

## Immunity from history: What can we learn from collective responses to crises?

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### Abstract

History is often evoked as a form of immunisation, as though prior exposure to a threat should protect us from its recurrence. The galloping crises of 2020 were no exception, with historians invited to offer guidance in the face of “unprecedented” challenges to our social and environmental fabric. But what illumination, inspiration or consolation can we meaningfully draw from the past? In revisiting the history of environmental, medical and technological hazards, this paper explores the histories of snakebite, aircraft accidents and epidemics. Did common threads unite efficacious responses to these challenges? Did they offer partial immunity from recurrent threats, or merely the illusion of protection? And what was the most effective scale of intervention — local, national or global? Moreover, how might we translate our history for the futures that we face together?

### Introduction

In delivering the Anniversary Address of the Royal Society of New South Wales in 1894, Professor Thomas Anderson Stuart vacillated between commendation and lamentation.

As the Professor of Physiology at the University of Sydney, Stuart had recently reviewed the Colony’s legislation relating to public health. His task was urgent: over the preceding year, he asserted, a disease outbreak had “practically overrun the whole Colony.” Between them, Stuart surmised, measles and scarlet fever had afflicted 36,000 citizens — nearly 3% of the population. A concurrent outbreak of diphtheria in Cowra had spread to almost a third of its residents, with a case-fatality rate of 13%. Citing recent developments in the US state of Michigan, Stuart called for greater government powers of notification, isolation and disinfection

for communicable diseases. His wish would soon be satisfied by the comprehensive *Public Health Act* of 1896.

Yet in that same 1894 address, Stuart also lauded a potential technological solution. Pastoral experiments with a locally produced anthrax vaccine in over 50,000 sheep had reduced herd mortality from a predicted 20–30% to just two animals. Indicating a galloping community acceptance of the still-novel concept of acquired immunity, he also noted a widespread lay practice in districts where paralysis ticks (*Ixodes holocyclus*) were common. Rural dogs were “regularly made immune” by allowing ticks to feed until their poisonous saliva caused its characteristic symptoms. “Upon complete recovery this is repeated one or two times,” Stuart explained. “After this the dog is protected.” But if country folk eagerly immunised their animals, he lamented, few

Sydneysiders would submit to voluntary vaccination against smallpox, even though it was as lethal as anthrax in livestock. Only an active outbreak, it seemed, spurred humans to protect themselves (Stuart, 1894).

**“The future will bear out the past”**

In the context of the coronavirus (COVID-19) pandemic of 2020, many of Stuart’s exasperations and enthusiasms still seem surprisingly pertinent. Although veterinary experience with immunisation promised the prospect of controlling contagion, in 1894 vaccines could not yet prevent the prevailing human epidemics. Rather than urging a local research program, Stuart pressed instead for both the expansion and consolidation of public health powers in the face of alleged local negligence. “What we have to contend with is not any real opposition,” he insisted, “so much as apathy and ignorance” (Stuart, 1894).

What Stuart advocated, above all, was the preventive power of knowledge. As the outgoing President of the Royal Society of New South Wales, his address came at the end of a long century propelled by an almost unwavering faith in progress. This philosophy was embraced by many of the Society’s members, who hailed from the Colony’s academic, bureaucratic, pastoral, mercantile and ecclesiastical elite. While many were gentlemen of learning rather than active investigators, they shared a positivist faith in the merits of accumulating empirical evidence to guide their predictions and their actions. Furthermore, they “recognised the need to educate or inform the broader public about the achievements of science” (Tyler, 2010).

Counted amongst the sciences was history. Indeed, one of the first acts of the nascent Philosophical Society of Australasia in 1821 was to erect a tablet to James Cook and Joseph Banks on Botany Bay’s southern shore, a spot that “once saw them ardent in their pursuit of knowledge” (Smith, 1882).

History was seen to offer both personal inspiration and precautionary information. Published throughout the two decades after Cook and Banks landed in Australia, Edward Gibbon’s *The History of the Decline and Fall of the Roman Empire* delivered a prophylactic tale against imperial dissipation and hubris. Its first volume was issued in 1776 — the very year that Britain’s American colonies declared their independence (Gibbon, 2005).

