We cannot feel sure that the apes do not learn from their own experience or from that of their parents what fruits to select. It is, however, certain, as we shall presently see, that apes have an instinctive dread of serpents...

Charles Darwin, *Descent of Man*, 1871, p. 61

Human fascination with the power of venom, and the quest for the discovery of a universal antidote against this most feared of poisons, is deeply woven into the history of medicine, society and our confrontation with the human condition. Indeed this triumvirate (fear, fascination and discovery) speaks to us of the broader narrative of human engagement with Nature as it has occurred over millennia and has been expressed in both the arts and sciences in multiple cultures, places and times. This interaction, one facet of which is evident in this exhibition, retains its power and significance even in this age of the ascendency of technology. It is fitting that in the Chinese Year of the Snake we have the opportunity, through this exhibition and its catalogue, to reflect on the place of the University of Melbourne and associated institutions, as the enduring thread that has woven together the Australian story of venom.

On a larger scale, it is telling of the power of this broader history that the world’s first temple site, Göbekli Tepe in Turkey (11 000 years old), that predates Stonehenge by 6000 years, has not angels but dangerous creatures, including snakes, spiders and scorpions, etched in its towering stone pillars. So potent were these creatures that their power was widely adopted in religious iconography and incorporated into many aspects of human culture. In particular, the image of a snake or serpent had multiple roles in the religious and cultural life of ancient Egypt, Mesopotamia and Greece. For example, in ancient Egypt venomous bites and stings represented a major cause of injury and were a religious and cultural preoccupation. Indeed, the God Horus, represented here from a temple in southern upper Egypt from the Ptolemaic period (332 BC–AD 395) was a falcon-headed deity with power over bites and stings. Gift giving was believed to offer protection from these hazards or assist in healing the bitten. Similarly, such was the significance of venomous snakes, that a pictogram of the deadly horned viper (Cerastes cerastes) actually formed part of the written ancient Egyptian language. This culture also offers us perhaps the first surviving text on snakebite—the papyrus held at the Brooklyn Museum of Art.

*Ptolemaic pharaoh offering incense to Horus*, wall relief; credit: Carole Reeves. Wellcome Library, London
Dating from Dynasty XXX or the early Ptolemaic Period (305 BC), among other topics it refers to the treatment of the snakebite wounds by lancing. Indeed the cultural imprint of venom in the middle-eastern ‘cradle of civilisation’ is also evident in early legal imagery. When you visit the University of Melbourne Law School building, you can see in the foyer an ancient Mesopotamian tablet that describes, in Sumerian script, the property rights bestowed by the King on a former soldier, as circumscribed by a boundary line of snakes. Also from Mesopotamia (about 4000 years ago), in one of the oldest recorded human stories, the Epic of Gilgamesh, the eponymously named hero has immortality stolen from him by a snake. Religious and historical scholars recognise the common linkages between the stories of Genesis and Gilgamesh, in part through the semiotics of the snake.

Specifically the serpent was used to represent the source of both knowledge as well as evil in the Hebrew and Christian bibles. In addition, in the Abrahamic traditions, the serpent symbolises sexual desire. This seductive power of the serpent, its role in eternal life, and as an agent of evil, endures as evident from medieval Christian art to present day secular and religious stories and imagery. The snake, like Camus, reminds humanity of the futility of the pursuit of immortality, the basis of the human condition. The exhibition and associated essays and illustrated items in this catalogue delve more deeply into some of these fascinating and persistent ideas and their medical resonances.

Turning to ancient Greece, we see that the serpent was appropriated as the very symbol of medicine itself, through the snake-entwined staff of Asklepios, referencing their God of Medicine. Such positive attributes of the serpent may well reflect Asiatic cultural influences. Consider that in Chinese tradition, the snake is imbued with intelligence, subtlety, elegance and portents good fortune. Indeed, in contrast to Genesis, in the story of Buddha and the serpent king Mucalinda, the former is protected, rather than imperiled, by the encircled snake. Nevertheless the Susruta-samhita, written by the Varanasi physician Susruta (c. AD 300), a foundational Ayurvedic medical text, describes scarification, bloodletting, and cupping for the treatment of venomous bites and stings.

