Improving Conservation Outcomes: Understanding Scientific, Historical and Cultural Dimensions of the Illicit Trade in Rhinoceros Horn

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ABSTRACT

This article aims to illuminate the pervasive allure of the rhinoceros to better comprehend the historical and cultural drivers for the illicit global trade in its most coveted part: rhinoceros horn. The market for rhino horn remains dominated by customary and cultural purposes, most notably in traditional medicine. Developing conservation strategies and responding to the criminological implications of the market requires cross-cultural understanding, drawing upon multidisciplinary sources from evolutionary biology, species ecology, cultural anthropology, biomedicine, biomaterial engineering as well as ancient and modern history. Analysis will be carried out in three parts: (1) a synopsis of evolution and ecology; (2) an examination of the cultural significance of the rhinoceros as informed by historical and contemporary sources; and (3) an investigation into the morphology and established uses of rhinoceros horn. This analysis demonstrates the importance of interdisciplinary approaches to developing optimal conservation strategies addressing the multifaceted problem of illicit trade in wildlife.

KEYWORDS

Rhinoceros, rhino horn, wildlife conservation, history, traditional medicine, illicit trade

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On 19 June 2015, Ceballos et al. published significant findings (against conservative metrics) confirming that Earth has entered its sixth age of mass extinction due to the sheer rates of biodiversity loss endured over the last few centuries. The authors offer a hopeful yet cautious recommendation: 'averting a dramatic decay of biodiversity and the subsequent loss of ecosystem services

is still possible through intensified conservation efforts, but that window of opportunity is rapidly closing'.[1] There is no doubt that urgent action is required to contend with the Holocene extinction, but questions remain as to how to maximise the impact of conservation policy frameworks on local, regional, national and international echelons. To state it simply, time is of the essence and priority ought to be afforded to approaches that are scientifically informed, targeted towards behaviour change, and capable of effective implementation.

Among the drivers of extinction challenging policy makers today is the illicit trade in wildlife, a multi-billion dollar global network of markets.[2] The trade predates on some of the world's most endangered wildlife, treating them as commodities to be sold whole or peddled piece by piece. The persistence of the trade is compounded by the cultural, traditional or customary value of some of the goods sold, as well as its 'relative lack of social stigma, small risk of prosecution for wildlife crimes, and the light penalties given to those few brought to justice' when compared to other black-market commodities.[3] However, the trade in species is not a new phenomenon. Its extensive history presents a double-edged sword: on the one hand, it provides an opportunity to design strategies informed by a wealth of historical data to extrapolate market trends and evaluate the effectiveness of past counter-measures; on the other, it drives home the stark reality that many practices associated with wildlife commodities derive from longstanding customs, which may be too culturally entrenched to overcome in the brief window of extinction mitigation for many species. As this article will demonstrate, the rhinoceros provides a prime example of a species besieged by the illicit trade for largely cultural-historic reasons, inviting an interdisciplinary approach to support conservation strategies.

This paper advances the necessity for conservation policies to be scientifically evidenced, historically informed and culturally aware, using the rhinoceros as a case study. Accordingly, it will be divided into three parts. Part I will clarify the subject matter by providing an overview of rhinoceros taxonomy. It will outline the evolutionary history of the taxonomic family *Rhinocerotidae* and profile each of the five extant species, including population statistics. Part II will draw together literary accounts of the rhinoceros in order to demonstrate the longitudinal human fascination with the animal

1. Gerardo Ceballos et al., 'Accelerated modern human-induced species losses: Entering the sixth mass extinction', *Science Advances* **1**(5) (2015).
2. United Nations Office on Drugs and Crime, *World Wildlife Crime Report: Trafficking in Protected Species* (United Nations, 2016) https://www.unodc.org/documents/data-and-analysis/wildlife/World_Wildlife_Crime_Report_2016_final.pdf. See also Channing May, *Global Financial Integrity, Transnational Crime and the Developing World* (2017), p. 53 http://www.gfintegrity.org/wp-content/uploads/2017/03/Transnational_Crime-final.pdf; Tom Milliken, US Aid and TRAFFIC, *Illegal Trade and Rhino Horn: an Assessment Report to Improve Law Enforcement Under the Wildlife TRAPS Project* (2014), p. 1.
3. Leo R. Douglas and Kelvin Alie, 'High-value natural resources: Linking wildlife conservation to international conflict, insecurity, and development concerns', *Biological Conservation* **171** (2014): 270–277, 272.

and its horn, canvassing western and non-western accounts. Lastly, Part III will undertake a closer examination of the rhinoceros horn by investigating its morphology as well as historical and current uses across eastern and western cultures.

PART I: THE EVOLUTION AND ECOLOGY OF THE RHINOCEROS

The Rhinoceros (or 'rhino') is a mammal belonging to the taxonomic family *Rhinocerotidae* characterised by the following features: large size, thick skin, short tail, long hair-tipped ears and distinct facial horns.[4] The name *rhinoceros* is evocative of the latter feature, comprised of the Greek words *rhino* (meaning 'nose') and *ceros* (meaning 'horn').[5] There are five extant species of rhinoceros: two African (White and Black) and three Asian (Indian, Sumatran and Javan). White, Black and Sumatran Rhinos possess two horns (the front referred to as the 'anterior' and the rearmost as the 'posterior') whereas Javan and Indian species sport a single horn. Less obvious to the naked eye, Asian rhinos have evidence of tusks whereas African species do not. All species are herbivores with gestation periods ranging from fifteen to sixteen months, communicate through vocalisations, faeces, urine and scent, have high functioning senses of smell and hearing, possess low functioning sight, and, despite size variation between species, are all referred to as *mega fauna*. Rhinos are also associated with the older zoological grouping *pachyderm* derived from the Greek *pachys* (meaning 'thick') and *derma* (meaning 'skin').[6] In contemporary biology, rhinos are referred to as *ungulates* (derived from the Latin *ungula* meaning 'hoof') and specifically as 'odd-toed ungulates'.

The evolutionary history of the rhinoceros is as fascinating as it is expansive, with Dinerstein highlighting three particular hallmarks: 'the antiquity of the lineage, the diversity and variety of the feeding niches that they occupied, and numerical abundance'.[7] There were three *Perissodactyl* families resembling the modern-day rhino: the *Hyracodontidae*, *Amynodontidae,* and *Rhinocerotidae*.[8] Hyracodontidae (often referred to as 'running rhinos') first appeared in the Eocene through to the early Miocene; whereas the

4. Eric Dinerstein, 'Family Rhinocerotidae (Rhinoceroses)', in Don E. Wilson and Russell A. Mittermeier (eds), *Handbook of the Mammals of the World*, Vol 2 (Lynx Edicions, 2011), accessed 29 Jan. 2015. http://www.lynxeds.com/hmw/family-text/hmw-2-family-text-rhinocerotidae-rhinoceroses

5. See also Kathleen Coleman, 'The Rhinoceros in the Ancient World', *Lantern* **39** (1) (1990): 27–31, 27: 'The rhinoceros was named for us by the Greeks, who designated it "nose-horn"; the Romans transliterated the Greek name into their own alphabet. Latin gave the word to English and, with modifications, to other modern European languages: 'renoster' (Afrikaans), 'rhinocéros' (French), 'rinoceronte' (Italian).'

