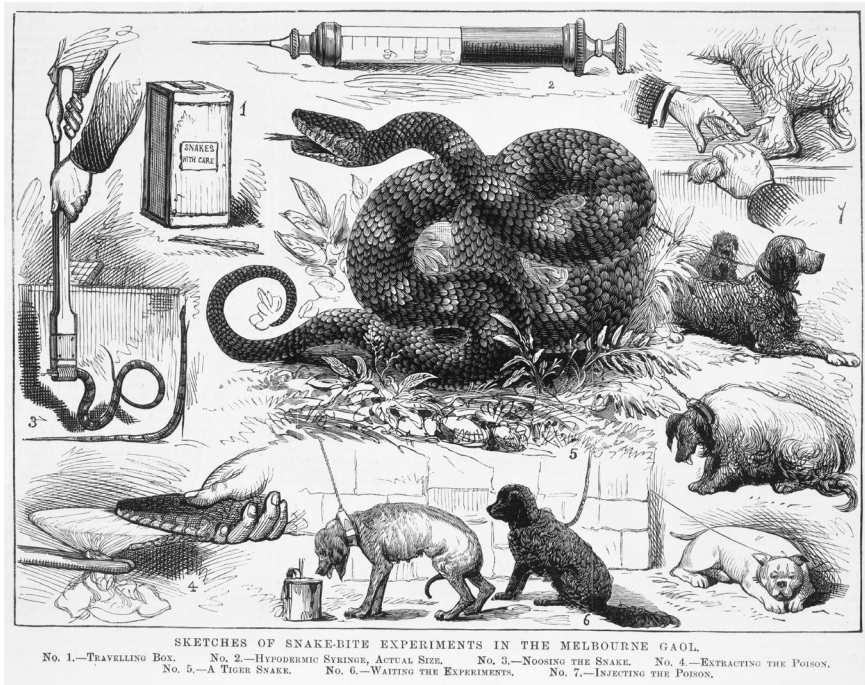
INTRODUCTION

From the day that Europeans first stepped ashore to occupy the Australian continent, they were never alone. From 1788, domesticated animals arrived alongside them, their numbers soon outstripping humans at every settlement. If colonists took comfort from the presence of these familiar beasts, they remained less certain of the indigenous creatures they encountered. Snakes, in particular, posed a quandary. Were they dangerous? What harm might they cause? And how could such *facts* be known?

This book argues that the practice of vivisection inextricably linked familiar animals and venomous snakes in colonial Australia. Over 1788–1914, imported beasts were both frequently observed and actively employed as victims of envenomation. While many instances were accidents, from 1840 onwards settlers increasingly orchestrated the transfer of venom from autochthonous serpents into living – and often unwilling – creatures. Even where it passed as entertainment, this process was primarily intended to find out something. Colonists hoped to determine the nature of snakes by discerning the action of their venom in other animals and – by extension – their own bodies (Figure 1).

This process – the empirical testing of animal toxins in sentient creatures – forms the analytical centre of *Venomous encounters*. Because such experiments employed living animals, I describe them as 'vivisection', although the meanings and nuances of that term shifted markedly over the nineteenth century.[1] While this practice is effectively absent from the historiography of colonial Australia, this book demonstrates that animal experiments to test venoms and putative antidotes were frequent, prominent and widespread across the antipodes prior to World War I. Yet if vivisection caused moral consternation in late Victorian Britain, in the Australian colonies such suffering went almost unremarked: studying snakebite intrinsically justified animal sacrifice. 'How could the action of snake poison … be investigated', queried one Member of the Victorian Parliament in 1881, 'without cruelty to dogs?'[2] Thus the presumptive character of one group of animals shaped the ethical status of others.

