perceived moral messages that the myth propagates, combined with its potential role to rescue and

elevate science from the very failings so astutely identified by Mary Shelley.

A primary message of the Tambora – Frankenstein myth (according to those who hold to it) is its illustrative lesson about the impact of climate change. If humans do as Tambora did, i.e.: emit vast amounts of pollution into the atmosphere, then they are going to force upon the world a myriad of 1816-esque disasters: floods and storms, agricultural collapse; economic stagnation, plus human misery, poverty and disruption. For those who believe that Mount Tambora forced climate change upon parts of early 19th century Europe, Mary Shelley's *Frankenstein* is artistic witness to a global environmental crisis.[50] Or as reported by a Smithsonian magazine writer:

> For Mary Shelley, Frankenstein was primarily an entertainment to "quicken the beatings of the heart," she wrote, but it has also long served as a warning not to overlook the consequences of humanity's tampering with nature. Fittingly, perhaps, the eruption that probably influenced the invention of that morality tale has, nearly two centuries later, taught me a similar lesson about the dangers of humanity's fouling our own atmosphere.[51]

Yet there is an obvious disconnect between the Tambora - Frankenstein myth and 21st century climate change. The Tambora eruption forced temporary climate cooling for a period of about a year in select parts of the Northern Hemisphere. The climate crisis of global warming, in contrast, is indisputably long-term and it also directs the thermometer in the opposite direction. As well, when we compare Tambora to global warming, there is a staggering dissonance between their respective causes such that any mode of response must be completely different. Dealing with an erupting tropical volcano is not the same as dealing with a global climate emergency with world-changing implications.

In a way though, the misapplication of the Tambora eruption as a warning against climate change is at least an improvement over previous scapegoating strategies that proposed volcanoes were the cause of global warming.[52]

Here, we can't go on without making a comment upon the 'unaware'-ness within the Tambora – Frankenstein myth. The fact that Shelley was unaware of the Tambora eruption and ignorant of its global atmospheric impact is forgiven by the Tambora – Frankenstein mythmakers since she lived in a time before modern science had uncovered the truth of global volcanic influence. This attempt to wrestle away the writerly agency from Shelley is, in effect, an attempt to explode a veil of scientific dust and ash over *Frankenstein*'s fine critique of scientific hubris. Thusly, the Tambora – Frankenstein myth has a social role within the scientific community to rescue science from Shelley's poignant criticism of that exact community.

From a feminist perspective[53], the Tambora - Frankenstein myth also works to devalue Shelley's skills as a speculative writer by insisting she was affected by forces only more recently successfully revealed my masculinist science. Yet, in contrast to the Tambora – Frankenstein myth, we might rightly assert that Shelley ably revealed and predicted the dangers of masculinist science via the characters of *Frankenstein*.

We can also find that the Tambora – Frankenstein mythmakers rely just about entirely on scientific disciplines to tell their story, relegating art and history in the process. In effect, they advocate that 21st century science is better at describing 19th Century nature and landscapes (and 19th Century society and politics) than 19th Century literature. Yet, Mary Shelley might riposte via the themes of the Frankenstein story that we shouldn't over-estimate the understanding proffered by modern scientific explorers since to do so confers upon intellectual pursuits a profound tendency toward dehumanization. Such a critique might quite aptly apply to the Tambora – Mythmakers, who've managed to reduce the act of literary creation to measurements of sulfurous dust in the Geneva air.

This same process of volcanic determinism also devalues all the other events that caused human misery in the years around 1816: most especially (but not only) the Napoleonic Wars. To help get things into perspective, and in fear that Tambora might overshadow the tragedy of the Napoleonic Wars in Romantic-era Europe, we could ask here which one was worse for humanity? Well, Tambora's eruption caused an estimated 100,000 or so deaths worldwide.[54] Yet the Napoleonic wars caused around 5,000,000 deaths – that's some 50 times more.[55]

Even restricting the misery to the Indonesian islands where Tambora blew its top, we can note that Napoleon-era European colonialism might have caused as much human death in early 19th Century as did the volcano. For instance, during Napoleon's rampages over Europe, the Netherlands was invaded by the French. This meant that on the other side of the world, the Dutch East Indies lost control of the populous state of Java to an opportunistic British force led by Stamford Raffles (the same Raffles who heard Tambora's explosions and thought they were cannon fire).