Considering the first western medical texts in the form of the Egyptian papyri, through to the ancient Greek and Roman pharmacopoeia, mention was always made of the effects of venom and a multiplicity of treatments proffered. For example, Gaius Plinius Secundus, also known as the Latin naturalist Pliny the Elder (AD 29–79), in his Naturalis historia, the most popular natural history text ever written, provided fascinating rhetoric with this wide ranging advice:

Cat. 130 Gaius Plinius Secundus (Pliny, the Elder), C. Plini Secundi naturalis historiæ ... Lugd. Batav. Roterodami: Apud Hackios, 1668–1669. Special Collections, Baillieu Library, University of Melbourne
For poisonous bites, it is customary to employ a liniment made of fresh sheep-droppings, cooked in wine. Rats cut in two are also applied; these animals possess important properties, especially at the epoch of the ascension of the stars, seeing that the number of a rat’s fibres wax and wane with the moon … Of all birds, those that afford most assistance against snakes are vultures. The black ones are the weaker. The odour of their feathers when burnt puts snakes to flight. Provided with a vulture’s heart one need not fear encounters with snakes, and can also defy the wrath of wild beasts, robbers, and princes.

For more than three millennia such interventions also mixed dubious surgical advice (lancing and amputation) with quasi-magical medical options (mutilation of pancreas such as thersites). The common outcome of snakebite meant that much such incunabula was consigned to the mists of millenium. Remarkably therapeutic, including the essential ingredients such as bezoar stones and viper, was even included in European pharmacopoeias well into the nineteenth century. Indeed this pharmaceutical concoction is featured within the Savory and Moore Pharmacy of the Medical History Museum, reflecting its place in British and Australian pharmaceutical practice of that late period (cat. 51).

Extracts from snakes, toads, scorpions and hornets’ nests remain within the Venom: Fear, fascination and discovery, Medical History Museum 16.

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Over the next hundred years the great natural history expeditions gathered a growing corpus of venomous organisms in the burgeoning public and private collections of Europe. Under the binominal classification system popularised by Swedish physician and zoologist Carl Linnaeus (1707–1778), these collections became the formalised common knowledge base for the emerging toxinologists of the Victorian era. Many notable natural historians of the period, including Darwin, Huxley and Haeckel, contributed to our understanding of venomous terrestrial and marine creatures. Such scientific progress, reflecting the titanic shift from natural philosophy to modern experimental science, occurred in the wider political and societal foment of that era.

More locally, over thousands of years Australian Aboriginal people had incorporated ways of understanding and dealing with these venomous creatures in their cultural and healing practices. Unfortunately, European Australia remains profoundly ignorant of these 60,000 years of learning from our national ‘book of nature’. However, in the exhibition we see glimpses of how Indigenous and non-Indigenous Australians have collaborated in the quest to prevent and offer better treatments for venomous bite and sting victims. We need to renew and learn from our collective shared knowledge about our ‘place’ and all its creatures, large and small. Indeed one of the enduring challenges the toxinology research community faces is a jellyfish sting that is itself named after an Aboriginal tribe found in north Queensland, the Yirrganydji people. More about this later in the catalogue, but suffice to say that the name recognises the traditional custodians of the place where the sting was originally described—where people, rainforest and reef meet.

It is important to note that from the beginning of colonial Australian toxinology, much of which was based here in Victoria, our reach and ambition was global. This intercontinental discourse went beyond the British colonies, particularly India and the United Kingdom, to engage Australian doctors and scientists with contemporaries in Brazil, the USA, France and Germany. The exhibition and catalogue provide many intriguing examples of how Australia contributed, not always productively, to cutting edge debate on venom, particularly snakebite and its treatment. This was not always the fault of the colonists—consider the case of the enigmatic venomous platypus, initially proclaimed a hoax in Britain. Despite the limited facilities, by Federation the studies of this venom were underway, and pioneered, at the University of Melbourne.