Indeed vivisection, I contend, operated within a *colonial animal matrix*, a concept mapped out in Chapter 1. Each site of settlement generated a localised scaffold of animal hierarchies and equivalences, forging a series of commercial, moral and sentimental relationships



1 'Sketches of snakebite experiments in the Melbourne Gaol', *Australasian Sketcher with Pen and Pencil*, 17 February 1877.

between indigenous and imported creatures. As with a game of snakes and ladders, particular creatures might ascend, descend or move laterally through this matrix, reflecting dynamic perceptions of their worth. These evaluations constantly compared animals against each other, incorporating direct observations, environmental cues, intercolonial transactions and circulating narratives – including those legitimated via the coalescing structures of science or medicine.

The colonial stampede

Although non-Indigenous occupation of Australia commenced from 1788, the mid-1830s marked several critical turning points in antipodean colonisation. The first was a dramatic geographic, demographic and pastoral expansion, which saw both European settlers and their domesticated animals encroaching across vast new territories. After nearly 50 years of tightly corralled settlement in New South Wales and Van Diemen's Land, the demi-decade 1835–40 witnessed an upsurge in colonisation and galloping territorial encroachment, pushing deep

inland and washing around the coastlines of Australia and New Zealand.

Accordingly, human and non-human encounters between invading and indigenous species escalated markedly. Yet as their purlieu expanded, settlers came to feel confident that the antipodes were bereft of threatening apex predators. Notwithstanding sharks and crocodiles, which rarely troubled whites until the twentieth century, in Australia the peak terrestrial carnivores were the 'native dog' or dingo, and the thylacine or 'Tasmanian tiger'. Neither species was dreaded in the manner of European wolves, American bears, Asiatic tigers or African lions.

The cultural and environmental place of such carnivores in subverting the colonial project has received considerable scholarly attention of late, emphasising both the agency of the creatures themselves and the complex geographies of encounter. Vividly recollecting her near death in the jaws of a crocodile, Australian ecofeminist Val Plumwood argues that for Europeans to become prey to non-human animals 'involves the forbidden mixing of these hyper-separated categories, the dissolution of the sacred–human into the profane–natural'.[3] The prospect – and spectacle – of claws and incisors violating white bodies undermines precarious presumptions of dominion while valorising the violent suppression of subaltern 'nature'.[4]

In contrast, what discomfited Australian colonists was not a fear of ending up inside a large predator, but the uncanny possibility that malign animal matter – venom – might contaminate their corporeal being.[5] I have elsewhere considered the transcolonial exchanges over poisonous spiders in New Zealand and Australia, as well as the atavistic implications of discovering that a 'primitive mammal' – the platypus – was also venomous.[6] But beyond the dreaded katipo spider, New Zealand proved peculiarly benign, as colonial boosters boasted: 'St. Patrick must have resided there before he discovered Ireland: there is not a snake or venomous reptile of any description whatever.'[7] If, as Pratik Chakrabarti emphasises, snakes 'formed an important part of the British imagination of Indian tropical wilderness', in the Australian colonies there was no question of their pre-eminence in the continent's ecology of dread (Figure 2).[8]

This obsession coincided with the third key development in antipodean human–animal relations: an upsurge in self-consciously local scientific activity. By the early 1840s Van Diemen's Land and New South Wales could boast relatively permanent learned societies, museums and periodicals purveying 'useful knowledge'. The subsequent circulation of intelligence within the antipodes provided a marked divergence from earlier scientific endeavours mediated largely via British authorities. The 1850s and beyond witnessed a gradual institutionalisation of science

2 'Commencement of the snake season. The first victims, at Colac and Whittlesea', *Police News*, 29 September 1877.

and medicine – in museums, mechanics' institutes, universities, hospitals, government departments and private enterprise – as a prominent but tenuous element of colonial culture.[9] As Chapters 2–6 elaborate, studies of snakes comprised an enduring if sporadic strand of inquiry that seamlessly spanned these local medical and scientific structures.

