

**Frogs and feeling communities: a study in history of emotions and
environmental history**

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Emotions pervade environmental histories, from John Muir's passion for nature, to the renowned (if overstated) colonial Australian fear and hatred of trees. Some works in the broad area, from Keith Thomas's influential *Man and the Natural World* to Grace Karskens' brilliant ethnographic-environmental history of early Sydney highlight the role of emotions in shaping the ways in which people in the past have understood and interacted with nature. Looking further afield, we have flourishing anthropologies, geographies and histories of emotion, and emotion figures as a key concern in ecocriticism and the interdisciplinary environmental humanities. Literary and art scholars and historians of medicine and science have examined how past (usually Western) societies understood emotions as markers of the experience of being human.¹ Environmental historians, however, are yet to make emotion a central category of analysis.

This is surprising, given that emotions clearly play an important role in shaping historical relationships between human and nonhuman. As anthropologist Kay Milton puts it, 'without emotion there is no commitment, no motivation, no action'.² Indeed, the connection between emotion and action has not gone unnoticed among contemporary wildlife conservation charities, with many of these organisations placing appeals to emotion at the front and centre of their call to arms. Indeed, in the context of the gathering global 'climate crisis', this connection may prove critical to the conversion of rhetoric into meaningful action.

Emotions have always been a fundamental part of human understandings (scientific, philosophical, poetic, artistic, economic) of the human and natural world. Human lives are lived in eclectically comprised communities of human, animal, natural and supernatural entities, and human emotional bonds are essential to these communities' functioning. Human emotions have mattered immensely to how we have interacted with the environment around us, whether it has been understood joyously as a gift from God to be employed for human benefit, or through the rise of 'rationality' as a form of emotional hardening against the aesthetic and moral appeals of nature, as Kay Milton suggests.³ Philosopher Glenn Albrecht has coined the term *solastalgia* as a form of distress caused by environmental change, harkening back to

the original orientation of the seventeenth-century use of ‘nostalgia’ to refer to loss of place, rather than time.⁴ We propose that methodologies drawn from the history of emotions scholarship have an important role to play in charting how emotions are understood and employed for the ecological operations of a given society.

As Grace Moore has pointed out, bringing the history of emotions together with environmental history and ecocriticism can provide useful context for understanding contemporary affective responses to our environments.⁵ Now, more than ever, as we plough headlong into both the sixth great extinction and uncharted climate territory, we could really use a sense of what is enduring about human emotions towards nature, and what is unique to the present. We need long histories that trace changing emotional dynamics in relation to nature and we need more intimate stories, similar to those told by geographer Franklin Ginn, of how embodied, emotional engagements with everyday proximate nature in different times and places provide hope for more ethical and sustainable human dealings with the non-human world.⁶ We need to understand changing emotional practices in the corridors of power and engineering offices as well as environmental campaign headquarters. We need to know how nature has been embedded into some emotional communities, and excluded from others. In short, we need environmental histories that consider emotions in a more sustained and theoretically-informed way. This article offers an overview of some approaches from the history of emotions that environmental historians could employ in order to sharpen engagement with emotion, and applies some of these approaches to a long history of human-frog interactions, by way of example.

We come to this study with an understanding that human interpretations, past and present, of the nonhuman are mediated by our human experiences of emotions, including their sensory dimensions, which are in turn shaped by the sociocultural context in which our emotional capabilities and inclinations are developed. The new history of emotions scholarship primarily understands emotional experience as cultural and social practices that are connected to specific, historic communities. As such, it asks how emotions have been conceptualised, termed and debated in particular past populations. It seeks also to understand not only the contexts in which emotion concepts and practices emerged, but also to chart change and continuity of emotional experiences within and across cultures, as they entangle across time and space.

The history of emotions field has developed multiple methodologies and approaches that inform the work of diverse humanities scholars who seek to investigate emotions in the past. A range of theories has helped scholars to navigate how emotions work across time and place, and their use depends in large measure on the questions that drive scholars' inquiries. Historians have typically distinguished between structures for feeling experience and expression at a communal level, and those of individuals residing within this cultural locale who may respond, react or disrupt its emotional ideologies and expectations. The former has been most powerfully analysed by medieval historian Barbara H. Rosenwein as 'emotional communities,' operating in all forms of society, each with their own systems of feeling.⁷ The concept of 'emotives' proposed by early modern historian William H. Reddy, by contrast, offers analytical capacity to articulate the feeling self, an individual's resistance and response to cultural norms or 'emotional regimes'.⁸ A concept that is gaining traction adapts sociologist Erving Goffman's conceptualisation and language of performance and its development by philosopher Judith Butler as 'performativity'.⁹ In this model, the analytical focus turns to how performed emotions and emotional performances create identity and selfhood. Similar is the definition of emotions informed by practice theory proposed by the historical anthropologist Monique Scheer: 'Conceiving of emotions as practices means understanding them as emerging from bodily dispositions conditioned by a social context, which always has cultural and historical specificity.'¹⁰ In Scheer's view, people acquire emotional repertoires in particular contexts, and they are embodied in 'habits following the logic of everyday practice': through practice, they become 'second nature'.¹¹ These approaches have been fruitfully applied to consider mass actions, panics and protests as much as individual thought and expressions, through a wide range of sources subject to study that includes interpretation of actions and events as well as close textual, visual and material readings.

Scholars of the field have also recently been engaging with concepts of space and place emerging particularly from anthropology and archaeology, and the opportunities for affective articulation in site-specific analyses.¹² This would seem to hold particularly rich possibilities for researchers pursuing questions pertinent to histories of both environment and emotions. Histories of emotions also frequently consider what emotions do culturally, what they allow and what they prohibit as they are expressed by individuals of different gender, age, status, ethnicity, ability, and faith, for example. In this vein, we can see ideas and feelings about the natural world

(as well as reflections on the potential emotions of living others) informing environmental engagement across time and place, from the treatment of animals as livestock or pets, and nature as exploitable forestry or marine resources.¹³ Feelings about other living entities have powerfully informed colonial enterprise across the world, not least in decisions taken about destruction of local ecosystems and habitats, and transportation of flora and fauna to new destinations around the globe in support of human ambitions. A nascent literature of early modern environmental and emotional histories, albeit usually in isolation from each other, is nonetheless beginning to chart this historical territory.

As will be clear from the discussion above, to investigate historical emotions one must also read sources differently, and sometimes read different sources. Environmental historians are accustomed to interpreting scientific data and other observations of ‘nature’, and setting these up in a dialogue with pertinent features of the social and cultural context. Reading emotion in historical sources requires a more ethnographic sensibility, attuned to gestures and glances as well as articulated responses, and their meaning within precise historical social, cultural and linguistic contexts. It requires constant vigilance and effort to make historical emotions strange and not assume that emotional expressions and experiences mean the same thing from one time to another.

While analysis of past emotional experience requires a degree of analytical distance, in another sense, proximity – both physical and emotional – would seem to be a particularly rich vein for exploring the role of emotions in environmental history.¹⁴ In this article we explore the ongoing challenge of managing relations with proximate nonhuman nature within evolving scientific and social contexts. We argue that emotions have played a key role in the constitution of human communities, as well as enabling or inhibiting particular kinds of thoughts and actions in relation with the living planet. Historical texts dealing with non-human subjects operate pedagogically, explicitly or implicitly, to train and discipline the emotional selves of human adults and children according to changing religious and moral ideologies. In what follows, we showcase the complex historic relationships between cultural (including religious and moral) frameworks, scientific expectations and conventions, and the texts and images arising from these contexts, which produced emotional pedagogies informing diverse human relations with the non-human world.