6. Ibid.

7. Dinerstein, 'Family Rhinocerotidae (Rhinoceroses)'.

8. Ibid.

Amynodontidae (also known as 'aquatic rhinos') appeared in the late Eocene with one genus, *Cadurcotherium* surviving until the Mid-Miocene. The Rhinocerotidae appeared in the late Eocene, achieving greatest abundance during the late Oligocene, and persists to this day. The five extant species of rhinoceros evolved across different geological timelines. Paleontological evidence plots the emergence of the White, Indian and Javan rhinoceroses as having occurred during the Mid-Pleistocene. Next in sequence from youngest to oldest is the Black Rhinoceros, which emerged in the Pliocene Epoch. The least derived species, the Sumatran Rhinoceros, has fossil records dating its genus to the early Miocene and shares more traits with its Miocene ancestors than any surviving species.[9]

A visual representation of the rhino's vast history, including its early interactions with humans, can be found on the walls of the Chauvet-Pont-d'Arc Cave in Southern France.[10] The caves were discovered in 1994 and contain some of the most optimally preserved figurative cave paintings in early human history. The precise age of the hundreds of paintings adorning the cave walls has been debated, with a 2012 study dating the artwork to 30–32,000 years ago and a more recent 2016 study estimating the black drawings to have been created in the first of two phases of human occupation (37,000–33,500 years ago).[11] Among the paintings of lions, bears, mammoths, hyena, horses and other creatures are two woolly rhinoceroses (*Coelodonta antiquitatis*), their horns pressed together. Paleontological discoveries continue to shape our understanding of possible early interactions between humans and rhinos. Most recently, a fossil of an *Elasmotherium sibiricum* found in Kozhamzhar, Kazakhstan was dated as 29,000 years old, not only indicating that the animal existed at the same time as humans in the region, but substantially rewriting the species' range.[12]

For a more complete understanding of illicit supply chains and markets for rhino horn, it is imperative to profile each species individually to gauge distinct levels of vulnerability and potential victimisation. At the very least, it requires an appreciation of the extent to which populations have decreased, if not become regionally extinct, due to past predation. Profiling each species also serves to inform audiences as to the existence and characteristics of

9. Ibid.

10. Richard Ellis, *Tiger Bone and Rhino Horn: The Destruction of Wildlife for Traditional Chinese Medicine* (Washington, DC: Island Press, 2005), p. 75.

11. Benjamin Sadier et al., 'Further constraints on the Chauvet cave artwork elaboration', *Proceeding of the National Academy of Sciences of the United States of America* **109** (21) (2012): 8002–8006. Anita Quiles et al, 'A high-precision chronological model for the decorated Upper Paleolithic cave of Chauvet-Pont-d'Arc, Ardèche, France', *Proceeding of the National Academy of Sciences of the United States of America* **113** (17) (2016): 4670–4675.

12. Andrei Valerievich Shpanksy, Valentina Nurmagambetovna Aliyassova and Svetlana Anatolievna Ilyina, 'The Quaternary Mammals from Kozhamzhar Locality (Pavlodar Region, Kazakhstan)', *American Journal of Applied Sciences* **13** (2) (2016): 189–199.

Asian rhinos as the lesser-known variations. Metrics of endangerment refer to the IUCN Red List classification that provides a seven-category sliding scale from 'Least Concern' to 'Extinct' (with 'Near Threatened', 'Vulnerable', 'Endangered', 'Critically Endangered' and 'Endangered in the Wild' in between) in addition to two categories regarding availability of data, 'Not Evaluated' and 'Data Deficient'.[13]

THE RHINOS OF AFRICA

Black Rhinoceros

The Black Rhinoceros (*Diceros bicornis),* also referred to as the 'hook-lipped rhinoceros' or 'prehensile-lipped rhinoceros', is not actually black in colour, but ranges from grey to brown.[14] According to the IUCN African Rhino Specialist Group, as at 2016 there were between 5,042–5,455 black rhinos surviving on the continent.[15] The Black rhino is native to Angola, Kenya, Mozambique, Namibia, South Africa, Tanzania and Zimbabwe. It is possibly extinct in Ethiopia, regionally extinct in Cameroon and Chad, and has been reintroduced in Botswana, Malawi, Swaziland, Zambia, and most recently Rwanda in 2017 (with an agreement between South Africa and Chad for re-introduction in 2018). In *Green Hills of Africa,* Ernest Hemingway once described a black rhino he had shot as 'a hell of an animal'.[16]

It should be noted that there has been some debate as to the number of subspecies, with the African Rhino Specialist Group recommending a distinction of four subspecies: *Diceros bicornis bicornis* (vulnerable), *Diceros bicornis minor* (critically endangered), *Diceros bicornis michaeli* (critically endangered) and *Diceros bicornis longipes* (listed as extinct in 2011),[17] whereas Groves and Grubb currently identify four additional subspecies: (*Diceros bicornis chobiensis*, *Diceros bicornis occidentalis*, *Diceros bicornis brucii* and *Diceros bicornis ladoensis*).[18] Irrespective of classification, numbers of black rhinoceros have dwindled, with the most recent Red List determination of 'critically endangered'.[19] The scale of endangerment has been documented for decades, with Nowak branding the decline in Black Rhinoceros popula-

13. IUCN 2014. *The IUCN Red List of Threatened Species. Version 2014.3*., accessed 15 Jan. 2015. http://www.iucnredlist.org
14. Kees Rookmaaker (ed.), Rhino Resource Center, *Black Rhino- Diceros bicornis*, accessed 29 Jan. 2015. http://www.rhinoresourcecenter.com/species/black-rhino/
15. International Union for Conservation of Nature, 'IUCN Reports Deepening Rhino Poaching Crisis in Africa', 9 Mar. 2016.
16. Ellis, *Tiger Bone and Rhino Horn*, p. 93.
17. Date Assessed: 5 Aug. 2011; Assessor: R. Emslie; Reviewers: M.H. Knight and K. Adcock.
18. Colin Groves and Peter Grubb, *Ungulate Taxonomy* (Baltimore: John Hopkins University Press, 2011). See also Colin Groves, 'Geographic variation in the Black Rhinoceros', *Zeitschriftfür Säugetierkunde* **32** (1967): 267–276.
19. Date assessed 6 Aug. 2011; Assessor: R. Emslie; Reviewers: M.H. Knight and K. Adcock.

tions as 'the greatest single mammalian conservation failure of the twentieth century'.[20] Fortunately, twenty-first century conservation has seen some victories, with the current population trend increasing and successful regional reintroductions.

White Rhinoceros

The taxonomy of the White Rhinoceros (*Ceratotherium simum*), commonly known as the 'square-lipped rhinoceros',[21] has also been subject of some debate. The IUCN classification distinguishes two subspecies: *Ceratotherium simum simum* (the Southern White Rhinoceros) and *Ceratotherium simum cottoni* (the Northern White Rhinoceros),[22] whereas Groves, Fernando and Rabovsky advance that these should be considered separate species.[23] As per 2011 assessment, the Southern White Rhinoceros is classified as 'Near Threatened' whereas the Northern White Rhinoceros is 'Critically Endangered'. [24] This species favours bush land and savannah habitats and is recognisable for a distinctively large hump on the back of its neck. It is native to South Africa, possibly extinct in the Democratic Republic of Congo, South Sudan and Sudan and regionally extinct in the Central African Republic and Chad. The species has been reintroduced in Botswana, Kenya, Mozambique, Namibia, Swaziland, Uganda and Zimbabwe and introduced in Zambia.[25] In 2016, the IUCN African Rhino Specialist Group approximated between 19,682–21,077 white rhinos surviving on the continent (a far cry from less than a hundred individuals in 1895).[26] There are currently only three Northern White Rhino: male Sudan, his daughter Najin, and granddaughter Fatu (Ol Pejeta Conservancy, Kenya) following the deaths of Angalifu and Nola (in 2014 and 2015 respectively, San Diego Zoo) and Nabire (in 2015, Dvůr Králové Zoo). Mitigation strat-

20. Ronald Nowak, *Walker's Mammals of the World*, 6th edition, Vol. II (Baltimore: John Hopkins University Press, 1991), p. 1036.
21. It ought to be noted that 'the notion that the label "white" is a corruption of the Afrikaans/Dutch word "wyd"/"wijd" (wide), presumably referring to the broad lips of the white rhino, has been convincingly disproved'. See Jan C. A. Boeyens and Maria M. van der Ryst, 'The cultural and symbolic significance of the African rhinoceros: a review of the traditional beliefs, perceptions and practices of agropastoralist societies in southern Africa', *Southern African Humanities* **26** (2014): 21–55, 23; Jim Feely, 'Black rhino, white rhino: what's in a name?' *Pachyderm* **43** (2007): 111–15.
22. Richard Emslie, *Ceratotherium simum*. The IUCN Red List of Threatened Species. Version 2014.3 (2012), accessed 30 Jan. 2015. www.iucnredlist.org
23. Colin Groves, Prithiviraj Fernando and Jan Rabovsky, 'The sixth rhino: a taxonomic reassessment of the critically endangered northern white rhinoceros', *PLoSONE* **5** (4) (2010): e9703.
24. Date assessed: 6 Aug. 2011; Assessor: R. Emslie; Reviewers: M.H. Knight and K. Adcock.
25. Richard Emslie, *Ceratotherium simum*. The IUCN Red List of Threatened Species. Version 2014.3 (2012), accessed 30 Jan. 2015. www.iucnredlist.org
26. International Union for Conservation of Nature, 'IUCN Reports Deepening Rhino Poaching Crisis in Africa' 9 Mar. 2016.