By the Federation of the Australian colonies in 1901, such ad hoc but rapidly professionalising pursuits were being palpably constrained by the limits of colonial infrastructure. Just as relations between publics and professions, science and government, medicine and experiment were transformed by World War I, so too were the ways in which animals were processed by twentieth-century schemas of zoology, veterinary science and biomedicine. As vivisection increasingly receded from the popular gaze through the *fin de siècle*, 1914 coincided with the end of a specifically colonial approach to knowing venomous serpents in Australia.

Speaking of animals

Much as they were often conflated, colonists consistently conceived snakes and their venoms as autonomous – and usually

malevolent – agents. When 11-year-old John Howorth wilted and then died after the bite of a 'black snake' in 1804, 'a wound appeared upon the left arm, thro' which the noxious viper had poured the contaminating fluid'.[10] Foregrounding not just their presence but their potency in shaping colonial medical science is one of the primary missions of this book. Indeed, post-Enlightenment empiricism relied critically upon the testimony of non-humans, whether animals, microbes, instruments, spaces or the networks linking them. A Latourian focus on objects, performances, places and the translocation of agents is therefore central to how I delineate the material, literary and social technologies that – over the course of the nineteenth century – reduced sentient creatures to mere vessels for venom.[11]

Yet a key problem for actor–network theory lies in its propensity to flatten ethical gradations.[12] Important accounts of the rise of modern biomedicine also largely overlook the impact of instrumentation, quantification and atomisation upon its hecatombs of experimental animals.[13] But as Stephen Pemberton has demonstrated, not all animal subjects became objects: their innate character and behavioural choices can also impel a 'necessity to care'.[14] Furthermore, only recently have historians of colonial medical science – notably Pratik Chakrabarti – acknowledged that the ordering of animals entailed a conjoint operation of Imperial hierarchy and laboratory praxis.[15] If this 'ideological symbiosis' between empire and empiricism saw countless creatures 'sacrificed' for the instrumentalist ends of natural history or medicine,[16] Virginia DeJohn Anderson affirms that colonial animals also pursued their own ends, acting as both agents of European encroachment and mediators for Indigenous–invader relations.[17]

In elaborating the interactions between colonial practitioners and sentient creatures, *Venomous encounters* suggests that animals themselves structured scientific inquiry and its application to emergent debates in functional anatomy, germ theory, experimental physiology and immunology. In particular, it disrupts the smooth teleological narrative of biomedical modernity: that vivisection *necessarily* became a primary mode of medical progress.

An associated imperative is to comprehend the evolving but unstable nature of venom itself as an ontological agent. This formulation extends beyond Owsei Temkin's ontological conception of disease: the late nineteenth-century transition from remedying internal imbalances to perceiving discrete but stable external pathogens as the chief cause of illness.[18] Rather, I explore colonial characterisations of venom via the frame of objectivity championed by Lorraine Daston.[19] At stake was not merely an epistemology of knowing 'objective' facts, but the historical ontology of what could – or could not – be conceived to

exist.[20] Comprehending the fundamental nature of venom – and its purposive relationship to the snake that expressed it – had cosmological consequences for Indigenous Australians and colonists alike.

Whilst the colonial animal matrix was predicated upon metonymic and emotive associations between humans and their animal familiars, this book does not attempt to historically reconstruct the interiority of snakes or other non-human creatures. In this decision I concur with Ludwig Wittgenstein's oft-cited aphorism, 'If a lion could talk, we could not understand him.'[21] Even when dealing with the charismatic species favoured by animal studies scholars, the sentience of non-human animals remains opaque to us. This does not mean, however, that we should not listen: the presence, intentions and actions of individual animals have meaning and consequence, even if they cannot adequately be translated into human terms.[22] Without attempting to rescue snakes from condescension, this book insists that denigrated, despised and dismissed creatures are also eminently worthy of consideration as historical actants.

Nevertheless, when venomous creatures encounter humans – or other animals – fear and suffering can commute in both directions. The results may be painful, distressing or lethal. In one sense, acknowledging this affective and embodied experience is important in understanding human animus towards snakes. Yet it was precisely the intersubjective identification with envenomed animals – above all, dogs – which reinforced the epistemological basis for vivisection in colonial Australia, even if it rarely translated into an ethical corollary.