In his time as Governor of Java, Stamford Raffles had to crack down on various acts of Javanese resistance to British take-over. In the process, his troops shot and looted their way through various Javanese kingdoms. Whilst deaths at the hands of Raffles' troops may have stayed under the ten thousand mark, his heavy-handed intrusions probably prompted the onset of the Java Wars a few years later between the returning Dutch rulers and the local leaders. These wars ended up killing some 230,000 East Indies natives; surpassing the death toll of the Tambora eruption.[56] Thus, if the Tambora – Frankenstein myth is somehow supposed to underscore the influence, power and awesomeness of nature over humans, we might, in contrast, assert that humans, during the first decades of the early 1800s, did unto themselves much much worse.

Conclusions

One of the reasons to reject the Tambora - Frankenstein myth outright is to shoot down the anti-environmental idea that nature is somehow more menacing and dangerous to humans than humans are themselves. Fortunately, most of the myth's advocates do not seem to be operating to do this – at least on the surface. Instead their moral reasoning revolves around the way the Tambora – Frankenstein myth serves as a cautionary tale against catastrophic climate change; whether it be natural or anthropogenic. We, the authors, are very sympathetic to the idea that climate change is

impacting upon the Earth in a catastrophic manner but we hold little store in the idea that a short-term climate cooling event like Tambora is a suitable analogy to global warming. In fact, Tambora just does not seem like an analogy to climate change at all: the causes are different, the changes effected are different, the gases involved are different, the timescale and geographic scale is different, the repercussions and remediation strategies are different, the potential socio-technical solutions are different. The analogy is so tenuous, in fact, that perhaps the myth is being offered up in the world of public science to do something else entirely -- for instance, to promote the intellectual standing of climate science in the study of history[57] or in an effort to link volcano science with a contemporary social concern (i.e. climate change). Since every profession, be it scientific or non-scientific, battles for territory in both the intellectual world and in the contemporary political/cultural environment, so the Tambora – Frankenstein myth may be retold primarily as such weapon in these battles.

Endnotes:

1. For a detailed description of the Tambora eruption, see: Oppenheimer (2011) or Cavendish (2015) or Behringer (2019).
2. As recorded by Raffles (1830) in his memoirs and also reiterated by the likes of Evans (2002), Wood (2014), Klingaman & Klingaman (2016), and Mcnamara (2019).
3. About the magnitude of the Tambora eruption see for example: Self *et al* (1984), Harrington, ed. (1992), Klemetti (2015), Klingaman & Klingaman (2016), Behringer (2019) and Mcnamara (2019).
4. As explained by, for instance: Oppenheimer (2011) and Mcnamara (2019).
5. As outlined in Starr (2018), Osbourne (2018) and Bressen (2019).
6. You can review this in, for instance: Cornwell (2014) or Clayton (2014).
7. See, for instance, Wood (2014a).
8. See, for example, the arguments contained within Wood (2014) and Ritchie (2016).
9. As indicated in Zerefos *et al* (2006) and Broad (2014).
10. A short sampler list of articles and books advancing or supporting the Tambora – Frankenstein myth would include the following: Evans (2002), Jacquot (2007), Phillips (2006), Wood (2014), Zielinski (2015), Davis (2015), Cavendish (2015), Wood (2015), Townsend (2016), Gunderman (2016), Wilson (2016), Ritchie (2016), Malathronas (2016), Higgins (2017), Zaleski (2017), Stone (2017), Andrews (2018), Starr (2018), Blakemore (2018), Strickland (2019). Similarly, a short list of broadcasts advancing the Tambora – Frankenstein myth would include the following: Minor (1993), Kushner (1997), Winston (2003), Bartimae (2005), Stewart (2006), Greenfieldboyce (2007), Bragg (2016), Sands, ed. (2016), and Gillespie (2017).
11. See, for example: Perrotet (2011), Buzwell (2014), Gordon (2015), Mercer (2016), Wilson (2016), Laurence (2018) and Blakemore (2018).
12. As explained by Mary Shelley in the introduction of the 1831 edition of *Frankenstein* (Shelley, 1831) and reiterated with Tambora – Frankenstein myth enthusiasm in Phillips (2006) and Wood (2014).
13. As conveyed in various chapters of the following works by Baldick (1987), Perkins (1992), Schor, ed. (2003).
14. See note 10 for a short list of such.
15. These climate effects are explained by writers such as Harrington, ed. (1992), Fagan (2001), Wagner & Zorita (2005), and Brönnimann & Krämer (2016).
16. These ideas have been expressed by the likes of Tann (1980), Luterbacher *et al* (2004) and Veale & Endfield (2016).
17. Which can be found here: Brönnimann & Krämer (2016).