egies have mobilised to bring the Northern White Rhinoceros back from the brink of extinction. In November 2015, San Diego Zoo received six Southern White Rhinos to become surrogates for Northern White embryos, aiming to produce a calf within ten to fifteen years.[27] Northern White populations have suffered substantially due to increased poaching during periods of civil war in the Democratic Republic of Congo and neighbouring Sudan.[28]

In September 2017, TRAFFIC released its *Pendants, Powder and Pathways* Rapid Assessment Report, citing more than 7,100 recorded incidents where rhinos have been killed by poachers in Africa over the past decade, with 1,160 documented incidents across six African range States occurring in 2016.[29] While this presents a slight decrease from 1,346 recorded in 2015, the report notes concerns with respect to 'geographical shifts in poaching'.[30] For example, within South Africa, home to 79 per cent of Africa's rhinos, news of decreases in poaching within Kruger National Park (which accounted for approximately sixty per cent of poaching incidents between 2008 and 2015)[31] have been eclipsed by increasingly frequent and violent killings in KwaZulu-Natal. Likewise, increasing poaching incidents in Namibia and Zimbabwe have raised concerns that poachers have simply repositioned efforts to exploit 'softer' targets.

THE RHINOS OF ASIA

Indian Rhinoceros

The Indian Rhinoceros (*Rhinoceros unicornis*) also referred to as the 'Greater-One Horned Rhino' has no subspecies.[32] It is native to India and Nepal and regionally extinct in Bangladesh and Bhutan. In 2008, the species was categorised as 'vulnerable'.[33] It is known for its magnificent horn and large folds of skin. So prominent are its skin folds that artists have depicted its body covered

27. 'Southern white rhinos arrive at San Diego Zoo for surrogacy conservation initiative to save northern relative from extinction', *ABC News*, 8 Nov., 2015. See also O.A. Ryder et al., *Press release: Reproduction and stem cell researchers set up a rescue plan for Northern White Rhino* (Press release of the Leibniz Institute, Berlin, Dec. 2015), p. 1.
28. Richard Emslie. 2012. *Ceratotherium simum*. The IUCN Red List of Threatened Species. Version 2014.3, accessed 30 Jan. 2015. www.iucnredlist.org
29. Sade Moneron, Nicola Okes and Julian Rademeyer, *Pendants, Powder and Pathways: A Rapid Assessment of Smuggling Routes and Techniques Used in the Illicit Trade in African Rhino Horn* (TRAFFIC, 2017), p. 2.
30. Ibid.
31. Julian Rademeyer, *Tipping Point: Transnational Organised Crime and the 'War' on Poaching* (Global Initiative against Transnational Organized Crime, 2016), p. 7.
32. Kees Rookmaaker (ed.), Rhino Resource Center, *Indian Rhino- Rhinoceros unicornis*, accessed 29 Jan. 2015. http://www.rhinoresourcecenter.com/species/indian-rhino/
33. B.K. Talukdar, R. Emslie, S.S. Bist, A. Choudhury, S. Ellis, B.S. Bonal, M.C. Malakar, B.N. Talukdar and M. Barua, *Rhinoceros unicornis*. The IUCN Red List of Threatened Species. Version 2014.3 (2008), accessed 30 Jan. 2015. www.iucnredlist.org

in plated armour. Assumptions due to its size are betrayed by its keen ability to swim. It was this species of rhino that inspired the English writer Rudyard Kipling to write *How the Rhinoceros got his Skin* (1902). Therein, a Parsee man rubs cake crumbs into a rhino's skin, causing it to itch and scrape itself up against a palm tree, creating the vast folds of skin it bears today. In 2013, the IUCN Asian Rhino Specialist Group recorded approximately 3, 550 greater one-horned rhinos surviving.

Javan Rhinoceros

The Javan Rhinoceros (*Rhinoceros sondaicus*) has only one surviving subspecies (*Rhinoceros sondaicus sondaicus*) following the extinction of *Rhinoceros sondaicus annamiticus* and *Rhinoceros sondaicus inermis*. The Red List states that it is 'critically endangered' and in 2008 determined it was native to Indonesia and Vietnam (regionally extinct in Bangladesh, Cambodia, China, India, the Lao People's Democratic Republic, Peninsular Malaysia, Myanmar and Thailand). The last Javan rhinoceros in captivity was a male called 'Rhini'[34] (1886 – 1907) who resided at Adelaide Zoo.[35] In 2008, there were an estimated forty to sixty animals on the western tip of Java in Ujung Kulon National Park with a smaller population in Cat Tien National Park, Vietnam.[36] In 2010 it was declared extinct in Cat Tien, leaving Ujung Kulon the last stronghold of the Javan Rhino; an at-risk area due to ongoing threats of tsunami and volcanic eruption.[37] As at November 2017, the count sits at 67, including four calves born in 2017.In 1817, in his *History of Java*, Raffles noted the demand for the Javan Rhinoceros' horn 'whose virtues are highly priced'.[38]

Sumatran Rhinoceros

The Sumatran Rhinoceros (*Dicerorhinus sumantratrensis*) has three recognised subspecies (*Dicerorhinus sumatrensis lasiotis*, *Dicerorhinus sumantratrensis sumatrensis* and *Dicerorhinus sumantratrensis harrissoni*) and is classified as 'critically endangered'.[39] In 2008, it was said to dwell mainly in the tropical rainforests and montane moss forests of Indonesia and Malaysia, and was listed

34. Clare Peddie, 'Mr Rhini leads the charge to share animals' stories' *The Advertiser*, 7 Sept. 2010.
35. L.C. Rookmaaker et al., *The Rhinoceros in Captivity: A List of 2439 Rhinoceroses Kept from Roman times to 1994* (The Hague: Kugler Publications, 1998), pp. 120–1.
36. Ibid.
37. Colin P. Groves and David M. Leslie Jr, 'Rhinoceros sondaicus (Perissodactyla: Rhinocerotidae)' *Mammalian Species* **43** (887) (2011): 190–208.
38. Thomas Stamford Raffles, *The History of Java*, Vol. 1 (London: Black, Parbury & Allen, 1817), p. 49.
39. Kees Rookmaaker (ed.), Rhino Resource Center, *Sumatran Rhino- Dicerorhinus sumatrensis*, accessed 29 Jan. 29 2015. http://www.rhinoresourcecenter.com/species/sumatran-rhino/

as possibly extinct in Myanmar and regionally extinct in Bangladesh, Bhutan, Brunei Darussalam, Cambodia, India, Lao People's Democratic Republic, Thailand and Vietnam. A 2015 analysis published in *Oryx* found that the Sumatran Rhino is extinct in the Malaysian wild.[40] There are four known wild populations in Way Kambas National Park, Bukit Barisan Selatan National Park, Leuser National Park, and, as of 2013, a previously unknown group in Kalimantan. While the current official estimate indicates a population less than a hundred wild individuals in total (a notable decrease from 275 in 2008), this figure has been described as 'overly optimistic' with the minimum estimates of each wild stronghold totaling as few as thirty wild Sumatran rhinos.[41]

As at November 2017, there are only nine Sumatran Rhinos in captivity. Tam and Iman are held in the Borneo Rhinoceros Sanctuary in Sabah, with current data indicating that they are the only remaining members of the Bornean subspecies following the passing of Puntung in June 2017.[42] The Indonesian Sumatran Rhino Sanctuary houses females Ratu, Rosa, Bina, and Delilah, and males Andalas, Harapan, Andatu. Andalas and Harapan were born at the Cincinnati Zoo in 2001 and 2007 respectively, and are offspring of the most prolific Sumtran sire, Ipuh and female Emi (both deceased).[43] In fact, Andalas was the first Sumatran rhino born in captivity in 112 years.