Recognising the innate otherness of non-human animals also raises the vexed issues of essentialism, representation and naming. In writing this critical history of science and medicine, I have remained cautious of inscribing present-day conceptions onto historical circumstances. In part, this avoids simple linguistic pitfalls: the 'black snake' described by a British settler in 1820 may have borne little or no morphological relationship to the species presently characterised as the red-bellied black snake (*Pseudechis porphyriacus*). The animal may simply have been seen in poor light or, knowing that 'black snakes' were then considered deadly, the reporter may have employed this moniker to dramatise her account. The 'black snake' may simply have been a burnt stick. As such confusion over identification and nomenclature persists into the present, I have employed my protagonists' descriptions throughout the text without seeking to translate them taxonomically.

Conversely, I have been careful to reproduce names bestowed upon individual domestic animals. When his dog 'Duke' was bitten by a 'gray snake' in 1836, surveyor William Govett 'patted him, he got up, looked

piteously in my face, and walked slowly after us' before staggering, collapsing and dying beside his horrified master.[23] Such accounts allow us to acknowledge each creature's unique identity, while serving as an analytical device for tracing shifting historical relations of ownership, sentimental attachment and moral consideration.[24]

The historical veracity of reported bites and subsequent symptomatology is notoriously difficult to ascertain. Thus individual case reports and colonial statistics on envenomation must be interpreted with extreme caution. Even apparently neutral descriptors such as 'envenomation' may carry anachronistic biomedical implications inappropriate or meaningless, for instance, to Indigenous cosmologies. Furthermore, animals are individuals, not archetypes. Characters observed in the present day – from the 'tameness' of an escaped cow to the potency of a serpent's venom – can and do change over individual lifetimes, let alone two centuries. I have therefore sought not to impose contemporary medical or toxinological data onto historical accounts, nor to attempt retrospective diagnoses. Rather, I have tried to integrate consideration of the actors involved, depicting how historical conjunctions – of animals, toxins, humans, equipment, spaces and discourses – continuously renegotiated the place of venomous creatures in the colonial animal matrix.

Structure and analytical threads

This book's primary argument is that over 1840–1914, vivisection proved both divisive and decisive in colonial Australia, dramatically changing local perceptions of venomous snakes and their toxins. These shifts occurred within the larger schema of a colonial animal matrix, which structured the moral, sentimental and commercial worth of animals in relation to other creatures.

Global scholarship on the messy menageries of colonialism increasingly affirms that, from the Transvaal to Tasmania, animals 'occupied material and symbolic spaces, helping to buttress the shifting sociopolitical orders and looming large in rituals of social differentiation'.[25] Each of the scattered settlements typifying the colonial antipodes comprised an unstable conjunction of people, animals, environments, technologies and circumstances, providing a rich source for animal-focused histories.[26] As detailed in Chapter 1, abrupt shifts in economic, ethical or affective valuations of animals threw into relief prevailing attitudes and practices. This chapter establishes the concept of the colonial animal matrix, elaborating how white settlers related both to the domestic species that landed alongside them and the autochthonous animals they encountered up to 1840. Even as

these localised hierarchies multiplied, by 1820 the settlers had established a consistent folkbiology for Australian serpents, based largely upon observing accidental snakebites in their valuable imported domesticates.

Chapter 2 characterises lay expertise in regard to snakebite and remedies, especially over 1840–80. Outlining European folklore and Aboriginal practices, I argue that by the early 1850s, plebeian expertise had established vivisection as the prime means of knowing venomous animals in Australia. In particular, snake charmers and antidote spruikers widely performed 'experiments' which involved the envenomation – and usually the suffering and death – of familiar domestic animals. Because these vivisections so frequently engaged general audiences, more was at stake than merely the evidence tendered. The very nature of proof itself was under negotiation. Indeed, into the 1870s lay practitioners – and the publics who attended their shows – embraced the epistemology of vivisection far more readily than doctors or naturalists. These professionals were, in fact, impelled to adopt animal experimentation largely because of its plebeian popularity.