18. As outlined in Grab (2003), O'Rourke (2006), Esdaile (2008), Dwyer (2014), Roberts (2014), and Emsley (2014).
19. As announced by the likes of Smith (2005), Esdaile (2008), Roberts (2014), Emsley (2016) and Veale & Endfield (2016).
20. As expressed in Harrington, ed. (1992), Trigo *et al.* (2009) and Wood (2014).
21. About the Corn Laws, you may review Eastwood (1996) or Barnes (1996).
22. For elucidation, see Woolf (2016) or Grell & Cunningham (2017).
23. See, for example: Landes (2003), Nye (2007), Allen (2009), Perrson & Sharp (2015).
24. See Bragg (2015).
25. The ice theme of Frankenstein is explored by, for instance: Spufford (1997*),* Carroll (2013), and Cavell (2017).
26. A scene explored by Zaleski (2017). Incidentally, though the monster's creation scene is often presented with blasts of lightning on a dark and stormy night, this owes more to its representations on the silver screen than to anything Shelley wrote in the book. Although Shelley wrote that the Frankenstein scientist infused the lifeless thing "with a spark of being" there's nil reference to lightning in this scene. So perhaps we shouldn't get carried away with positing that electrical storms were needed for 'sparking-up' the birth of Frankenstein (either for the characters or the novel as a whole).
27. Having identified all the cold and ice and rain and snow, though, it's also important to point out that the novel covers other seasons and weather scenarios in detail as well. The monster for instance gets all excited about spring during one of his monologues:
    "The pleasant showers and genial warmth of spring greatly altered the aspect of the Earth. Men, who before this change seemed to have been hid in caves, dispersed themselves, and were employed in various arts of cultivation. The birds sang in more cheerful notes, and the leaves began to bud forth on trees. Happy, happy Earth! Fit habitation for gods, which, so short a time before, was bleak, damp, and unwholesome. My spirits were elevated by the enchanting appearance of Nature; the past was blotted from my memory, the present was tranquil, and the future gilded by bright rays of hope and anticipations of joy" (Shelley, 1818: Chapt. 12). Thusly, any purported attempt to characterize *Frankenstein* solely as an icy cold novel is doomed to inaccuracy and misrepresentation either of the novel and probably of Mary Shelley's moods and affectations regarding the Swiss weather.
28. As recorded by Agence-France Presse (2019).
29. As described in, for instance: Seymour (2002), Schor, ed. (2003), Hay (2011), Johnson (2014), Gordon (2016), Sheppard (2019).
30. Recounted in Perrotet (2011) and Buzwell (2014).
31. See, for example, Andrews (2018).
32. Mary Shelley's other novels include: Mathilda (1819), Valperga (1823), The Last Man (1826), The Fortunes of Perkin Warbeck (1830), Lodore (1835), and Falkner (1837).
33. As explicated in the likes of Cottom (1980), Dugget (2010), Matus (2017), and Mouna (2018).
34. See, for example: Bertram (1973), Carlson (2007*),* Philp (2013), and Gordon (2015).
35. Obviously Mary Shelley is observing the connection between the Napoleonic Wars and human misery in this passage (which was first published under the Shelleys co-authorship in Shelley & Shelley, 1817).
36. An idea advanced in: Zielinski (2011), Wood (2014), Klimetti (2015), and Fredrickson (2018).
37. As described in Bloom (2007), Davison (2009), Dugget (2010), Matus (2017), and Mouna (2018).
38. As reported in Brönnimann & Krämer (2016).
39. On the connections between Frankenstein and the French Revolution see: Small (1973), Botting, ed. (1991), Randel (2003), or Douthwaite (2012). Another keen contemporary literary reflector of French Revolutionary politics and French imperialist politics was Lord Byron. In fact, when the Shelleys had rolled into Geneva to meet up with Lord Byron, he wasn't there because he, himself,