The consequent century of revolutions witnessed the emergence of diverse theories that sought to explain the operation and value of history in positivist terms (Burrow, 2009). In its initial usage, the very term “revolution” pointedly implied a circular view of the past, of history returning to its point of origin. Yet in a century captivated by Progress with a capital “P,” the data of history was increasingly invoked to advance society to new heights.

Here, however, a fundamental dichotomy emerged. In 1859, Charles Darwin depicted natural history as a process of incremental adaptation, an endless struggle against eternal environmental change (Darwin, 1860). Writing in the same epoch, Karl Marx argued instead that historical evidence could serve teleological ends. For Marx, the deep patterns of the past indicated how humans might actively intervene in history to attain a state of perfect social organisation (Marx, 1906).

Although it profoundly simplifies the depth and diversity of subsequent meta-historical debate, these two positions have tended to dominate the ways in which non-historians interpret narratives of the past. History either provides object lessons in how to avoid repeating our predecessors' errors, or it reveals entrenched structures from which we might model possible futures. "There need be little doubt but that the future will bear out the past," wrote Colonel Hubert Foster, Director of Military Science at the University of Sydney in 1914 (Foster, 1914). With exquisite irony, the release of his book *War and the Empire* was unexpectedly delayed by the outbreak of a global conflict that was later — if briefly — named "the war to end all wars."

For historians, too, there is an ever-present imperative to argue for the heuristic value of our discipline. "A poverty of disaster memory is convenient for some, but a tragedy for most," writes historian of technology, Scott Knowles. If we fail to systematically scrutinise past calamities, he urges, "others will do it for us without the perspectives offered by the long view of history, namely that risk-taking is no accident and disasters are never truly unexpected" (Knowles, 2014). But, as Thomas Anderson Stuart understood, knowledge alone is insufficient to overcome inertia. Thus both historians and non-historians face the same hermeneutic challenge: how can we operationalise pragmatic insights for tomorrow from a world that no longer exists?

### Immunity from history?

In this paper, I propose a variant reading for the instrumental value of history. I suggest that history is often perceived as a form of acquired immunity. Rather than being

merely instructive, knowledge of the past may prove actively protective. As with tick poison, historical patterns represent both a threat and a potentially efficacious agent for prophylaxis. History may be salutary. Appropriately dosed, it stimulates proactive defence against the recurrence of unhealthy developments. When properly administered, repeated exposure further bolsters this immunity from history.

But can the past truly inure us to the future? And is the protection it affords only partial, or is it truly prophylactic? The following case studies consider three examples drawn from Australian science, technology and medicine. I consider the problems of snakebite, aviation accidents and epidemics in order to explore when, how and why we might productively apply this novel analogy. I then conclude by suggesting whether the concept of immunity from history offers false hope, or a constructive framework for planning ahead.

### Shaping snakebite remedies: novelty versus inertia

It took the European colonisers less than two decades from 1788 to realise that they had little to fear from Australia's apex predators — at least on land. Neither the dingo (*Canis lupus dingo*) nor the thylacine (*Thylacinus cynocephalus*) threatened to eat, maim, trample or gore humans in the manner of big cats, wild canids, bears or pachyderms on other continents (Maglen, 2016).

Over those same two decades, however, the new arrivals became increasingly alarmed about Australia's indigenous serpents. At first they had been dismissed as innocuous, but by 1810 snakes were widely seen as the deadliest creatures in the antipodes. Although they rarely paid heed to the

natural knowledge and healing systems of Aboriginal people, the settlers shared a similarly diverse range of ideas about the danger posed by snakebite — and the most efficacious means of treating it. Throughout the nineteenth century, common settler remedies included one or more of the following: cutting the bite site, sucking out the venom, exploding gunpowder in the wound, tying a ligature, forced exercise, flagellation, smelling salts, electrical shocks, folk antidotes or imbibing copious quantities of stimulants — especially brandy (Hobbins, 2013).