Historians have frequently elaborated the impact of Australia's unique fauna upon the European imagination, from black swans to kangaroos.[27] Rarely explored, however, is the way in which animal poisons were perceived or investigated. Chapter 3 argues that, from 1840, local scientific and medical cultures shifted away from anatomical description and clinical testimony in determining which indigenous beasts were dangerous. By comparing the characterisation of local snakes with the potential emergence of rabies as a 'venomous' disease, I contend that instruments and living experiments became necessary to establish *objective* medical facts in the antipodes. As these exchanges coincided with the emergence of germ theories of disease, venom provided both an enigma and an exemplar of an ontological agent of disease. Yet neither microscopy nor vivisection could firmly establish its status as a living or dead entity, especially when Australian observations were nullified by international interlocutors.

In transitioning from a deferential tradition favouring scriptural, classical or clinical authority, colonial doctors and scientists rarely embraced positivism in a rigorous Comtean sense. Spanning the critical decade of 1868 to 1876, Chapter 4 details how snakebite treatment and vivisection were central to a profuse and acrimonious medical debate across British Australia and India. At stake were competing discourses and practices of medical authority, encompassing clinical testimony, observations in animals and public participation. Even as

they became tools for experiment, however, domesticated creatures emerged as patients for Australian snakebite remedies. As this chapter demonstrates, the moral devaluation of experimental animals did not silence their ability to 'speak' as subjects. Nevertheless, this decade proved decisive for the heuristics of colonial medicine. By the time that Britain legislatively regulated vivisection in mid-1876, animal experimentation had independently become de rigueur for colonial investigations of envenomation and remedies.

Centred on the 1880s, Chapter 5 complicates the moral and epistemological status of animal experimentation. In 1881 the colony of Victoria became the second legislature worldwide to formally regulate vivisection, yet both the spirit and enforcement of this law were honoured mainly in the breach. This statute arose, I argue, to protect human investigators rather than their animal subjects. Indeed, seeking an effective remedy for snakebite was considered sufficient reason to lessen moral consideration for all animals involved in such experiments. Through the emergence of a novel injected remedy – subcutaneous strychnine – this chapter furthermore affirms that well into the 1890s there was no certitude that vivisection would succeed clinical experience as the fundamental epistemology underscoring colonial medical practice.

Concluding with the outbreak of World War I, Chapter 6 reprises the authority claims outlined in Chapter 4. Contrasting Australia with India and French Indo-China, clinical experience appeared largely to trump vivisectional data for much of the 1890s. Yet when a 'universal' antivenene appeared – predicated upon the new science of immunology – its efficacy was concomitantly discredited by the novel technologies of experimental medicine. In particular, animal studies suggested that because venoms were complex biochemical mixtures, geographically specific antivenenes would be required to counter the venom of each local species. Australia concurrently became an independent nation, whose citizens increasingly valued their native fauna. For snakes, however, this transformation represented a hollow victory. As venom came to be seen as a potent autonomous agent, snakes were correspondingly drained of the awe they had once commanded.

For settlers in the Australian colonies, public vivisections to study envenomation and antidotes established standards of proof and authority which were followed, rather than led, by learned professionals. By tracing the tools, techniques and arguments through which venomous animals and their toxins were characterised, this book offers a new perspective not only on science and medicine in the colonial antipodes, but of their wider impact upon animals in the nineteenth-century world.