was travelling to the site of the Battle of Waterloo (eager to feel the ambience of the place where European history had turned). Byron for a long while was a keen Bonapartist since Napoleon seemed to him to stand for social mobility, personal liberty, egalitarianism, as well the end of the European form of slavery known as serfdom. However, as Napoleon co-opted a civic revolution in the name of his autocratic military nationalism, Byron fell out of love with Bonaparte. He came to terms with this often through his poetry (see Clubbe, 1997) just as Mary Shelley had to do the same through *Frankenstein*.

40. On this matter, see Pynchon (1984), Gardner (1994), Jones (2006), ICC (2013), and Eschner (2017).
41. See, for instance: K. Carr (2013), Galloway (2016), Georgievska (2016).
42. As noted, for example, by the following: Small (1973), Fulford *et al* (2004), Sha (2012), Friedman & Kavey (2016), and Harkup (2018). Another British candidate for the real-life figure that inspired the Frankenstein scientist character is written about by Goulding (2002).
43. More about which you can read via a combination of first-hand and reinterpreted accounts in: Shelley & Shelley (1817), Feldman & Scott-Kilvert, eds. (1997), Seymour (2002), Shelley & January (2015).
44. See the details of such a connection contained within: Richard (2010), Craciun (2011), Carroll (2013), and Cavell (2017).
45. As explained in, for example: Botting, ed. (1991), Komisaruk (1999), Seymour (2002), Brown (2003), Franklin (2012), Friedman & Kavey (2016).
46. As identified, for example, by Almond (1998).
47. As explored in the feature film *Mary Shelley* (2017) written by Emma Jenson; as well as in the Frankenpod blogpost titled 'Percy Frankenstein/Viktor Shelley' to be found at: https://thefrankenpod.wordpress.com/2018/03/09/percy-frankenstein-victor-shelley/ (Accessed July 2019).
48. For instance, on this, see: Mellor (1988), Botting, ed. (1991), Geohegan (2011), Seymour (2002), Gordon (2015), Mercer (2016), and Wilson (2016).
49. See, for example, Marshall (1988).
50. As explicitly suggested in works such as Jacquot (2007), Wood (2014), and Tonkin (2016).
51. As reproduced in Evans (2002).
52. For an introduction to this phenomenon, see: Klemetti (2015a).
53. For feminist perspectives on Shelley's *Frankenstein*, see, for example: Mellor (1988), Schor, ed. (2003), or Shelley & Mellor (2017).
54. See various estimates of the Tambora death toll in Stothers (1984), Oppenheimer (2011), Brönnimann & Krämer (2016), Orijanska (2018), or Mcnamara (2019).
55. For various estimates of deaths via the Napoleonic Wars, see Esdaile (2008) or Gates (2011).
56. About the Java Wars see, for example: Carey (1976), Ricklefs (1993), or Kumar (1997).
57. For example, the Tambora – Frankenstein mythmaker G. Wood (2014) declares that it is 'high time' that historians caught up with climatologists regarding the investigation of historic events.

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