Then there was Charles Darwin’s potentially fatal misclassification, in 1836, of a Tasmanian elapid (front-fanged) snake whilst in Hobart. Indeed it is interesting to...
contemplate how different the world would be had he been bitten by this presumed
tall black snake that he, the former Edinburgh University medical student and ambitious
young naturalist, collected and misidentified as a harmless Coluber, during a ramble up
Mount Wellington. This taxonomic category refers to the family ‘Colubridae’, mostly
featuring minimally dangerous snakes that are, collectively, more common amongst
European than Australian snakes. It is notable that tiger snakes remain the leading cause
of death from snakebite in Victoria and Tasmania.

In some cases our early practitioners of ‘evidence-based medicine’ fearlessly
debunked the mistaken ideas promoted by some Australians. For example, statistics
published in 1893 by Sydney physician Louis Huxtable positively condemned the
recommendation of injections of strychnine made by Dr Augustus Mueller of
Yackandandah, Victoria. Huxtable’s studies showed that strychnine-treated snakebites
had mortality rates of 13.2 per cent whereas those not treated with strychnine had a
mortality rate of 4.1 per cent. Yet only three years earlier the editor of the Australasian
Medical Gazette, asserted, ‘No medical man in Australia now can treat a case of snake-
bite other than by his method [Mueller’s intravenous injection of strychnine] without
incurring the charge of culpable ignorance.

Unfortunately, despite the evidence of Huxtable and others, in the absence of
the evidence of Huxtable and others, in the absence of
research discoveries, especially those that challenge conventional medical paradigms,
cannot be taken for granted.

Nevertheless these definitive early snakebite statistics found their way to France
and were reproduced in the foundation document of modern toxicology, Vénoms, venimeous
animals and anti-venom serum therapies, by Albert Calmette. It was Calmette, one of
Pasteur’s disciples, who transformed snakebite management through the first commercial
production of snake antivenom. Calmette, shown here in a contemporary cartoon, was
but one of the giants of modern toxinology who also straddled the emergent dominions
of immunology, microbiology, neurology, physiology and pharmacology. Many such
discoveries were precipitated by academic industry collaborations as public health driven
serotherapy and industrial chemistry underwent fundamental mechanistic observations of
the workings of the immune and nervous systems.

Elsewhere in this collection details are provided of the many amateur and
administrative successes outside of their venom researches. Yet others such as former
Walter and Eliza Hall Institute director Charles Kellaway have been largely overshadowed
by their proteges and the tide of subsequent medical advances, or, in the case of the
Commonwealth Serum Laboratories’ Saul Wiener, by their own modest nature. In the
singular case of Eleanor Williams, Kellaway’s ‘right-hand woman’, her story is that of the
neglected role of female nurse-scientists in developing modern Australian medical research.

This history also reminds us that, beyond the Academy, our understanding of
venom derives, in part, from a lifetime of contributions from many amateur and
professional men and women who collected and milked these potentially deadly creatures.
The story of Kevin Budden and the snake that was literally responsible for his death, forms
the nascent definition of what are now known as the leukotoxins. This later led Bengt Samuelsson and others to the 1982 Nobel Prize for their work on leukotrienes and
prostaglandins.

Finally and consequently, if nothing else, this exhibition returns us to the ancients
who understood that enduring truth of the human condition: the illusion of complete
knowledge. It is salient to contemplate, as we reflect on the tide of history, the mistake
of our recent medical contemporaries who wrote the editorial in the June 15, 1929
Medical Journal of Australia: ‘The story is complete and there is no longer any room for
the astonishing differences of opinion that have characterised some of the communications on
the subject [of snakebite] in the pages of this journal.’ We invite you to join us in writing
the next chapter in this never-ending, and always thrilling, ‘story of venom’.

Dr Kenneth D Winkel