Notes

1 The foundational text is Richard D. French, *Antivivisection and Medical Science in Victorian Society* (Princeton: Princeton University Press, 1975). See also Andreas-Holger Maehle and Ulrich Tröhler, 'Animal experimentation from antiquity to the end of the eighteenth century: attitudes and arguments', in Nicolaas Rupke (ed.), *Vivisection in Historical Perspective* (London: Croom Helm, 1987), pp. 30–9; Anita Guerrini, *Experimenting with Humans and Animals: From Galen to Animal Rights* (Baltimore: Johns Hopkins University Press, 2003), pp. 61–74.

2 *Victoria. Parliamentary Debates. Session 1881. Legislative Council and Legislative Assembly* (Melbourne: John Ferres, 1882), p. 344.

3 Val Plumwood, 'Human vulnerability and the experience of being prey', *Quadrant*, 39:3 (1995), p. 34.

4 For example, Heather Schell, 'Tiger tales', in Deborah Denenholz Morse and Martin A. Danahay (eds), *Victorian Animal Dreams: Representations of Animals in Victorian Literature and Culture* (Aldershot: Ashgate, 2007), pp. 230–48; Mark V. Barrow Jr, 'The alligator's allure: changing perceptions of a charismatic carnivore', in Dorothee Brantz, ed., *Beastly Natures: Animals, Humans, and the Study of History* (Charlottesville: University of Virginia Press, 2010), pp. 127–53; Chris Wilbert, 'What is doing the killing? animal attacks, man-eaters, and shifting boundaries and flows of human–animal relations', in The Animal Studies Group (eds), *Killing Animals* (Urbana: University of Illinois Press, 2006), pp. 30–49.

5 This sense of 'uncanny' owes a debt to Julia Kristeva; see James Hatley, 'Where the beaver gnaw: predatory space in the urban landscape', in Gary Backhaus and John Murungi (eds), *Transformations of Urban and Suburban Landscapes: Perspectives from Philosophy, Geography, and Architecture* (Lanham: Lexington Books, 2002), pp. 39–40.

6 Peter Hobbins, 'Invasion ontologies: venom, visibility and the imagined histories of arthropods', in Jodi Frawley and Iain McCalman (eds), *Rethinking Invasion Ecologies from the Environmental Humanities* (Oxford: Routledge, 2014), pp. 181–95; Peter Hobbins, 'A spur to atavism: placing platypus poison', *Journal of the History of Biology* (2015), pp. 499–537.

7 Charles Hursthouse, *New Zealand, or Zealandia, the Britain of the South*, vol. I (London: Edward Stanford, 1857), pp. 117–18.

8 Pratik Chakrabarti, *Bacteriology in British India: Laboratory Medicine and the Tropics* (Rochester: University of Rochester Press, 2012), p. 116.

9 See Bryan Gandevia and Ann Tovell, 'The first Australian medical libraries', *Medical Journal of Australia*, 2 (1964), pp. 314–20; Colin Finney, *Paradise Revealed: Natural History in Nineteenth-Century Australia* (Melbourne: Museum of Victoria, 1993), pp. 1–62.

10 'Sydney', *Sydney Gazette and New South Wales Advertiser* (21 October 1804), p. 3.

11 Bruno Latour, *The Pasteurization of France*, trans. Alan Sheridan and John Law (Cambridge, Mass.: Harvard University Press, 1988), pp. 22–39; David N. Livingstone, *Putting Science in its Place: Geographies of Scientific Knowledge* (Chicago: University of Chicago Press, 2003), pp. 141–85; Steven Shapin and Simon Schaffer, *Leviathan and the Air Pump: Hobbes, Boyle, and the Experimental Life* (Princeton: Princeton University Press, 2011), pp. 22–40.

12 Tim Ingold, 'When ANT meets SPIDER: social theory for arthropods', in Carl Knappett and Lambros Malafouris (eds), *Material Agency: Towards a Non-Anthropocentric Approach* (New York: Springer, 2008), pp. 209–15.

13 For instance, Michael Worboys, *Spreading Germs: Disease Theories and Medical Practice in Britain, 1865–1900* (Cambridge: Cambridge University Press, 2000); W.F. Bynum, 'The rise of science in medicine, 1850–1913', in W.F. Bynum *et al*. (eds), *The Western Medical Tradition, 1800 to 2000* (Cambridge: Cambridge University Press, 2006), pp. 103–239.