Our study seeks to contextualise and trace, through intimate engagements and broader ideologies, some continuities and changes of emotion in human-frog

relations. Globally, and in western societies specifically, frogs are not so obviously inscribed with prior meanings as charismatic mega- and mini-fauna such as rats on the one hand, or butterflies on the other. For humans, they have carried an ambivalence that arguably makes them a sensitive barometer to changing human emotions around nature. They are rarely subject to market relations, but have played important roles in scientific research and education, so our narrative dwells on this area. Our principal focus is on frog encounters in Perth, Western Australia, across the twentieth century. We hone in on particular moments in which less tutored juvenile feelings came up against established (adult) emotional norms, starkly illuminating adult feeling communities and their practices. These moments took place in everyday suburban life as well as formal educational settings; while they are peculiar to their antipodean location on the Swan Coastal Plain, they also crucially involved knowledge, institutions and practices inherited from Britain, and it is likely that similar moments might be found in British settings. Settler Australian children's emotional education in interspecies relationality with frogs took place in the context of an inherited mythical and biblical literature, the rise of animal welfare concerns, flourishing natural history institutions and texts, and a settler culture that at first denied or disparaged and later sought to recover and appropriate Indigenous knowledge. A crucial context is modern science, which has long entailed suppressed empathy for individual animals as part of emotional performances of professionalism and objectivity. In order to understand settler scientific emotions as durable practices in the Australian context, we trace their antecedents back to eighteenth-century Europe.

We therefore set down some roots at the intersection of histories of modern science and histories of the emotions. Scholarly exchanges between the two subjects are conspicuously rare.¹⁵ Where histories of modern science and emotions have intersected in historical scholarship to date, they have done so, generally speaking, within a fairly rigid interpretative framework. The chief claims of such analyses are that Enlightenment discourses of the perpetual 'progress' of scientific understanding were a symptom of an ever-growing human mastery of the living and non-living universe. Such a line of argument joins with an allied narrative of a rising rationalism, positing that as human power expanded then human fear of the uncontrollable elements of that universe crumbled away. In short, science had tamed the wild world.¹⁶ Peter Stearns, for instance, focusing specifically on the late Victorian period in the United States, identifies not only a decided shift to what he terms a 'cool

emotionology’ - a heightened ‘objectivity’ - but also proposes that this approach to the universe has deep historical roots.¹⁷

Beyond recognition of these macro-entanglements, there are notably few interrogations of the inter-relationship between modern science and emotion. A couple of recent works have, however, explicitly sought to set the scholarly agenda in this regard, pointing to at least two core approaches that such an engagement might take: a history of science perspective on the emotions, and a history of emotions perspective on the history of science. Each has the potential to reform and recalibrate understandings of the other in both past and present contexts.¹⁸ It is the second of those approaches that principally concerns us here. Seeking history of emotions perspectives on modern scientific practices, positions and performances has the potential to unravel complex modes of past understanding of the more-than-human world on a variety of levels, not least in relation to the ways in which other forms of life – frogs, in this case – have been imagined and treated by feeling individuals and by larger scientific interest groups in both theory and practice. Indeed, if we take emotions to be *creative* forces, not simply products of events in space and time, then we may consequently understand them in a history of science context as being key elements in the formulae that forged past scientific concepts, attitudes and practices.¹⁹

Emotions have historically resided at the very core of scientific engagement with the locations and inhabitants of the more-than-human world.²⁰ The relative dearth of scholarship that explicitly sets out to nuance an entangled history of emotions and modern science means that there is ample space for the posing of new historical questions: what stories are there to tell, about the emotions that structured scientific change on the largest of scales on the one hand, and about the impact emotions have exerted on incremental practical approaches, on the other? Dissecting the structures of scientific mindsets and practices, and the links between science and society is one dimension of what concerns us here. If we consider the contexts of the animal and environmental sciences, the potential horizons opened by engaging emotions with history of science in this way are profound, not least in light of the multiplicity of spaces implicated in the doing and dissemination of scientific work, including (but not limited to) traditional laboratories, the ‘living laboratories’ of the zoological and botanical gardens, the vivisector’s table, the colonial field station, the farm, and extreme environments at each of the planet’s poles as well as deep within it.²¹ Scientific practitioners of whatever hue encountered the living world and the beings who dwell as part of it across an unimaginable array of spaces and contexts,

and these spaces and contexts are ripe for interrogation at the intersection of histories of science and emotion.

As we illustrate, the frog sits at the intersection of science, environment and emotion in ways that demonstrate both change and continuity with the passing of time. Recent scholarship by historian Charlotte Sleight has explored the frog as a case study of ‘the ontological status of animals and things’ and particularly as a curiously inexpressive interlocutor in present environmental causes, asking ‘why can we not hear it?’²² Her own prior work has been an important contribution to a meagre scholarship on the frog in human history.²³ Although her focus is not the history of emotions, she concludes that ‘Frogs can’t speak, but it’s scientists whom we should help to talk. Otherwise frogs will croak.’²⁴ Sleight’s work thus points to the significance of inter-species relations and relational identities, and of the importance of human emotions to these, in the quest to protect the diversity and integrity of our planet’s ecosystems.

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By the eighteenth century, the laboratory was seen as the prime location in which knowledge about nature might be created, and frogs could increasingly be found in these scientific spaces.²⁵ Indeed, frogs had emerged as a pre-eminent subject for scientific dissection and vivisection, and animal feelings a topic of interest within this work.²⁶ On the whole, the evidence suggests that in the early modern period, documented concerns about vivisection focussed on its scientific value rather than the suffering of the animals involved. These discussions about knowledge production can be viewed as emotional performances of a relatively closed community of intellectual men. Emotional expression and knowledge production were connected, for the ‘right’ sort of performed emotions were necessary to produce knowledge acceptable to this scientific community.²⁷ Accordingly, compassion, sympathy or love for fellow creatures did not feature strongly in early modern anatomists’ accounts, although we cannot rule out that such emotions were experienced by these men. A more common range of feelings referenced awe and marvel at God’s creative work in scientists’ discovery of the complex inner workings of human and animal bodies.²⁸