Owing to its prehistoric appearance, British naturalist Charles Hose described 'the beast' in 1929 as 'the most grotesque of his kind'.[44] In 1822, Raffles wrote of the *badak*'s shy nature: 'they are not bold, and one of the largest size has been seen to run away from a single wild dog'.[45]Of the demand for its horn, Wallace wrote of two specimens purchased in the Bazaar at Sibu in 1874:

> both horns and teeth are brought to Sibu by natives arriving from the above district for purposes of trade; and these articles being valued by Chinese and Malays for their supposed medicinal properties, at once command a ready sale, so that they disappear generally beyond hope of recovery.[46]

40. R.G. Havmøller et al., 'Will current conservation responses save the Critically Endangered Sumatran rhinoceros *Dicerorhinus sumatrensis*?' *Oryx* published online 3 Aug. 2015.
41. Jeremy Hance, 'Worst-case scenario: There could be only 30 wild Sumatran rhinos left', *Mongabay*, 7 Nov. 2017.
42. Jeremy Hance, 'Officials: Sumatran rhino is extinct in the wild in Sabah', *Mongabay*, 23 Apr. 2015.
43. They also shared a sister, Suci (2004–2014).
44. Charles Hose, *The Field Book of a Jungle-Wallah: Being a Description of Shore, River, and Forest Life in Sarawak* (Singapore: Oxford University Press, 1929).
45. Thomas Stamford Raffles, 'Descriptive catalogue of a zoological collection, made on account of the Honourable East India Company, in the island of Sumatra and its vicinity, with additional notices illustrative of the natural history of these countries', *Transactions of the Linnean Society of London* **13** (1822): 239–274, 269.
46. Alfred Russel Wallace, 'On the rhinoceros of Borneo', *Proceedings of the Zoological Society of London*, 3 Nov. 1874, 498–499, 499.

PART II: A CULTURAL HISTORY OF 'RHINOMANIA' AND 'RHINOCEROTICA'

Extinction causation is complex, and while the particular conditions of endangerment impacting each of the five extant species of rhinoceros vary (even more so when homing in on regional extinctions) each of the IUCN Red List assessments identifies poaching for the coveted horn as a significant driver in population decreases.[47] The cultural and economic value of the horn and its intended utility vary regionally. What is clear from historical accounts, the world over, is that the animal is bearing the ultimate cost for centuries of human captivation that has morphed into a fatal attraction, one which views the animal as a resource for human consumption. The so-called 'beast' is reduced to a trophy on the wall, handle of a dagger, or ingredient in the pharmacopoeia. This phenomenon of human fascination with the rhinoceros has been described by Clarke as resembling 'rhinomania' and 'rhinocerotica'.[48]

To obtain a fuller appreciation of the drivers of the international market for rhino horn, it helps to pursue a broader avenue of cultural inquiry that seeks to situate the rhino and its horn within a lengthy history of human interest. The allure of the rhino and its horn draws from a rich tapestry of scientific facts woven together with flights of fancy and embellished with mystique and myth. The following section of this article will investigate both western and non-western representations of the rhino to account for its global appeal.

Ancient accounts

The procurement and exchange of exotic animals has been traced back to both the Egyptians (2,500 BC) and the Greeks (seventh century BC), and increased significantly during Roman times where animals were used for blood sport in the Amphitheatre games from 186 BC to the last games in 523 AD.[49] Ancient accounts of traded species, including the rhinoceros, were dominated

47. For example, the IUCN Red List assessment indicates that populations of Greater One-Horned rhinoceros have been adversely affected by declines in quality of habitat in some regions due to severe invasion of alien plants, 'reductions in the extent of grasslands and wetlands due to woodland encroachment and silting up of beels', and competition for grazing with domestic livestock. Likewise, Javan rhinoceros in Ujung Kulon face a scarcity of smaller plants on which to feed due to the invasive Arenga palm, forcing them to compete with other species for the remaining food supply or venture into more exposed areas. For Sumatran rhinos, while habitat loss and poaching were the primary historical reasons for decline, 'today's reproductive isolation is the main threat to the survival of the species' (i.e. that each isolated group lacks sufficient genetic diversity for long-term survival). See: Benoît Gossens et al., 'Genetics and the last stand of the Sumatran rhinoceros *Dicerorhinus sumatrensis*', *Oryx* **47** (3): 1–5..

48. T.H. Clarke, *The Rhinoceros from Dürer to Stubbs 1515–1799* (London: Sotheby's Publications, 1986), pp. 1–219.

49. Julie Ayling, 'What Sustains Wildlife Crime? Rhino Horn Trading and the Resilience of Criminal Networks', *Journal of International Wildlife Law & Policy* **16** (2014): 57–80, 57.

by a handful of authors. In 2013, Waters published a rigorous comparison of ancient accounts canvassing the records of Ctesias, Aristotle, Pliny the Elder and Claudius Aelianus (better known as Aelian).[50]

The first classical version was recorded around 400 BC by the Greek medical practitioner, Ctesias of Cnidus. Following his seventeen-year service to King Darius II of Persia, Ctesias wrote his *Indika*, describing the Persian and Indian worlds. Much in the tradition of oral history, Ctesias had not travelled to India himself, but had rather accumulated knowledge from visitors to the Persian court. He described the 'wild ass' as an animal 'with a white body, red head, blue eyes, bile in the liver, and bitter flesh' with ankle-bones like an ox. Of the horn's value, he stated that the dust filed from the horn protects from deadly drugs and that an individual would be immune to poison if drunk from a vessel fashioned from the horn.[51]

In the sequence offered by Waters, Aristotle was the next significant author to describe what he called the 'Indian ass' in *The History of Animals*. He adds to Ctesias' work, identifying the 'Indian Ass' as the only creature to have solid hooves and a knuckle-bone: 'there are … some animals that have one horn only, for example, the oryx, whose hoof is cloven, and the Indian ass, whose hoof is solid. These creatures have a horn in the middle of their head.' Next was the renowned Roman encyclopaedist, Pliny the Elder, who compiled the records of one hundred authors in his *Natural History*. Of all the classical accounts, it was Pliny's that proved the most influential, with an impact spanning over 1,500 years. Pliny's account of a 'monoceros' was published in 77 AD: 'the Orsaean Indians hunt an exceedingly wild beast called the Monoceros, which has a stag's head, elephant's feet, and a boar's tail, the rest of the body being like that of a horse'.[52] He expands 'of the Rhinoceros':

> in the same Plays of Pompey, and many Times beside was shewed a Rhinoceros, with a single Horn on his Snout. This is a second begotten Enemy to the Elephant. He fileth this Horn against hard Stones, and so prepareth himself to fight; and in his Conflict he aimeth principally at the Belly, which he knoweth to be the tenderest Part. He is full as long as his enemy; his Legs much shorter; his Colour a palish Yellow (Book VIII, Chapter XX).

Battles between rhinos and elephants were a popular spectacle for centuries, adding to the pomp and ceremony of gladiatorial games. For example, Cassius Dio's *Roman History* (Book LV, p. 479) describes games in the Circus wherein 'an elephant overcame a rhinoceros'. It was a powerful visual interpreted by artists, centuries apart. For example, in 1685 Jan Griffier published a mezzotint *A True Representation of the Two Great Masterpieces of Nature…* depicting an

50. Elyse Waters, 'Zoological analysis of the unicorn as described by classical authors', *Archeometrial Műhely* **X** (3) (2013): 231–236.

51. Ibid., 232.

52. Ibid., 232.

elephant and rhinoceros fighting in the manner described by Pliny the Elder, the rhino piercing the elephant's lower belly with its horn.