14 Stephen Pemberton, 'Canine technologies, model patients: the historical produc-

tion of hemophiliac dogs in American biomedicine', in Susan Schrepfer and Philip Scranton (eds), *Industrializing Organisms: Introducing Evolutionary History* (New York: Routledge, 2004), pp. 202–5. See also Lynda Birke, *Feminism, Animals and Science: The Naming of the Shrew* (Buckingham: Open University Press, 1994), pp. 43–7.

15 Pratik Chakrabarti, 'Beasts of burden: animals and laboratory research in colonial India', *History of Science*, 48:2 (2010), pp. 125–51.

16 Richard Drayton, 'Science, medicine, and the British Empire', in Robin W. Winks and Alaine Low (eds), *The Oxford History of the British Empire* (Oxford: Oxford University Press, 1999), p. 264.

17 Virginia DeJohn Anderson, *Creatures of Empire: How Domestic Animals Transformed Early America* (Oxford: Oxford University Press, 2004), pp. 160–71, 211–16.

18 Owsei Temkin, 'The scientific approach to disease: specific entity and individual sickness', in A.C. Crombie (ed.), *Scientific Change: Historical Studies in the Intellectual, Social, and Technical Conditions for Scientific Discovery and Technical Invention, from Antiquity to the Present* (London: Heinemann, 1963), pp. 629–47.

19 Lorraine Daston and Peter Galison, *Objectivity* (New York: Zone Books, 2007), pp. 19–27.

20 Ian Hacking, *Historical Ontology* (Cambridge, Mass.: Harvard University Press, 2002), pp. 1–26.

21 Ludwig Wittgenstein, *Philosophical Investigations*, 2nd edn, trans. G.E.N. Anscombe (Oxford: Basil Blackwell, 1963), p. 223e. See also Cary Wolfe, 'In the shadow of Wittgenstein's lion: language, ethics, and the question of the animal', in Cary Wolfe (ed.), *Zoontologies: The Question of the Animal* (Minneapolis: University of Minnesota Press, 2003), pp. 1–57.

22 Key texts include Jacques Derrida, 'The animal that therefore I am (more to follow)', trans. David Willis, *Critical Inquiry*, 28 (2002), pp. 369–418; Donna Haraway, *The Companion Species Manifesto: Dogs, People, and Significant Otherness* (Chicago: Prickly Paradigm, 2003), pp. 3–25; Akira Mizuta Lipitt, *Electric Animal: Toward a Rhetoric of Wildlife* (Minneapolis: University of Minnesota Press, 2008), pp. 1–25.

23 State Library of New South Wales, Sydney, A 330, Notes and sketches taken during a surveying Expedition in N. South Wales and Blue Mountains Road by William Govett on staff of Major Mitchell, Surveyor General of New South Wales, William Romaine Govett, 1830–1835, p. 11.

24 Harriet Ritvo, 'Our animal cousins', *differences: A Journal of Feminist Cultural Studies*, 15:1 (2004), pp. 48–68.

25 Sandra Swart, *Riding High: Horses, Humans and History in South Africa* (Johannesburg: Witwatersrand University Press, 2010), p. 2.

26 See for instance Robert Kenny, *The Lamb Enters the Dreaming: Nathanael Pepper & the Ruptured World* (Melbourne: Scribe, 2007), pp. 168–76.

27 Examples include Penny Olsen, *Upside Down World: Early European Impressions of Australia's Curious Animals* (Canberra: National Library of Australia, 2010), pp. 2–5; Danielle Clode, 'From molluscs to monkeys: Darwin and early Australian biology', in Jeanette Hoorn (ed.), *Reframing Darwin: Evolution and the Arts in Australia* (South Carlton: Melbourne University Press, 2009), pp. 14–19.