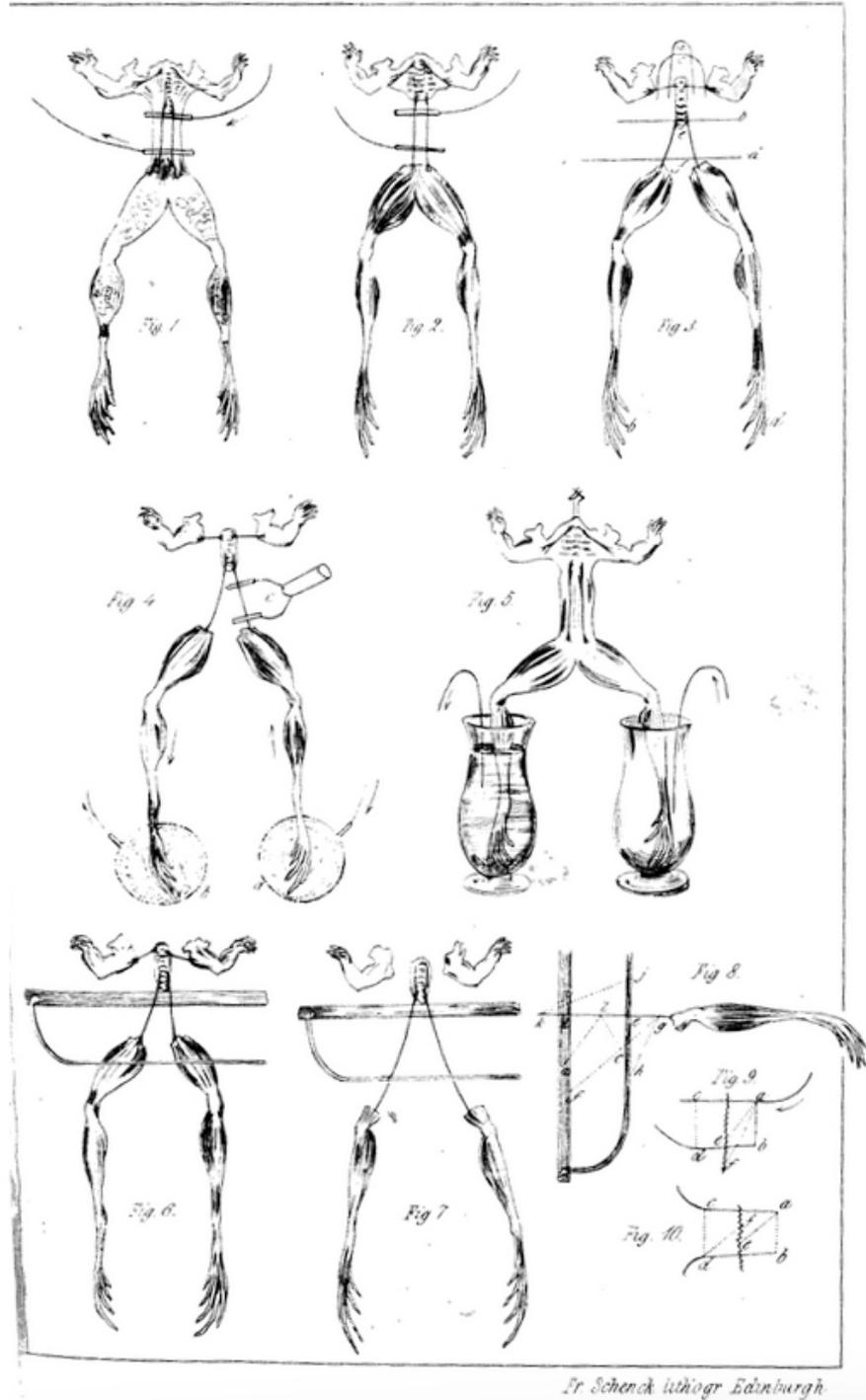
Frog bodies were subjected to ever-new forms of mutilation with the emerging interest in electricity in the eighteenth century. This reflects growing attention to the mechanics of nature: the precise ways in which parts related to each other in the

production of animation. Indeed, this was something of a burning issue that often – though not always – resulted in binary interpretations which privileged either purely mechanical relationships or which pointed to the presence of some kind of vital force that animated living things. This problem was largely interrogated through violent practices.

Scholars have suggested that frogs suffered with the consolidation of scientific method that demanded repeatability, for observations that could be witnessed in frogs were hard to produce as successfully in other species.²⁹ The scientific process that separated muscle and nerve from corporeal casing, and terminology that made frogs ‘fibres,’ ‘muscles’ and ‘nerves,’ denied subjectivity and agency to the living creature called a frog. Among the Bologna physician Luigi Galvani’s laboratory notes on his experiments with frogs and electricity is one sketch that demonstrates how he connected an electric machine to the spinal cord and legs of a frog, on the one hand, and a Franklin square, on the other, in order to observe the legs’ contractions and advance his theories of neuro-electric animal motion.³² The casual reader would be hard pressed to identify the elongated scribble as a frog, or parts of one, which may have indeed been Galvani’s aim. These visual and textual acts of scientific documentation removed all identity and selfhood from the being that was its centrepiece. This pattern continues in a wide variety of nineteenth-century illustrations of key electrical experiments that are mostly depicted via disembodied human hands manipulating disembodied frog spinal cords and legs.³⁴

Victorian scientist Marshall Hall, who formulated a set of principles for animal experimentation that were intended to minimise suffering, routinely used frogs in his experiments on the nervous system in the 1830s and 40s. After first cutting the spinal cord near the skull, in keeping with earlier strategies the experimental frog was transformed from a (previously) living being to an assemblage of tissue, by removing everything but the subject nerves and muscles from its frame (see figure 1). Hall intermingles emotional and scientific objectives in noting that this mode of preparation was intended ‘to annihilate sensation, and to obviate all idea of the infliction of suffering, and of the interference of volition with the other results’.³⁵ It appears that Hall delegated the work of frog preparation to others, rather than undertake it himself. As frogs become ever more embedded in scientific processes, the scientists who worked on them appear to have sought ways to deny the possibilities of frog selfhood and to separate themselves emotionally from their subjects.

This ideal of ‘objectivity’ was increasingly at the heart of scientific epistemology during the nineteenth century and, as George Levine suggests, the story of the pursuit of this objectivity is highly complex. Deploying the evocative metaphor of ‘dying to know’, Levine argues that a key element of the quest for knowledge was the moral desire to effectively eradicate the self; a state that can only ever be possible in death. The point of self-abnegation was to purge the pursuit of knowledge of all emotion, as well as prior context, and thus to allow natural objects to ‘speak for themselves’. While such an endeavour was always-already in vain, Levine nonetheless provides convincing evidence that the pursuit of objective truth entailed great intellectual and moral strength; a commitment to scientific method and the maintenance of emotional distance from the subject of investigation.³⁶ Rob Boddice’s study of late nineteenth-century Darwinian scientists’ advocacy of the importance of this kind of emotional control in the face of animal suffering, as well as their failures to achieve these ideals, attests to the continuing challenge of emotional management of human-non-human relations within changing scientific paradigms.³⁷



Fr Schenk lithogr Edinburgh

From Marshall Hall, 'Researches into the Effects of certain Physical and Chemical Agents on the Nervous System', *Edinburgh New Philosophical Journal*, vol.45, no.90, 1848, p.267.