The final author discussed by Waters is Aelian who lived in Rome for the majority of his life, but composed most of his work in Greek. Aelian refers to the creature as a 'cartazonus' in his *De natura animalium*. Like Aristotle, Aelian's account draws strongly from Ctesias.[53] His version corroborates Pliny the Elder's, wherein the animal possesses a tail and loud vocalisations. Aelian's contribution provided extra details on how the animal interacted with others of its species.[54]

Historians have studied the inception of rhinos in Greco-Roman culture with particular interest, with the current pool of research indicating that accounts refer to Indian and African rhinos (with the number of horns depicted being a useful indicator). Regarding allusions to the Indian rhinoceros, Nichols traces Ctesias' 'wild ass' specifically to the Indus Valley and the northwest of India,[55] whereas Lavers connects Aelian's description to the Tibetan plateau.[56] In addition, Pliny's description of the 'monoceros' displayed by Pompey the Great in his games of 55 BC and Aristotle's 'Indian ass' also correspond with an Indian rhino.[57] In fact, Coleman cites the single-horned specimen of Pompey the Great as the first record of a rhino to be shown in Rome.[58] The African rhino too has a rich history during the ancient period. Coleman refers to a third century wall painting from a tomb at Marissa, Jordan as the earliest Greek representation of a rhinoceros (one bearing two distinct horns). The author corroborates this portrayal of an African rhinoceros with sources referring to an 'Ethiopian rhinoceros' of similar description which was shown in 275–274 BC.[59] Enright elaborates that the Greek King of Egypt, Ptolemy II (Philadelphos) paraded animals as part of his Ptolemaia celebrations, and at the 275–274 BC event made an appearance at the end of the parade wherein 'men led a white bear, fourteen leopards, nine cheetahs, four caracals, a giraffe and a white rhinoceros from Ethiopia'.[60] Significantly, Coleman indicates that the Nile was the 'main artery of the trade route supplying African rhinos to the Mediterranean world'.[61] One of the sources used to support this claim is a mosaic at Piazza Armerina in Sicily known as the 'Great Hunt' which shows

53. Malcolm South (ed.) *Mythical and Fabulous Creatures: a Source Book and Research Guide* (Connecticut: Greenwood Press, 1987), p. 11.
54. Waters, 'Zoological analysis of the unicorn as described by classical authors', 232–233.
55. Andrew Nichols (trans.), *Ctesias. On India, and Fragments of His Minor Works* (London: Bristol Classical, 2011), pp. 18–19.
56. Chris Lavers, *The Natural History of Unicorns* (New York: Granta Books, 2009), p. 37.
57. Coleman, 'The Rhinoceros in the Ancient World', 28.
58. Ibid., 28.
59. Ibid., 28. Pliny the Elder described this Ethiopian Rhinoceros as being found in the Upper Nile.
60. Kelly Enright, *Rhinoceros* (London: Reaktion Books Ltd, 2008), p. 29.
61. Coleman, 'The Rhinoceros in the Ancient World', 28.

a rhino standing in water surrounded by an array of African animals, which may thus be interpreted as being set on the Nile. The mosaic dates from the fourth century AD, which coincides with the growth of mosaic workshops in Africa, and so Coleman suggests that it was likely designed in Carthage before being exported and laid in Sicily.[62] Keimer supports this analysis of trade, adding that information on imports to Egypt (Alexandria) and Rome indicate that Asian, as well as African species of rhino were supplied.[63]Further, rhinos were shown alongside hippos in the triumphal procession of Octavian (the Emperor Augustus) in 29 BC, following his victory over Cleopatra.[64]

The above sources are the most commonly attributed in ancient representations of the rhinoceros; however, a variety of other sources from a range of mediums sheds light on its cultural significance. As previously cited, the earliest representations are the drawings inside the Chauvet Caves. Looking to the East, rhinos appeared on Harappan seal stones from Mohenjo Daro (now in southern Pakistan) that have been dated as far back as 2,000 BC,[65] and the existence of a rhino-like creature in China was recorded in 2,697 BC.[66] In fact, historians studying Ancient Egypt have made a number of key findings relating to black and white rhinos, relying on different forms of primary sources.[67] For example, imitation horns made of pottery were found in the *mastaba* ('eternal house') of the First Dynasty King Hor-Aha, located at Saqqara.[68] These were created to evoke the mystical powers believed to flow through the horn. Additionally, a sunken relief of a rhinoceros killed by the pharaoh in Nubia appears on a pylon of Thutmose III of the Eighteenth Dynasty in the Temple of Armant (Hermonthis).[69]

As time passed, and with it the increased dissemination of tales and illustrations of animals, the *Physiologus* was composed (approximately 200 AD).[70] Cook and Pitman describe the impact of the *Physiologus* as follows: 'with the exception of the Bible, there is perhaps no other book in all literature that

62. Ibid., 29.

63. L Keimer, 'Note sur les rhinoceros de l'Egypte ancienne', *Annales du Services des Antiquités de l'Egypte* **48** (1948): 47–54, 50. See also Pliny's account of 'Rhinoceros Indicus' in Book VIII, Chapter XX of his *Natural History*.

64. Coleman, 'The Rhinoceros in the Ancient World', 29.

65. Ellis, *Tiger Bone and Rhino Horn,* p. 88.

66. Ibid., p. 74; Rudiger Robert Beer, *Unicorn, Myth and Reality* (New York: Mason/Charter, 1977).

67. Dale J. Osborn and Jana Osbornová, *The Mammals of Ancient Egypt – The Natural History of Egypt Volume IV* (Warminster: Aris & Phillips Ltd, 1998), p. 140.

68. Ibid., p. 140.

69. Ibid., p. 140. The authors also note that errors have occurred in interpreting the animal subjects of some Ancient Egyptian art based on physical features. For example, in distinguishing between elephants, rhinos and hippos, a trunk or tusk may be mistaken for a horn (or vice versa).

70. John S. Wilkins, *Species: A History of the Idea* (Berkeley and Los Angeles, University of California Press, 2009), p. 38.

has been more widely current in every cultivated tongue and among every class of people'.[71] This book of animal legends, with no single author, was first published in Alexandria and subsequently translated into Syrian, Arabic, Armenian, Ethiopian, Latin, German, French, Provençal, Icelandic, Italian and Anglo-Saxon. It metamorphosed into what became known as the *Medieval Bestiary* (or *Book of Beasts*) around the twelfth century.[72] The exact point of transition between the two texts is unclear; however historians have indicated that the *Bestiary* derived its name from the opening line of the *Physiologus*: '*Bestiarum Vocabulum*'.[73]

Compendia and encyclopedias of exotic species continued to be informed by explorers, travelers and envoys well into the modern era. In fact, it was none other than Marco Polo (1254–1324) who provided one of the earliest descriptions of the Sumatran rhinoceros:

> They have wild elephants and plenty of unicorns, which are scarcely smaller than elephants. They have the hair of a buffalo and feet like an elephant's. They have a single large, black horn in the middle of the forehead. They do not attack with their horn, but only with their tongue and their knees; their tongues are furnished with long, sharp spines, so that when they want to do any harm to anyone they first crush him by kneeling upon him and then lacerate him with their tongues. They have a head like a wild boar and always carry it stooped towards the ground. They spend their time by preference wallowing in mud and slime. They are very ugly brutes to look at.[74]

While these early representations indicate a natural, almost intuitive, attraction to the rhinoceros, the historical cocktail of science and folklore begged as many questions as it afforded answers. However, what it did provide was a mystique that followed the rhinoceros into the sixteenth century, where an unprecedented impact on Western thought was imminent. The rhino would become a diplomatic gift, travelling attraction, taxidermied exhibit, figure on a coin, a hairstyle, a knick-knack and the subject of many artistic interpretations.

Sixteenth to eighteenth century Europe: The Clarke eight

A principal scholar of European rhinoceros iconography, T.H. Clarke, undertook the daunting task of chronologically documenting not only the influence of the first rhinos in Europe since the menageries of Ancient Rome, but also the animal's appearance in multiple artistic representations including tapestries, pottery, porcelain and glass, sculpture, clocks, furniture, arms and armour. The

71. Albert Stanburrough Cook and James Hall Pitman, *The Old English Physiologus* (New Haven: Yale University Press, 1921), p. iv.
72. Ellis, *Tiger Bone and Rhino Horn*, p. 78.
73. Janetta Rebold, *The Medieval Menagerie* (New York: Abbeville Press, 1992), p. 69.
74. Ibid., pp. 86–87; Marco Polo, *The Travels*, Trans. R.E. Latham (Harmondsworth: Penguin, 1958).

rhinos described are all Indian Rhinoceroses and will be hereon referred to as the 'Clarke Eight'. [75] The 'Clarke Eight' illustrate the continuum of intrigue sparked by the ancient writers, in particular Pliny the Elder, and in the exceptional cases of the first and fifth rhinos in sequence, a heightened individual impact enduring centuries after their demise.