By the 1850s, envenomation and its treatment were subject to the emerging scientific mode of medical inquiry. Members of the Philosophical Society of New South Wales were foremost in pursuing such explorations, publishing systematic studies and speculations in the predecessor publications to this journal (Roberts, 1858<sup>1</sup>). Yet many of their fellow practitioners sought to guide future treatment by publishing individual case histories — isolated anecdotes that largely lacked any consistent theory or systematic analysis.

From the late 1860s, the introduction of two injectable snakebite remedies helped to reshape the practice of Australian medical science. First came the intravenous injection of ammonia, followed by the subcutaneous administration of strychnine. Up to a hundred case reports for each were cited to extol the benefits of injecting these notorious poisons. Both individually and collectively, such cases provided the reassurance of clinical history in the pursuit of medical modernity. Despite their widespread adoption by doctors and laity, however, both remedies were ultimately discredited by two newly ascend-

ant biomedical technologies: health statistics and animal experimentation (Hobbins, 2017).

During his 1894 address, Stuart confirmed that these emergent approaches had effectively overturned centuries of dogma founded on the testimony of the practitioner. “It is only by ascertaining the physiological action of the venom as it affects the different organs and parts of the body,” he stated, “that a rational method of treatment will be definitely arrived at” (Stuart, 1894). Indeed, his University of Sydney colleague, physiologist Charles Martin, simply dismissed the 400-odd previous Australian publications on snakebite. Instead, he conducted a lengthy program of laboratory studies into the venom of the red-bellied black snake (*Pseudechis porphyriacus*). It was so thoroughgoing that Martin earned the 1895 medal of the Royal Society of New South Wales (Martin, 1895).

Martin also led the new field of experimental immunology, developing the first antivenene (antivenom) for Australian snakebites in 1897. Although highly targeted and efficacious, the technical complexity of antivenenes created a clinical quandary. There were no local serum facilities suited to their production, nor did networks exist for their distribution, storage and administration. Thus, having dismissed the historical experience and expertise of his predecessors, Martin left local practitioners with few alternatives but to fall back upon superseded remedies. For instance, while the first commercial antivenene finally entered the Australian market in 1930, major hospitals continued to offer strychnine injection for snakebite into the 1950s, even though it had been condemned half a century earlier.

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<sup>1</sup> Read at the meeting of 14 October 1857, of the Philosophical Society of NSW. [Ed.]

“We should beware of privileging the novel,” cautions historian of technology, David Edgerton, as history suggests that novelty rarely trumps the inertia of the everyday (Edgerton, 2010). While snakebite treatments evolved, Australian clinicians remained alert to the faddish cycles of medical innovation. By retaining a diverse armamentarium of prior remedies, they insured their practices against the failure of the latest advances. Oftentimes, patients also insisted on older treatments, riding out the rhythms of change.

### Iterative immunity: avoiding aviation accidents

Novelty, nevertheless, can shape history. Among the most instrumental adopters of the “history-as-lesson” mantra is the aviation industry. Both in civilian and in military contexts, an overt and ubiquitous justification for reviewing historical crashes is “to provide a reminder of the circumstances of those losses and see how the lessons can be applied today” (Directorate of Defence Aviation and Air Force Safety, n.d.). Paradoxically, the risk landscape of flight is regularly depicted in Darwinian terms: “Safety is not a utopian state which can be reached, it is a continuing battle against ever changing threats,” remarks industry expert Graham Braithwaite (2001).

One result is a voracious appetite for accident reports configured not as human tragedy, but as pedagogy. Another is the sophisticated forensic framing of investigations, which seek to integrate technological, environmental, systemic and human factors into a complex causality matrix. But as historian of science Peter Galison argues, drawing salutary lessons from accidents is often confounded by the dialectic between blaming specific artefacts, circumstances

and decisions, and diffusing causation across systems, environments and historical trajectories (Galison, 2000).

Nevertheless, as Figure 1 suggests, the cumulative effect of regulations, operations and investigations has drastically reduced Australia’s fatal accident rate across diverse forms of aviation, especially since the 1950s.