Western literary culture at this time did little to cultivate emotional engagement with frogs or offer an imaginative sense of their own inner lives into the nineteenth century. From Aesop's Fables, to Jean de la Fontaine's seventeenth-

century courtly poems, and Uncle Remus' folktales, frogs were generally presented as either stupid or deceitful creatures. For many, frogs remained hard to love. In the Brothers Grimm *Frog Prince* (1812), the princess despises the frog, a 'disgusting' and 'stupid' creature with a 'thick, ugly head'. In the Grimms' original tale, the Princess doesn't kiss the frog but throws him against the wall; one of many instances in which frogs are objects of cruelty.³⁸ Mephistopheles in Goethe's *Faust*, Part One, (1828-9) announced himself in biblically apocalyptic terms as 'The Lord of rats and mice, of flies and frogs, bed-bugs and lice.'³⁹

Yet, at the same time, an emerging discourse was increasingly defining acts of animal cruelty in society and in law. The Victorian era had seen significant transformations in human-animal relations, as public zoos were established, pet ownership became widespread among the middle class and extensive networks of animal breeders were established.⁴⁰ The period also saw the rise of animal protection, welfare and anti-vivisection movements in Britain, Australia and elsewhere, which actively endeavoured to shape ways of thinking about and relating to animals.⁴¹ In Britain at least, this was linked to humanitarianism: William Wilberforce, who led the campaign against slavery in the British Parliament, was also a co-founder of the British Society for the Prevention of Cruelty to Animals (founded 1824). By the mid-nineteenth century these shifts were also felt in the Australian colonies. An *Act for the Prevention of Cruelty to Animals* was enacted in Van Diemen's Land in 1837, and in the 1860s animal welfare clauses were added to all colonial Police Acts. Societies for the prevention of cruelty to animals were active in all Australian colonies by 1892, driven largely by women and focusing mainly on pets and working horses in urban areas.⁴²

In parallel with these developments, between the 1790s and 1860s childrearing and etiquette manuals began to emphasise 'mercy and pity' for brute creation, and a specialised market for animal protection advice pamphlets and manuals appeared. These were concerned with children's cruelty to animals and its moral and political dangers, amid the belief that children practicing cruelty to animals would develop an 'inner barbarism' that would in time be expressed in cruelty to other humans.⁴³ Children's books containing moral tales dealing with animals as victims of human violence began to appear from the mid-nineteenth century.⁴⁴ Australian organisations for the prevention of cruelty to animals were involved in apprehension of offenders but also had an educational agenda that targeted both adults and children: one 1883

Victorian SPCA pamphlet urged children to see animals as beings with ‘feelings, hopes, fears [and] wants like ourselves’.⁴⁵

Increasingly across the eighteenth and nineteenth centuries, the public were also encountering animals within institutions and texts devoted to natural history, which at this time can be usefully understood in relation to expansion on multiple fronts. Across the period, and as Western imperial processes accelerated, the extent to which natural artefacts could be extracted and moved from place to place increased.⁴⁶ Building on the earlier establishment of scientific societies, such as the Royal Society in London (1660), the gathering of the knowledge that came alongside the influx of natural ‘things’ from across the world intensified. This expansion and the associated globalisation of natural history also accelerated cultures of collecting and communication, which led initially to the establishment of private cabinets of curiosity and then, later, science museums.⁴⁷ Natural History grew in popularity in the eighteenth century. Private collections and public exhibitions of living, formerly living and inanimate nature took a variety of forms – from static menageries like the Exeter ‘Change on the Strand in London (est. 1773), to published textbooks crammed with rich detail and directed towards an array of potential readers.⁴⁸ As Stephen T. Asma notes of natural history museums (but the sentiment is applicable well beyond the walls of those institutions), this was about ‘visualizing the invisible, of making ideas palpable.’⁴⁹ This shift between spheres of experience and exposure – which gathered strength and influence across the long nineteenth century - stimulated the emergence of new emotional engagements with the natural world.

One of these took place in schools. In Australia, as elsewhere around the Western world, nature study was introduced in the late nineteenth century as part of the progressive reforms of ‘New Education’.⁵⁰ Schools introduced structured naturalistic pursuits for children such as observing frogspawn, taking nature walks, creating botanical diaries and collecting insects, which aimed to encourage empathy with the natural world through intimate experience. Here, emotional attachment and aesthetic appreciation were valued alongside scientific observation and reasoning, though not always equally. For example, Wilbur Jackman’s influential American guide, *Nature Study for the Common Schools* (1891), recommended classes studying skeletons of small animals such as frogs, mice or birds, for which the animals would be killed and prepared by the teacher using a caustic solution, scraping of flesh and removal of the brain with a crooked wire.⁵¹ By contrast, in a series of texts designed for nature study in New South Wales in the early twentieth century, Australian nature

educator William Gillies encouraged teachers to help children to make the distinction between ‘a frog’ and ‘a particular frog,’ imbued with selfhood and individual experience.⁵²

It was in the context of these forms of growing attention to children’s relationships with animals that in late March 1904, Perth, capital of Western Australia, experienced a ‘visitation of frogs’. Situated on the Swan coastal plain, the city encompassed significant permanent and ephemeral wetlands, some of which had yet withstood the tide of urbanisation. Overnight rain followed a few days of warm weather, and in the morning ‘thousands’ of small frogs appeared and ‘hopped around in roadside puddles’. The event, as reported in the *Western Mail*, called up diverse emotions: ‘bewildered pedestrians rubbed their eyes and recalled biblical versions of plagues gleaned in Sunday school days’, while the animals ‘became a source of alarm to timid housewives’ and a ‘never-failing delight to youngsters, who shared their love of puddles’.⁵³ A gossip columnist for the *Kalgoorlie Miner* put a more sinister spin on the youngsters’ delight, reporting that:

Yesterday the pavement showed endless skeletons of frogs, frogs flattened or ‘bashed’ in the language of ‘Wee Macgregor’. The boys caught the unlucky frogs by one leg, and they cried in a most pitiful way. Small boys had a glorious time, and so had cats.⁵⁴

Though the descriptions are slight, they comprise evidence of a range of emotions, anticipated or actually expressed as part of broader, multi-layered systems of feeling.

The allusion to ‘Wee Macgregor’ refers to the work of Scottish author JJ Bell, about a boy of about 7-8 years old in a working-class Glaswegian family. It was a smash hit of its day, and its appearance in this context reflects the assumed legibility of emotions within (and perhaps beyond) the British Empire.⁵⁵ One Wee Macgregor story, ‘For wee Joseph,’ recounts Wee Macgregor’s visit to his Grandpa Purdie at seaside Rothesay. There he catches crabs, which he says he intends to take home for his bedridden friend Joseph. Grandpa Purdie tells him that the crabs will die in Glasgow, so he should let them swim free. This angers Wee Macgregor, who then wants to bash the crabs. Grandpa Purdie tries to encourage empathy in Macgregor, telling him that the crabs haven’t done anyone any harm and asking whether he would like to be bashed by a giant. Macgregor only relents when Grandpa Purdie considers the crabs’ own emotions: “The wee beasties is that happy, ye ken, an’ it wud be a sin to bash them. They’re jist like weans doon at the coast fur the Fair, rinnin’ about an’ enjeyin’ theirsels, an’ they’ll be awfu’ obleeged to ye fur no’ bashin’ them.”⁵⁶ The

reader is guided by the actions of Grandpa Purdie, who spares the innocent crabs and contributes to Wee Macgregor's emotional education, consciously instilling sympathy for these small crustaceans.

By the time of the visitation of frogs in West Perth then, children's cruelty to animals was – at least among some middle-class adults – seen as an indicator of children's lack of civilised conduct that should be rectified through appropriate guidance, lest it lead to a life of barbarism. After noting the boys' cruelty, the journalist concluded: 'The heaps of slain frogs reminded me of pictures showing savages killed in war and heaped together.' This conclusion points to the way in which class-based and deeply ingrained understandings of civilisation and barbarism were organised spatially and through practice, including emotional practices. The boys' gleeful violence, which thrust the spectre of 'barbarism' into a controlled and 'civilised' suburban context, was deeply unsettling, to the extent that it invoked imagery of human atrocity. However, the emotional register at the end of the article is one of sorrow and pity rather than fear or anger, likely arising from a confident sense of the upward trajectory of civilisation both over human history and across the human lifespan: this particular emotional expression turned on a deep-seated belief in both the inevitability of both Indigenous decline and death, and the violence of untutored schoolboys yet to acquire the status of fully civilised adults. There is also, of course, a moral equivalence being expressed here between frogs as the unwilling victims of the boys' violence, and the indigenous peoples who must yield – violently if necessary – to safeguard the spread of civilisation. The newspaper guided readers towards a perception of appropriate feeling as part of a shared emotional community.