1. 1515: The Lisbon or Dürer Rhinoceros, or the Ganda

The first live rhinoceros to reach Europe since the third century arrived in Lisbon on 20 May 1515 on the Portuguese ship *Nostra Senora da Ajuda*, transporting spices from Goa.[76] The rhinoceros was referred to by the Portuguese as a *ganda* (its Indian Gujarati name).[77] It was a diplomatic gift to Albuquerque, governor of Portuguese India, by Sultan Muzafar II, ruler of the kingdom of Cambaia. The earliest sculpture of the *ganda* is a 'corbel below a feigned oriel on the side of the tower facing the Tagus' as this was the river that bore it to its destination.[78] King Manuel I of Portugal wished to test Pliny's account and scheduled a fight between the *ganda* and an elephant on Trinity Sunday, 3 June 1515. Reports of the day state that the elephant turned tail and sought refuge.[79] In March of the preceding year, King Manuel I had gifted Pope Leo X a famed and popularly beloved elephant, Hanno, and now decided to garner more favour by offering his *ganda*.[80] After the ship docked briefly in Marseilles en route to Rome, disaster struck and in the midst of a storm the ship sunk and the rhino, chained to the deck, perished. This event is dated late January 1516. It has been alleged that the rhino was recovered, stuffed and brought to Rome to be received by the Vatican and subsequently displayed *impagliato* (according to writer Damião de Gois).[81]

Nuremburg artist Albrecht Dürer received a sketch from Valentin Ferdinand and created several ink sketches and his famous woodcut. The *Dürer Rhino* depicts an awe-inspiring animal adorned with impenetrable armoured plates and an extra horn jutting from its shoulder. According to the British Museum, Dürer's iconic creation inspired European illustrators for the next three centuries, even after they had seen a living rhinoceros without plates and scales.[82] Of the woodcut, Quammen in *The Boilerplate Rhino: Nature in the Eye of the*

75. Clarke, *The Rhinoceros from Dürer to Stubbs 1515–1799*, pp. 1–219.
76. Ibid., p. 19.
77. Ibid., p. 16.
78. Ibid., p. 19.
79. Ibid., p. 19.
80. Ibid., p. 19.
81. Ibid., p. 20.
82. British Museum 'Albrecht Diirer's Rhinoceros, a drawing and woodcut, accessed 4 Feb. 2015. http://www.britishmuseum.org/explore/highlights/highlight_objects/pd/a/albrecht_dürers_rhinoceros.aspx. See also Mary Morton (ed.), *Oudry's Painted Menagerie: Portraits of Exotic Animals in Eighteenth Century Europe* (Getty Publications, 2007), pp. 91–94.

Beholder posited that this representation 'despite inaccuracies is one of the most influential animal pictures of its time'.[83]

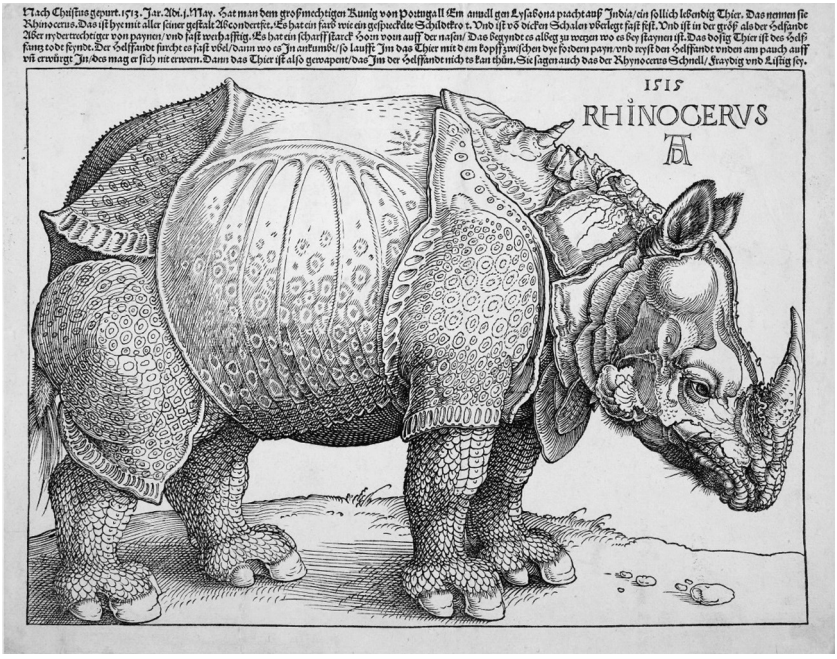

Figure 1. 'The Rhinoceros', Albrecht Dürer, Germany, c.1515. © The Trustees of the British Museum (by permission).

Dürer's *Rhinoceros in Brown Ink* has a similar description to the woodcut. The translation is as follows:

> In the Year 1513 (sic) upon the I. Day of May, there was brought to our King at Lisbon such a living Beast from the East-Indies that is called Rhinocerate: Therefore on account of its Wonderfulness I thought myself obliged to send you the Representation of it. It hath the Colour of a Toad[84] and is close covered with thick Scales in Size like an Elephant, but lower, and is the Elephant's deadly Enemy; it hath on the fore part of its Nose a strong sharp Horn; and, when this Beast comes near the Elephant to fight with him, he always first whets his Horn upon the Stones; and runs at the Elephant with his Head between his fore Legs; then rips up the Elephant where he hath the thinnest Skin, and so gores him: The Elephant is terribly afraid of the Rhinocerate; for he gores him always,

83. David Quammen, *The Boilerplate Rhino: Nature in the Eye of the Beholder* (New York: Scribner, 2000), p. 206.

84. 'Toad' has also been translated as 'tortoise'.

> where-ever he meets an Elephant; for he is well armed, and is very alert and nimble. This Beast is called Rhinoceros in Greek and Latin; but, in Indian, Gomda.[85]

This iconic image continues to be of great value today, both financially and culturally. In January 2013, a Dürer Rhino drawing sold for a record US$866,500 at Christie's, New York.[86] More significantly, the woodcut's impact was included in *A History of the World in 100 Objects* by Neil MacGregor.[87] The rhino is also the subject of the book *The Pope's Rhinoceros*.[88]

It is also worth noting that there were other artistic renditions of the Dürer Rhino. On 3 July 1515 Giovanni Giacomo Penni, published 21 verses about the rhino with a woodcut of a rhinoceros on the cover below the title *Forma e natura e costumi de lo Rinocerorhe*.[89] According to Clarke, 'the woodcut shows a sympathetic, naive creature, with beady eyes, its forelegs hobbled and chained, its folds of skin clothing it like a surcoat, the ribs, which in Dürer's woodcut have been likened to the spokes of an umbrella, are here more like an uncomfortable saddle'.[90] Also in 1515, a second German woodcut was made by a friend and contemporary of Dürer, Hans Burgkrnair.[91] This rhino appears in chains and more true-to-life, its armour less pronounced and the extra horn missing.

2. 1579–86: The Madrid rhinoceros or abada

The Madrid Rhino came to Lisbon in 1579 as a gift to King Phillip II, ruler of Spain and Portugal. Phillippe Galle produced an engraving of the *abada* in Antwerp in 1586.[92] It was also the subject of a watercolour once owned by Emperor Rudolf II of Prague. In 1584 the *abada* was seen by the first Japanese embassy of four noble youths on their way to visit the Pope. Despite its appeal, it was not spared maltreatment, as evidenced in the following account:[93]

> At the Escurial in Spain I saw [a Rhinocerot] that was brought from the Indies; but because he had overturned a Chariot full of Nobility, though fortunately no harm was done, the King commanded his eyes should be put out, and his horn cut off. The Duke of Medina advised the King to kill him with a musket, because he had maimed a Gentleman of his … his eyes were put out and his horn cut off.

85. Clarke, *The Rhinoceros from Dürer to Stubbs 1515–1799*, p. 20.
86. Katya Kazakina, 'Durer "Rhino" Sells for Record $866,500 at Christie's NYC', Bloomberg, 29 Jan. 2013. http://www.bloomberg.com/news/articles/2013–01–29/durer-rhino-sells-for-record-866–500-at-christie-s-nyc
87. Neil MacGregor, *A History of the World in 100 Objects* (London, Penguin, 2012).
88. Lawrence Norfolk, *The Pope's Rhinoceros* (London, Sinclair-Stevenson, 1996).
89. Clarke, *The Rhinoceros from Dürer to Stubbs,* 23.
90. Ibid, 23.
91. Ibid, 24.
92. Ibid, 28.
93. Ibid, 30.