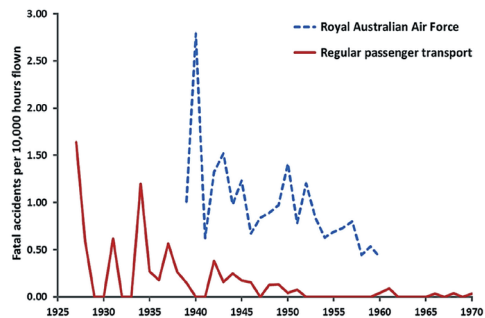


Figure 1: Fatal accident rates versus year for military and scheduled passenger aviation in Australia, 1925–70 (unpublished data).

This proud and hard-won historical record amply illustrates the value of a virtuous cycle, in which flaws are identified via analysis of previous accidents and incidents. Shortfalls are circumvented in later design, maintenance, recruitment, training, operating and oversight systems. The survival of Qantas flight QF32 after an uncontained engine disintegration while climbing out of Singapore in 2010 is a case in point. Despite the accident being traced to inadequate quality control during engine manufacture, the Airbus A380 landed safely, in part because its design incorporated survivability guidelines developed after prior engine disintegrations in the 1970s and 1980s (Australian Transport Safety Bureau, 2013).

Such forensic incision can prompt its own perils, however. For example, leading safety investigator Alan Hobbins sought to debunk an industry axiom: that rising tech-

nological reliability drives the proportional blame for accidents increasingly toward human factors. His analysis compared 100 Australian aircraft crashes over 1921–32 with a cognate dataset published in 1996. Noting an almost identical proportion of accidents attributed to humans for each period (68% *vs* 72%), Hobbs contested the depiction of human factors as an escalating and urgent “last frontier” in complex sociotechnical systems (Hobbs, 2004). However, my own published and unpublished accident data reveals a marked variability over time. Based on archival records spanning 1921–75, the fault ascribed to humans see-saws between 31% and 85% for both military and civilian aircraft crashes (Hobbins & Roberts-Pedersen, 2019). By taking such a longitudinal view, the presumed continuities of history seem shaky indeed.

Finally, proposes technology scholar John Downer, a paradoxical driver for historical improvements in aviation safety is the inherent conservatism of the industry itself. By copiously imbibing history, he asserts, aircraft designers “believe in progress, but only by consecrating traditions and building on the hard-earned wisdom of their predecessors” (Downer, 2017). The inoculation of the past, if we may call it that, continues to engineer a conservative cycle of virtue.

### **Viral history: eradicating epidemics**

My third and final historical case study considers contagion. In the COVID-19 epoch, historians have been especially in demand. We have been asked both to recapitulate the social, political and economic impact of past pandemics, and — rather more hesitantly — to prognosticate about the post-COVID future. In fact, history has been a major component of pandemic planning over the last century.

If Stuart fostered aspirations for alleviating epidemics, he had precious little positive history to guide him. Since his arrival in Sydney in 1882, notable improvements had been made in the city’s sanitation, including its water supply, sewerage, refuse collection and the removal of noxious trades to the outskirts (Coward, 1988). However, as he noted in 1894, multiple transmissible diseases flowed readily across the Colony, even as smallpox vaccinations remained a rarity. Curiously, Stuart ignored both the recently passed “Russian” influenza pandemic and the creeping spread of bubonic plague around the Pacific and Indian Ocean rims.

Pestilence in the past had typically abated as a result of uncontrolled contagion, hasty containment or calamities such as the Great Fire of London. For Stuart, as for many of his contemporaries, immunisation represented an almost unparalleled upheaval that might alter the mode, scale and politics of prevention. The sole human exemplar to guide its adoption was vaccination, first introduced a century earlier in 1796. It entailed inoculation with the relatively innocuous cowpox, to reduce the danger of suffering from smallpox. Vaccination had, in turn, superseded the far riskier previous practice of variolation: inoculation with a mild variant of smallpox itself (Bennett, 2020).