In the twentieth century the frog remained an important, if no longer dominant, subject for experimentation in the laboratory.⁵⁷ However, it found a new and perhaps more destructive role in science pedagogy—destructive both to the creatures who were its victims and to human perceptions of frogs as animals worthy of care and protection. This trend ran both in parallel, and opposition, to a growing pedagogical attention to the natural world. Natural history writing, for example, flourished in Australia – as elsewhere in the anglophone world - in the first decades of the twentieth century, and items in the adult and juvenile periodical press regularly probed the mysteries of frogs—their remarkable lifecycle, mating habits, feeding and calling—to a curious readership. Meanwhile, animal advocacy and popular culture reflected an increased tendency to see animals as repositories of individual experience

and imbued with selfhood; these broader emotional currents would see somewhat of a fracturing in approaches to science education.

In August 1931 a small item in the ‘news and notes’ of Perth’s leading metropolitan daily newspaper led to a minor controversy over the status of animals – and especially frogs – in relation to scientific education. It began: ‘At a large Perth school recently, the science master asked the boys each to bring to school a frog, to be cut up for study purposes.’ This is in itself intriguing, as it points to the assumed availability of frogs, and therefore their ubiquity and boys’ knowledge of where and how to find them. The note then recounted the story, told by Rabbi Freedman to the Perth Rotary Club, of how one young Jewish boy did not bring a frog because he claimed it was against his religion. The master wrote to the Rabbi asking whether this were true, the Rabbi wrote back that it was not, and when the master showed the letter to the boy he exclaimed ‘Oh, but Rabbi Freedman is not a proper Jew’.⁵⁸ The religious humour was overshadowed, however, by the debate over uses and treatment of animals.

Agitation against vivisection gained currency in the Australian context from the late 1920s, when the British Union for the Abolition of Vivisection established a presence in Sydney and Melbourne.⁵⁹ The first respondent to the school frog news item, believing the animals were to be dissected alive, declared that the cruelty of the practice was ‘self-evident’, to which the author added the now familiar argument against animal cruelty, that it was ‘brutalising and degrading to inure children to the abuse and destruction of living animals’. Religious arguments emphasising moral uplift were also presented:

To many parents the foundation of all natural religion is the recognition that all life is One. We teach our children to feel not merely reverence for Nature, but kinship with all that possesses a spark of the divine mystery, Life. How shall they feel akin to that which is “to be cut up for science purposes”.⁶⁰

Several letter-writers defended the use of the animals as humane and essential to scientific education, distinguishing the practice from vivisection by noting that all frogs were chloroformed or gassed before dissection.⁶¹ A representative of pharmaceutical company F.H. Faulding & Co. weighed in at a Rotary Club luncheon, declaring that ‘It is essential that the manufacturing chemist should have live subjects for testing purposes’.⁶² Jack Jones, a teacher from Perth Modern School (and quite likely the ‘science master’ in question), defended the practice of dissection as essential for the education of students intending to become ‘teachers, medical men,

etc.': He said it was an exercise in which they were 'bettering themselves and making themselves more fitted for their professions in later life.' The 'Jew Boy's' opposition to the exercise was put down to 'his fear of dirtying his hands'. Jones also justified the use of cats in dissection exercises by claiming that 'when cats are brought to be dissected, they are not cats at all, but merely kittens—sometimes with their eyes not opened'.⁶³ Jones' letter betrays the extent to which school biology classes were part of an emotional education essential to the project of modernity, intended to harden those destined for 'professional' careers against excessive sensory or emotional sensitivity. This was training for future belonging to an exclusive feeling community of professionalised men; about learning 'right feeling' as part of a particular, professional, adult male and Christian emotional community. Frogs were the principal focus, as a non-human animal long denied agency and subjectivity to make them a suitable object of fatal scientific experimentation and education, though Jones also attempted to construct newborn cats as suitably inert, non-agential material for similar service.

Some dissenters rejected this form of emotional induction. One letter-writer responded by recalling his university education in biology, in which he realised that the creatures didn't suffer so much in the lab as in collection and transit: 'Frogs which have been impaled on forks while being dug for in swamps, and others stepped on while being chased, disembowelled, with broken legs or crushed bodies—they all came to the dissection table'.⁶⁴ This suffering, the writer claimed, was for naught, as he had never used the knowledge gained through dissection. He recommended instead a system of *papier-mâché* models of frogs. The last letter in the exchange came from 'Junior', purportedly a student, who admonished the previous letter-writers for not considering the students' feelings, or the frogs'. It continued:

I think I can safely say that the frog does not like practical biology, neither do many of us... I suppose I am horribly sentimental, but I hate taking life—even that of a frog. Think of it. That poor devil of a frog might have been still 'tonk-plonking' happily out on the swamp, or passing his days in peace in the cool depths of some well, if I had not bagged him for a rotten biology lesson.⁶⁵

The letter closed by observing that 'Some children delight in pulling living things to bits, stabbing flies with pens and other kindred "amusements",' and dissection would likely nurture their abnormal cruel streak, leading them ultimately to incarceration. This letter is an ambiguous source: we cannot be sure whether it was written by a young person, rather than a SPCA member impersonating one, but either way it

demonstrates sympathy with frogs and defence of such sentimental attachment, as well as the more long-standing, conventional argument about the debasing effect of animal cruelty. This story highlights not only the workings of one of the institutions that socialised children into a ‘rational’ approach to nature, but also emotional expression and experience as a disruptive power and form of resistance to it, which argued for the legitimacy of religious and sentimental approaches to nearby nature.

Currently, no Australian state mandates compulsory dissection in the curriculum and several students took cases to court to avoid dissection in university courses and research practices in 1998 and 2000.⁶⁶ Significantly, childhood and young adult mutilation of animal bodies in the late twentieth century, and the growing resistance to it, co-existed alongside increasingly sympathetic renderings of frogs that emerged in juvenile literature from the late nineteenth and early twentieth century. Beatrix Potter’s *The Tale of Mr Jeremy Fisher* (1906), based on a story she had composed in an 1893 letter, displayed the author’s keen natural scientists’ eye in her awareness of frog anatomy and environment, although the eponymous hero remains dressed in contemporary human clothing and roasts his dinner of grasshopper with ladybird sauce. In Kenneth Grahame’s *Wind in the Willows* (1908), anthropomorphic Toad of Toad Hall is a reckless and self-obsessed but not loathsome character displaying largely human characteristics.⁶⁷ The lovable Kermit the Frog, evolving out of a puppet show beginning in 1955 to take on his now-familiar form in the 1960s, similarly expresses human desires and ambitions despite his ranine appearance. It is questionable whether these anthropomorphic frogs assisted children to engage with the living animal. Perhaps more successful in this regard, at least for Australian children, was the work of Densley Clyne, who paved the way for frogs’ reinvention as a subject of empathy and delight with her pioneering macrophotography published from 1969 in a series of juvenile non-fiction books on frogs and other forms of ‘backyard nature’.⁶⁸