3. 1684–5: The first London rhinoceros

The third of Clarke's rhinos is also known as the first London rhinoceros. An advertisement in The London Gazette dated 6 October 1684 reads: '[a] Very strange Beast called a Rhynoceros, lately brought from the East-Indies, being the first that ever was in England, is daily to be seen at the Bell Savage Inn on Ludgate-Hill, from Nine a Clock in the Morning till Eight at Night'.[94]Upon viewing the rhinoceros in person, John Evelyn wrote a lengthy description in his diary, dated 22 October 1684:[95]

> The Rhinocerous (or Unicorne) … resembled a huge enormous swine … but what was the most wonderfull, was the extraordinary bulke and Circumference of her body, which …. could not be lesse than 20 foote in compasse: she had a set of most dreadful teeth, which were extraordinarily broad, & deepe in her Throate, she was led by a ring in her nose … in my opinion nothing was so extravagant as the Skin of the beast, which hung downe on her hanches, both behind and before her knees, loose like so much Coach leather … these lappets of stiff skin, began to be studdied with impenetrable Scales, like a Target of coate of mail, loricated like Armor. (When she lay down] she appeared like a greate Coach overthrowne, for she was much of that bulk, yet would rise as nimblyas ever I saw an horse … to what stature she may arrive if she live long, I cannot tell, but if she grow proportionable to her present age, she will be a Mountaine.

As to its end, a newsletter circulated 28 September 1686 informed readers that 'last weeke died that wonderful creature the Rhynocerus'.[96]

4. 1739: The second London (or Parsons) rhinoceros

The second London rhinoceros, a young male, arrived from Bengal via the ship *Lyell* on 1 June 1739.[97] While in Leiden, Dr James Douglas saw the stuffed body of a rhino that had died aboard a Dutch East Indiaman in 1677 (another casualty had perished on the *Shaftesbury* in 1737). During this visit he met the painter and engraver Jan Wandelaar who made drawings of the *impagliato* animal for him.[98] The arrival of this new rhino in London gave Dr Douglas cause to visit its display in Red Lion Square[99] where he wrote a description that he orally reported to the Royal Society on 21 June 1739. Douglas' presentation was accompanied by drawings and figures created by his assistant, Dr James Parsons. After Douglas' death, Parsons carried his work forward, publishing a letter in *Philosophical Transactions* dated 9 June 1743, containing *The Natural*

94. Ibid., p. 37.
95. Ibid., p. 39.
96. Ibid., p. 39.
97. Ibid., p. 42.
98. Ibid., p. 42.
99. According to Clarke, the price of viewing this rare pachyderm had more than doubled since 1684.

History of the Rhinoceros.[100] The *Philosophical Transactions* were widely read all over Europe, with some copies reaching India. Parsons' letter was translated into both French and German and representations were extensively pirated. [101]

5. 1741–1758: The 'Dutch' rhinoceros, Clara

The Dutch rhinoceros was a female captured in snares in 1738 or 1739. The ruler of the Kingdom of Assam presented her to the director of the Dutch East India Company in Bengal, after which she was acquired by a Dutch sea captain by the name of Douwe Mout van der Meer.[102] They arrived in Holland on 22 July 1741 on the *Knabenhoe*. She became known and beloved as Clara.[103]

By happenstance, a stopover in the captain's hometown in Leiden in 1742 overlapped with a visit by Bernhard Siegfried Albinus who was working on his seminal anatomy text *ext Tabluae sceleti et musculorum corporis humani*.[104] Albinus, who was collaborating with the artist Wandelaar, added young Clara to the background of two plates. This intersection of eighteenth century art and science produced the first anatomically accurate depiction of a rhino in visual medium.

Van der Meer toured Clara throughout Europe for seventeen years on a cart drawn by eight horses.[105] According to Clarke, she roused universal interest, being 'received by royalty and fed beer by commoners'. 'Rhinomania' was in full effect: poems and songs were written about her; she was sketched and engraved on porcelain, snuff boxes, clocks and the like. Her likeness was even emulated in the fashion of the day, with reports on 8 May 1750 describing French women styling their hair *à la rhinocéros*.[106] Her face gilded medals, pamphlets and posters in German, French English and Dutch. Portrayals of Clara include those by Jean-Baptiste Oudry, *Clara the Rhinoceros in Paris* (1749), Pietro Longhi, *Exhibition of a Rhinoceros at Venice* (1751) and several by Johann Elias Ridinger including *Eve gives Adam the Forbidden Fruit* (1748–50). Oudry's *Portrait of Clara in Paris* (1749) was adapted further and appeared in the naturalist Georges-Louis Leclerc, Comte de Buffon's *Histoire naturelle, generale et particuliere* and Diderot and d'Alembert's *Encyclopédie*.[107] Even the equally famed Casanova became part of Clara's adventures when his mistress mistook a man 'dressed in the African fashion' for

100. James Parsons, 'A letter containing the natural history of the rhinoceros', *Philosophical Transactions of the Royal Society of London* **42** (470) (1743): 523–541, pls 1–3.
101. Clarke, *The Rhinoceros from Dürer to Stubbs 1515–1799*, p. 45.
102. Ibid., pp. 47–8.
103. Ibid., p. 48.
104. Ibid., p. 50.
105. Ibid., p. 51.
106. Ibid., p. 60.
107. Glynis Ridley, *Clara's Grand Tour: Travels With A Rhinoceros In Eighteenth Century Europe* (New York, Grove Press, 2004), p. 136.

a rhinoceros when visiting her exhibition at the St Germain Fair in 1749.[108] Clara returned to London in 1758, where she was exhibited at the *Horse and Groom* in Lambeth with an entry price of sixpence and one shilling. This was where she died on 14 April, aged approximately twenty years. So impactful was Clara's legacy that Kees Rookmaaker wrote a short piece *How I met Clara, the Dutch Rhinoceros* for the fiftieth issue of *Pachyderm* in 2011.[109]

6. 1770: The Versailles rhinoceros

The Versailles rhinoceros (1770–93) was procured for Louis XV. Clarke makes the key observation that 'le rhinoceros de Versailles' attracted little attention from painters and sculptors, particularly in comparison to its magnificent predecessor. However, it was visited both by naturalists and distinguished members of the public, such as the Austrian Emperor Joseph II in 1777, the Dutch anatomist Petrus Camper (who made a sketch in ink on 28 July 1777) and by naturalist Georges-Louis Leclerc, Comte de Buffon on several occasions. This was the first European rhino to be held in permanent captivity in a specially designed enclosure until its death in 1793.[110]

7. 1790: The third London rhinoceros (or Stubbs rhinoceros) and 8. 1799: The fourth London rhinoceros

The third London, or Stubbs Rhinoceros (1790–3) and fourth London rhino (1799–1800) were both exhibited at the Exeter Change.[111] The former is referred to by Rookmaaker, Gannon and Monson as 'Clark's Rhinoceros' and the latter as 'Pidcock's Rhinoceros'.[112] The menagerie housed in the Great Room was founded by Thomas Clark whose success in the 1770s saw his animals also displayed at The Lyceum, a few blocks east.[113] Around this time, Gilbert Pidcock had started his business touring a small-scale menagerie. In 1789 the two arrived at a commercial agreement whereby Pidcock would hire out some of Clark's animals for tour.[114]

The third London rhinoceros was purchased by Clark for £700 from Henry Dundas, president of the Board of Commissioners for the Affairs of India, who had received it as a gift from Asaf-Ud-Daula (the Nawab of Lucknow in Utar

108. Ibid., p. 143.
109. Kees Rookmaaker, 'How I met Clara, the Dutch rhinoceros', *Pachyderm* Special 50th Issue (2011): 10–11.
110. Clarke, *The Rhinoceros from Dürer to Stubbs 1515–1799,* p. 70.
111. Ibid., p. 70.
112. Kees Rookmaaker, John Gannon and Jim Monson, 'The lives of three rhinoceroses exhibited in London 1790–1814', *Archives of Natural History* **42** (2) (2015): 279–300.
113. Caroline Grigson, *Menagerie: The History of Exotic Animals in England* (Oxford: Oxford University Press, 2015), p. 98.
114. Ibid 100.

Pradesh).[115] The healthy two-year-old arrived in London on 5 June 1790 and could be seen at The Lyceum for one shilling. Just as Clara had appeared before King George II in 1752, the third London rhinoceros was brought before royalty during the reign of King George III: [116]

> This Day June 3 1793 HER MAJESTY sent to PIDCOCK the Exhibitor of the Rhinoceros, for that Animal to be brought to the QUEEN'S Lodge, for the Queen and Princesses to view it. It was of course immediately drawn in the Machine before the Lodge, the appearance of which highly gratified them and the KING.