In reviewing the anthrax immunisation data in sheep, Stuart also faced the long and fractious history of smallpox vaccination in the Colony. Unlike several other Australian colonies and Great Britain, New South Wales had never mandated compulsory vaccination. One result, he noted, was the limited popular impetus for protection unless an epidemic threatened. Yet throughout the nineteenth century, smallpox remained a slow pandemic, in part because of the erratic



global adoption of vaccination (Bhattacharya & Brimnes, 2009). Even when the disease circumvented Sydney's quarantine system in 1876–77 and 1881–82, the rise in metropolitan vaccination rates was merely ephemeral. Both outbreaks were instead overcome by vigorous maritime and municipal quarantines. These measures were predicated on drastically increased powers for the city's centralised Board of Health and — for the first time — the enforced confinement of citizens (Hobbins, 2017).

As a prominent intellectual and an advocate for public health, Stuart therefore faced a historical dilemma. In the context of concurrent epidemics of measles, scarlet fever and diphtheria, should he place faith in the true “herd immunity” against anthrax recently proven in sheep, or urge a further extension of medical policing powers? Each path would potentially diminish the liberties that colonial citizens took for granted. In this context, major advancements in medical technology and authority hardly bespoke “progress” to Sydney's poorer residents, as they had protested to a Royal Commission into the 1881 smallpox outbreak (Street et al., 1882).

Stuart's message largely reflected his audience. He asserted that improving public health was “distinctly a poor man's question.” Yet in proposing laws to enable the compulsory notification and prevention of transmissible diseases, he presumed that “I do not suppose there is a man in the room who does not assent” (Stuart, 1894). The men in the room were, of course, members of the Royal Society of New South Wales. Stuart himself was not a politician, bounden to the votes of an increasingly enfranchised male populace. But law-making required champions in Parliament, and many Members in the audience heard his entreaties.

Balancing the frustrating history of smallpox vaccination against the conspicuous successes of compulsory surveillance and detention, Stuart recommended regulation rather than research. Immunisation might hold prophylactic promise, but it did not offer the certitude of the recent past. That past itself promised two forms of immunity. The first was the pragmatic knowledge that such measures had demonstrably defeated disease several times in recent memory. The second was political immunity from protest, founded on an appeal to history as the ultimate arbiter of authority to speak for the future.

### Threats and threads

History is operationalised every day across diverse fields of human endeavour, from facial mask wearing to pandemic planning. Its instructive value is primarily perceived via past prototypes or parallels. Studying history is frequently justified by positioning it as a source of verifiable observations — data that can shape our conscious, rational decisions about future choices and their consequences.

But as I have suggested in the three examples above, the concept of immunity from history also entails an attitudinal element. It presumes a degree of subconscious absorption of the past that may protect us into the present. Both the pattern and the prototype models of history have shaped professional cultures, industry standards, political processes and our normative assumptions about which paths are possible, or desirable, or just. It need not be overt to be salutary, but as with any form of tradition, it can readily become reactionary.

If our aviation safety record is one indicator, an entrenched culture of conservatism is not necessarily a retrograde development. The very accountability

of posterity encourages a precautionary approach. Yet even well-intentioned examples can prove problematic if they suggest a stability not borne out by the messy trajectories of history. Australia's history of snakebite treatments also illustrates the unhealthy allure of prior practices when progress proves problematic. And Stuart's patrician attitudes toward the "poor man's question" of eliminating epidemics were shaped as much by the previous political success of public health interventions as by the promise of shaping new knowledge.

Sojourning across scale is also intrinsic to seeking immunity from history. Individual exposure is critical, but the collective response shapes its cumulative impact. Industries and communities comprise individuals, whose daily decisions are often drawn from personal and proximal history. The diagnostic process in medicine, for instance, commences with taking an individual history. But both the prognostic and therapeutic options are guided by the cumulative histories of prior patients.

At both conscious and unconscious levels, models and examples drawn from history remain critical to everyday decision-making across science, technology, medicine and the humanities. But fostering an immunity from unhealthy precursors requires critical analysis of both our historical evidence and the stories it feeds. Our urgent challenge for the post-COVID world lies in credibly communicating those collective narratives — at least where we concur that history may be salutary.

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