There is another history to be told of Indigenous children’s relationships with frogs. In Perth, frogs, *kwooyar*, are embedded in Noongar ‘country’, which combines natural, cultural and spiritual understandings. Within this Indigenous ontology, *kwooyar*, like all living country, form part of cross-species kin relations. They are *baronga* (totems) with whom individuals hold spiritual and practical responsibilities to protect their habitats and environments.⁶⁹ These are emotional connections across time and space, between all living things – a very different relationship than that experienced by settler children. Though emerging from within a very different

ontology, since the 1970s, Indigenous Australian stories about rancid emotional and moral behaviours told to countless generations of Indigenous children, have been opened up to non-Indigenous juvenile readers through popular picture books.⁷⁰ The tale of the Gunai people of South Gippsland about Tiddalik is a prominent example. This greedy frog selfishly drank all the water until all living creatures in the world began to perish. Only when they banded together could the other animals resolve this environmental crisis — specifically through engaging the frog's emotions, provoking Tiddalik to laugh and thus expel all the water in his belly.⁷¹ This oral tradition, now conveyed to non-Indigenous audiences as a children's story, potentially explained an historic climatic event and offered a framework for future Indigenous environmental engagements.

Such works found increasing resonance among non-Indigenous people becoming more awake to the degradation of the living planet. The rise of the new environment movement in the 1970s popularised compassion for a vulnerable nature, and by the 1990s 'caring for nature' was a thoroughly mainstream idea, if not thoroughly enacted. Against this background, in the 1980s scientists worldwide began to describe frog extinctions and shrinking populations that by 1990 were perceived as part of a global pattern of decline.⁷² A deadly chytrid fungus was identified as the cause. Frogs' skin is exquisitely permeable, adapted to living in and out of water, but also highly sensitive to pollution and disease. These qualities have seen them marked as an 'indicator species' of general environmental health. As a result of their decline, their status as indicator species and their common green colouring the frog — and in particular the charismatic red-eyed tree frog — soon became a symbol for ecological awareness. In a marked contrast with the widespread Australian loathing of the exotic and invasive cane toad (*Rhinella marina*), by the mid-1990s frogs had become an obvious choice for a local wetland conservation and citizen science program.

In Perth this took the form of the WA Museum's FrogWatch program, established in 1995 with sponsorship from the Australian subsidiary of multinational aluminium company Alcoa, which had been working hard to establish its credentials as a good corporate citizen after destroying vast swathes of native jarrah forest for its bauxite mining operations from the 1960s. At the crest of a new wave of environmentalism, the FrogWatch program was started as a wetlands conservation and citizen science initiative that responded to 'community interest and concern about the state of the environment generally'.⁷³

In the early years of the program Museum staff collected and analysed frog watchers' observations of frogs in their gardens or other local sites and helped to create an active community of interest – and also emotion – around frogs in Perth. A bi-annual newsletter shared information on frogs and how to accommodate them in suburban areas. Community-based frogwatch organisers, supported by Museum staff, conducted local walks, as well as running school visits and educational stalls at public events. In January 2003, over a thousand children participated in the 'fantastic froggy fun' activities at the WA Museum. As well as engaging with more conventional forms of instruction such as information sheets, the children observed captive live frogs and were encouraged to imagine themselves *as* frogs by 'mucking around in a frog pond' and making a mask to take home. The year 5 class at Yidarra Catholic Primary School were one of several groups supported to design and build a frog pond in their schoolyard, in order to 'save the frogs' in their local area.⁷⁵ Such programs provided a new emotional training with frogs that combined science and sympathy. By 1998 the program had 2500 members signed up and numbers were growing, especially in light of the well-publicised arrival of the deadly chytrid fungus in Perth, and associated decline in some frog populations.⁷⁶ In 1999 the FrogWatch program had expanded to enable increased monitoring, education, and a frog-friendly gardening program aimed at 'getting frogs back into our everyday lives and keeping them there'.⁷⁷ By September, FrogWatch coordinator (and WA Museum curator of reptiles and frogs) Ken Aplin reported that the community interest and commitment was 'absolutely overwhelming'.⁷⁸ A community of feeling had been established based on sympathy for a globally beleaguered animal and delight in their company.⁷⁹

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This paper has demonstrated the richly intertwined imaginative and emotional nature of religious, scientific, legal, literary, pedagogic and community discourses and practices that present frog-human relations through time, more often than not in order to signify and produce changing human communities and identities. Further fine-grained attention to the emotional dynamics, fractures, and possibilities for change, of human relations with proximate natures and nonhumans, in specific times and local contexts are vital. Stories of frogs with us offer significant insights into humans' changing emotions of nearby nature. It is not just the fate of frogs that hangs on interpretation of this knowledge. In his history of the origins of American environmentalism, Christopher Sellers concludes that the most viable path to an environmentalist revival lies in emotional mobilization around clusters of local issues,

as well as a new ethics of nature that values the quotidian and proximate as much as the spectacular and remote.⁸⁰ Knowledge of the complex historical relationships between emotions and nearby nature and nonhumans provides an important foundation for these essential projects. However, we must also be attentive to the human emotions that have made the frog an indicator species of a new kind of impending apocalypse, and ask in what sense this status confers upon the frog the much-needed human sympathy, empathy, love, care or attention that might enable its survival, or simply reflects time-old human preoccupations merely with our own kind.

¹ See the contributions in the section “The Non-Human World” in Susan Broomhall ed., *Early Modern Emotions: An Introduction* (London: Routledge, 2017), IV.45-51.

² Kay Milton, *Loving Nature: Towards an Ecology of Emotion*, (London: Routledge, 2002), 150.

³ Milton, *Loving Nature*.

⁴ Glenn Albrecht, “Solastalgia, a new concept in human health and identity,” *Philosophy Activism Nature*, 3 (2005): 41-55 (and especially 42-3).

⁵ Grace Moore, “Nature,” in Broomhall, ed. *Early Modern Emotions*, 346-49.

⁶ Franklin Ginn, *Domestic Wild: Memory, Nature and Gardening in Suburbia* (London: Routledge, 2017). For a further place-specific example of the ways in which intimacy and emotion have historically generated specific responses to the more-than-human world, see Andrew Flack, *The Wild Within: Histories of a Landmark British Zoo* (Charlottesville: University of Virginia Press, 2018).

⁷ Barbara H. Rosenwein, *Emotional Communities in the Early Middle Ages* (Ithaca: Cornell University Press, 1998); *Generations of Feeling: A History of Emotions, 600-1700* (Cambridge: Cambridge University Press, 2015).

⁸ W.M. Reddy, *The Navigation of Feeling: A Framework for the History of Emotions* (Cambridge: Cambridge University Press, 2001).

⁹ See discussion of this concept in Katie Barclay, “Performance and Performativity,” in Broomhall, ed., *Early Modern Emotions: An Introduction*, 14-23.

¹⁰ Monique Scheer, “Are emotions a kind of practice (and is that what makes them have a history)? A Bourdieuan approach to understanding emotion,” *History and Theory* 51 (May 2012): abstract, 193.

¹¹ Scheer, “Are emotions a kind of practice”, 203.

¹² See, for example, Katie Barclay, “Space and Place,” in Broomhall, ed., *Early Modern Emotions*, 20-23, and within geography scholarship, the journal *Emotions, Space and Society*.

¹³ There is an increasing literature, generally located within the broad and ethically-informed field of Animal Studies, which engages with questions surrounding the emotional lives of animals. See, for instance, Mark Bekoff’s scholarship, including Mark Bekoff, ‘Animal Emotions: Exploring Passionate Emotions: Current interdisciplinary research provides compelling evidence that many animals experience such emotions as joy, fear, love, despair, and grief – we are not alone.’, *BioScience*, 50,10 (2000): 861-70. Also see Jeffrey Masson and Susan McCarthy, *When Elephants Weep: The Emotional Lives of Animals* (New York: Vintage, 1996). There is limited work that considers animals’ emotion from an historical perspective. See, for

example, Jason C. Hribal, *Fear of the Animal Planet: The Hidden History of Animal Resistance* (Chico, CA: A K Press, 2011).

¹⁴ This project was begun by Keith Thomas, in his *Man [sic] and the Natural World* (Oxford: Oxford University Press, 1983), though without the benefit of more recent critical and theoretical perspectives on emotion.

¹⁵ This is notably less the case for medieval and early modern intellectual and natural knowledge practices: see for example Susan Broomhall, 'Medical and scientific understandings,' in Broomhall and Andrew Lynch, eds, *A Cultural History of the Emotions in the Late medieval, reformation and Renaissance Age* (London: Bloomsbury Academic, 2019), 13-29; Broomhall, 'Feeling Divine Nature: Natural History, Emotions and Bernard Palissy's Knowledge Practice,' in Paul J. Smith & Raphaëlle Garrod, eds, *Natural History in Early Modern France: The Poetics of an Epistemic Genre* (Leiden: Brill, 2018), 46-69; Broomhall, 'Health and Science,' in Sandra Cavallo & Silvia Evangelisti, eds, *A Cultural History of Childhood and Family in the Early Modern Age*, Volume 3 (Oxford and New York: Berg Publishers, 2010), 171-186.

¹⁶ See Michael Hagner, 'Enlightened Monsters', in William Clark, Jan Golinski, and Simon Shaffer, eds, *The Sciences in Enlightened Europe* (Chicago: University of Chicago Press, 1999), 175-217. See also, for instance, John Gordon, 'T. S. Elliot's Head and Heart', *ELH*, 62 (1995), 979-1000.

¹⁷ Peter Stearns, *American Cool: Constructing a Twentieth-Century Emotional Style* (New York: NYU Press, 1994).

¹⁸ Frank Biess and Daniel M. Gross go so far as to suggest four key structural questions which might underpin future historical research: Which emotions appear dominant? Which emotions are excluded, superseded, or unavailable? What are the trajectories of emotional arcs over time? What is the political economy of emotion? See Frank Biess and Daniel M. Gross, *Science and Emotions after 1945: A Transatlantic Perspective* (Chicago: Chicago University Press, 2019) and Otniel E. Dror, Bettina Hitzer, Anja Laukötter and Pinar León-Sanz, 'An Introduction to History of Science and the Emotions', *OSIRIS*, 31 (2016), 2-18.

¹⁹ Frank Biess, Alon Confino, Ute Frevert, Uffa Jensen, Lyndal Roper and Daniela Saxer, 'History of Emotions: Forum', *German History*, 28 (2010), 71. For an example of this approach to medieval and early modern knowledge practices see Broomhall, 'Medical and Scientific Understandings', in Broomhall and Lynch eds, *A Cultural History of the Emotions*.

²⁰ Thomas Dixon, 'The Tears of Mr Justice Willes', *Journal of Victorian Culture*, 17 (2012), 1-23; Donna J. Haraway, *Primate Visions: Gender, Race and Nature in the World of Modern Science* (London: Routledge, 1990); Paul White, 'Darwin Wept: Science and the Sentimental Subject', *Journal of Victorian Culture*, 16 (2011), 195-213; Elizabeth A. Wilson, "'Would I had him with me always": Affects of Longing in Early Artificial Intelligence,' *ISIS*, 100 (2009), 839-47.

²¹ For examples of histories of such locations, see Adrian Howkins, *The Polar Regions: An Environmental History* (Cambridge: Polity, 2015); R. J. Hoage and William A. Diess, eds, *New Worlds, New Animals: From Menagerie to Zoological Park in the Nineteenth Century* (Baltimore: Johns Hopkins University Press, 1996); Martin J. S. Rudwick, *Bursting the Limits of Time: The Reconstruction of Geohistory in the Age of Revolution* (Chicago: Chicago University Press, 2005).

²² Charlotte Sleight, "'Only a Spectacle': Frogs, Cosmopolitics and the Ecological Crisis,'" in Kaori Nagai et al. eds, *Cosmopolitan Animals* (Basingstoke: Palgrave Macmillan, 2015), 44.

- ²³ Charlotte Sleight, *Frog* (London: Reaktion Books, 2012); Charlotte Sleight, 'Jan Swammerdam's Frogs,' *Notes and Records of the Royal Society*, 66, (2012): 373-92.
- ²⁴ Sleight, "Only a Spectacle", 55.
- ²⁵ Pamela H. Smith, 'Laboratories', in Katharine Park and Lorraine Daston, eds, *The Cambridge History of Science*, Volume 3: *Early Modern Science* (Cambridge: Cambridge University Press, 2006), 298-301.
- ²⁶ Anita Guerrini and Domenico Bertoloni Meli, "Introduction: Experimenting with Animals in the Early Modern Era," *Journal of the History of Biology* 46 (2013): 170; Bertoloni Meli, "Early Modern Experimentation on Live Animals," *Journal of the History of Biology* 46 (2013): 199-226.
- ²⁷ See Broomhall, 'Medical and Scientific Knowledge,' in Broomhall and Lynch, eds, *A Cultural History of the Emotions*.
- ²⁸ Roger French, *Dissection and Vivisection in the European Renaissance* (Aldershot: Ashgate, 1999), 207-9. Authors 1 and 2 are currently working on an essay "Dissecting the frog: emotions in the history of scientific knowledge production", that further disentangles these relationships.
- ²⁹ Frederic L. Holmes, "The old martyr of science: the frog in experimental physiology," *Journal of the History of Biology*, 26 (1993): 319.
- ³² Piccolino and Bresadola, *Shocking Frogs*, 86.
- ³⁴ See for example Figs 2 and 3 in Fabian Till Schneider, "The terror of frogs and the birth of the novel *Frankenstein*", *ETH Heritage: Highlights from the Collections and Archives of ETH-Bibliothek and ETH Zurich*, Switzerland, 16 February 2018, <https://blogs.ethz.ch/digital-collections/en/2018/02/16/der-schrecken-der-froesche-und-die-geburt-des-romans-frankenstein/> [accessed 21 March 2018]
- ³⁵ Marshall Hall, "Researches into the Effects of certain Physical and Chemical Agents on the Nervous System", *Edinburgh New Philosophical Journal*, vol.45, no.90, 1848, p.253. See also Diana E. Manuel. *Marshall Hall, 1790–1857: Science and Medicine in Early Victorian Society*. *Clio Medica*, vol. 37. Wellcome Institute Series in the History of Medicine (Amsterdam: Editions Rodopi, 1996).
- ³⁶ George Levine, *Dying to Know: Scientific Epistemology and Narrative in Victorian England* (Chicago: University of Chicago Press, 2002). For further work on the place of 'objectivity' in modern science, see Peter Galison, 'Judgement against Objectivity', in Peter Galison and Caroline A. Jones, eds, *Picturing Science, Producing Art* (New York: Routledge, 1998): 327-59; and Peter Galison and Lorraine Daston, 'The Image of Objectivity', *Representations*, 40 (Fall, 1992): 81-128.
- ³⁷ Rob Boddice, *The Science of Sympathy: Morality, Evolution and Victorian Civilization* (University of Illinois Press, 2016), 72–100.
- ³⁸ Jacob and Wilhelm Grimm, [Der Froschkönig oder der eiserne Heinrich](#), *Kinder- und Hausmärchen*, no. 1. Translated by D. L. Ashliman, 1999-2002, available online at <https://www.pitt.edu/~dash/grimm001.html> [accessed 4 October 2019]
- ³⁹ 'Der Herr der Ratten und der Mäuse/ Der Fleigen, Frösche, Wanzen, Läuse,' Goethe, *Faust*, Part One (London: Wacey, 1839), 159.
- ⁴⁰ Paul S. White, "The Experimental Animal in Victorian Britain," in Lorraine Daston and Gregg Mitman, eds, *Thinking with Animals: New Perspectives on Anthropomorphism* (New York: Columbia University Press, 2005), 59.
- ⁴¹ Pascal Eitler, 'Dr Doolittle's Empathy', in *Learning How to Feel: Children's Literature and Emotional Socialization*, Ute Frevert et al. eds, (Oxford: Oxford University Press, 2014), 104, 106; Hilda Kean, *Animal Rights: Political and Social Change in Britain since 1800* (London: Reaktion Books, 1998).
- ⁴² Peter Hobbins, "Venom and Vivisection in the Colonial Antipodes, 1788-1914" (Ph.D., University of Sydney, 2013), 238.

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- ⁴³ Eitler, “Dr Doolittle’s Empathy,” 107.
- ⁴⁴ Eitler, “Dr Doolittle’s Empathy,” 104.
- ⁴⁵ Quoted in Hobbins, “Venom and Vivisection in the Colonial Antipodes”, 239.
- ⁴⁶ See, for instance, Steven J. Harris, ‘Networks of Travel, Correspondence and Exchange’, in Park and Daston, eds, *The Cambridge History of Science*, Volume 3: *Early Modern Science* (Cambridge: Cambridge University Press, 2006), 341-62.
- ⁴⁷ Jan Golinski, *Making Natural Knowledge: Constructivism and the History of Science* (Chicago: University of Chicago Press, 2005), 96-7; Katie Whitaker, ‘The culture of curiosity’, in N. Jardine, A. Secord and E. C. Spray, eds., *Cultures of Natural History* (Cambridge: Cambridge University Press, 1996), 82.
- ⁴⁸ Harriet Ritvo, *Animal Estate: The English and other Creatures in Victorian England* (Cambridge, MA: Harvard University Press, 1989), 10.
- ⁴⁹ Stephen T. Asma, *Stuffed Animals and Pickled Heads: The Culture and Evolution of Natural History Museums* (Oxford: Oxford University Press, 2001), 154.
- ⁵⁰ Dorothy Kass, *Educational reform and environmental concern: a history of school nature study in Australia* (Abingdon, Routledge, 2018).
- ⁵¹ Wilbur S. Jackman, *Nature Study for the Common Schools* (New York: Henry Holt and Company, 1891), 141.
- ⁵² Kass, *Environmental Concern*, 59.
- ⁵³ “A Visitation of Frogs”, *Western Mail*, April 2, 1904, 5.
- ⁵⁴ “Metropolitan Gossip”, *Kalgoorlie Miner*, April 5, 1904, 6.
- ⁵⁵ “Wee Macgregor”, *New York Times*, April 11, 1903, 8.
- ⁵⁶ J.J. Bell, *Wee Macgregor* (1903. Reprint, Project Gutenberg Australia, 2011), <http://gutenberg.net.au/ebooks11/1100201h.html>.
- ⁵⁷ Experiments using frogs continue into the 20th century and beyond. See Sleigh, *Frogs*, chapter 4.
- ⁵⁸ ‘News and Notes’, *West Australian*, August 22, 1931, 12. Distinguished by the use of Glaswegian dialect, the book, first published in late 1902, launched an international ‘Wee Macgregor’ craze, selling 70,000 copies in just over a month: Bell, *Wee Macgregor*, ‘Introduction: The story of the book’.
- ⁵⁹ Hobbins, “Venom and vivisection in the colonial antipodes.” 251.
- ⁶⁰ C.J. Horrocks, letter to the editor, *West Australian*, August 25, 1931, 14.
- ⁶¹ See for example H. Bluck, “Practical Biology,” *West Australian*, August 28, 1931, 16.
- ⁶² “Biological tests: Live subjects essential,” *West Australian*, August 29, 1931, 15.
- ⁶³ Jack Jones, letter to the editor, *West Australian*, August 28, 1931, 16.
- ⁶⁴ A.C. Broughton, letter to the editor, *West Australian*, August 31, 1931, 16.
- ⁶⁵ Junior, “The Biology Student’s View,” *West Australian*, September 9, 1931, 6.
- ⁶⁶ See Andrew Knight ed., “Learning without Killing: A Guide to Conscientious Objection,” online <https://scholarworks.iupui.edu/bitstream/handle/1805/3771/AKCOGuide.pdf;sequence=1>; Lucy Fish, ‘Learning to heal without learning to kill,’ *Alternatives in Veterinary Medical Education*, 15 (2000): 2-3; Sy Woon, ‘Humane veterinary education: Uncovering ethical alternatives while studying my veterinary students colleagues,’ *Humane Society Veterinary Medical Association* (2013), online at http://www.hsvma.org/humane_veterinary_education_uncovering_ethical_alternatives#.VtfPZ5N97LY
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- ⁶⁸ Densy Clyne, *Australian frogs*. Periwinkle Books, [Melbourne, Vic.], 1969.

⁶⁹ Debra Hughes-Hallett, 'Indigenous history of the Swan and Canning rivers', Curtin University and Swan River Trust, 2010, 32-3, 47.

⁷⁰ See for example *The Dreamtime: Australian Aboriginal Myths*, text by Charles P. Mountford, illust. Ainslie Roberts (Adelaide: Rigby, 1965), especially 'Tiddalik the flood-maker'; L. & G. Adams, *Molok the Thirsty Frog*, illust. Chris Riordan, (Sydney: Science Research Associates, 1972); *What Made Tiddalik Laugh*, retold and illustrated by Joanna Troughton (West Melbourne: Thomas Nelson Australia, 1977),

⁷¹ Edward M. Curr, *The Australian race: its origin, languages, customs, place of landing in Australia and the routes by which it spread itself over the continent*, (Melbourne: J. Ferres, 1887), vol. 3: 547-8.

⁷² James P. Collins and Andrew Storfer, 'Global Frog Declines: sorting the hypotheses', *Diversity and Distributions*, 9, 2003, p.89.

⁷³ *Alcoa frogWATCH*, August 1995, 1.

⁷⁵ *Newsletter* (Alcoa Frog Watch), no. 9, winter 2003, n.p.

⁷⁶ *Alcoa FrogWATCH*, no.2, October 1998, p.4.

⁷⁷ *Alcoa FrogWATCH*, no.3, April 1999, 1.

⁷⁸ *Alcoa FrogWATCH*, no.4, September 28 1999.

⁷⁹ See for example Vivienne Elanta, 'Frog dreaming', online <http://vivienneelanta.blogspot.com.au/>

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