The Clark Rhino was the subject of a watercolour by the artist Stubbs.[117] However, its image was more popularly recognised on the face of a token halfpenny when private coinage was used to supplement the shortage in the royal mint.[118] The docile rhino became well known for drinking three or four bottles of sweet wine.[119] It was taxidermied and exhibited following its death.[120] The rhino's skin was later sold for five shillings and the horn went for one pound and two shillings.

The last of the Clarke Eight rhinos was a smaller male. He arrived in 1799 and was purchased by Antonio Alpi, an agent of the Holy Roman Emperor Francis II, for £1,000.[121] *The Times* (25 November 1799) reported that the rhino had toured through Kent with Pidcock's menagerie and was exhibited before the Princess of Wales at her residence in Blackheath.[122] He died in a stable-yard in Drury-Lane in 1800, two months after being purchased prior to shipping.[123]

The attraction roused by the Clarke Eight provides modern researchers with insight into the enduring appeal of the rhinoceros, and this is further demonstrated by its historical valuation in the exotic animal trade. Simons writes of Charles Jamrach who was a renowned London-based dealer from the early 1840s-1880s.[124] Jamrach's empire extended throughout the imperial

115. Christopher Plumb, *The Georgian Menagerie: Exotic Animals in Eighteenth-Century London* (London: I.B. Tauris, 2015), pp. 136–137.

116. Clarke, *The Rhinoceros from Dürer to Stubbs 1515–1799*, p. 74.

117. Ibid., p. 75.

118. Ibid., p. 74.

119. Grigson, *Menagerie*, p. 101.

120. Plumb, *The Georgian Menagerie*, pp. 136–137.

121. Grigson, *Menagerie,* p. 112.

122. Kees Rookmaaker, John Glannon and Jim Monson, 'Sources on the three rhinoceroses living in London in The Exeter 'Change and The Lyceum from 1790 to 1814', Supplementary Material to *Archives of Natural History* **42** (2) (2015: 279–300.

123. Clarke, *The Rhinoceros from Dürer to Stubbs 1515–1799*, p. 75. See also: Plumb, *The Georgian Menagerie*, p. 38.

124. John Simons, *The Tiger that Swallowed the Boy: Exotic Animals in Victorian England* (Faringdon: Libri Publishing, 2012); John Simons, 'The Scramble for Elephants: Exotic Animals and the Imperial Economy', in Melissa Boyde (ed.), *Captured: The Animal within Culture* (New York: Palgrave Macmillan, 2014), pp. 26–42.

world, with agents posted across the colonies collecting his exotic wares. For example, in 1873 Jamrach's agents in Singapore had secured the services of two local hunters referred to as 'the Fernandez brothers' to scout the Malaysian Peninsula for a shipment including 'eight each of rhinoceri, tapirs, tigers and panthers as well as numerous birds'.[125] The stock of Charles Jamrach was quoted in a 1879 article, including 'a Sumatran rhinoceros (currently on loan to London zoo)' for £1,000 and an 'Indian Rhinoceros' called 'Begum' who was purchased from British officers in Burma for £1,250.[126] What followed was a steep decline in the price of exotic animals that saw tigers plummet from £300 to £80, lions from £100 to £20–£25 and elephants from £400 to £120–£150 between the time of Charles Jamrach in 1879 and his son Albert Jamrach in 1903.[127] It appears that the rhinoceros was impervious to this downturn with its price remaining stable at £1,000 in 1903. Simons attributes this partially to its 'great size and rarity'.[128] Indeed, the rhino has proven to be a particularly charismatic example of megafauna across historical eras.

The Clarke Eight, in particular the Dürer rhinoceros and Clara, have left their indelible mark on Western perceptions of their kind. Their legacy of inspiring artists across centuries to emulate their likeness in the visual medium remains testament to the species' appeal. Salvador Dali became enthralled with both the rhino and its horn, referring to the latter's structure as divine geometry.[129] Inspired by his dual-obsessions, Dali once ordered his assistants to dangle a copy of Vermeer's 'The Lacemaker' in front of a rhino at the Vincennes Zoo to entice it to charge. When the rhino, named François, did not oblige the artist used a lance to impale it himself. So enamoured was Dali with the animal that he and collaborator Philippe Halsman included a photograph of Dali face-to-face with a rhino in their 1954 compendium *Dali's Mustache*. Photographer Annie Leibowitz reinterpreted the iconic image in a 1996 photo shoot for *Vanity Fair* featuring actor Nicholas Cage. Adding to its pop culture credentials, Andy Warhol produced a screen print entitled *Black Rhinoceros* as part of his *Endangered Species* series in 1983.

Non-Western accounts

In assessing the broad appeal of the rhino, it is necessary to examine non-Western representations of the rhinoceros, certainly given its Asian and African

125. Simons, *The Tiger that Swallowed the Boy*, p. 33.

126. Ibid., p. 33. While recorded as an 'Indian Rhinoceros', Begum was actually a famed Sumatran Rhinoceros. She was captured in 1867 or 1868, at at least two years of age, after being rescued from quicksand 'sixteen hours' march south of Chittagong' in modern day Bangladesh. She died on 31 Aug. 1900, aged approximately 35 years, the standing record longevity for her species. See John Edwards, *London Zoo from Old Photographs 1852–1914*, 2nd edition (Butler Tanner and Dennis, 2012) pp. 141, 147.

127. Simons, 'The Scramble for Elephants', p. 31.

128. Ibid., p. 31.

129. Ridley, *Clara's Grand Tour*, p. 135.

origins. To address the westernisation of rhinoceros iconography, Heller asks *Why Has the Rhinoceros Come from the West?*[130] Allusions to rhinos are made in a number of Eastern spiritual traditions. In Chan rhetoric, for example, an exchange between Dongshan Liangjie and one of his students sees the master utilise the metaphor of a 'chicken-scaring rhinoceros'.[131] In Buddhist scripture, the *Rhinoceros Sutra* advises the practitioner to be like the rhinoceros (or rhinoceros horn) in avoiding attachments to the superlative or material. In the *Discourses on the Causes and Conditions of the Pratyeka-Buddha* we find the line '[The pratyeka-buddha] is like the rhinoceros's one horn, leaving far behind the company of disciples'. Another passage expands on the theme of singularity:

> silently preserving his integrity, constantly in a state of detachment, he dwells in still and silent places such as mountains and forests, and along-side ravines and streams. Because his mind courses in quietude, he has nothing to say. It is like the horn of the rhinoceros, solitary in its travels.[132]

The rhinoceros was referred to as *xi* or *si* in ancient China.[133] Preceding the Tang Dynasty (618–906 AD), the Shang (1600–1050 BC) and Zhou (1046–256 BC) controlled rhino populations, with the 'beasts' being driven out as a necessary part of civilisation. In support of this claim, Heller cites the example of Mencius who, when listing the Duke of Zhou's accomplishments, praises him for 'expelling tigers, leopards, rhinoceroses, and elephants so that they were far away'.[134] During Tang rule it roamed an area including western and southern Hunan and adjacent areas, with some also allegedly ranging across Hunan, Hubei, Guizhou and Sichuan. They were hunted for their hides and horns to make shields and drinking vessels. In fact, the practice of using rhinoceros hides for armour originated well before Tang rule. Harris refers to a chapter in the *The History of Wu and Yue* which speaks of a general named Goujian who ruled the Southeast China coastal provinces having amassed an army of 130,000 soldiers 'armed with suits of rhinoceros skin'.[135] This not only illustrates the sheer scale of production using rhinoceros skin, but indicates that there must have been a substantial population of rhinoceros in China during the fourth century BC.

130. Natasha Heller, 'Why Has the Rhinoceros Come from the West? An Excursus into the Religious, Literary, and Environmental History of the Tang Dynasty', *Journal of the American Oriental Society* **131** (3) (2011): 353–370.
131. Ibid., 353.
132. Ibid., 357.
133. Margrit Harris, 'China and the Rhino', *NIKELA* http://www.nikela.org/wp-content/uploads/2011/03/Ebook_China_and_the_Rhino.pdf Accessed 11 Mar. 2016, 4.
134. Heller, 'Why Has the Rhinoceros Come from the West?', 355.
135. Harris, 'China and the Rhino', 6.

Horns were also fashioned into ritual sceptres known as *ruyis* and used as hairpins in royal attire.[136] Working primarily from tax and tribute records offered to the throne, scholars have found that the horn was categorised as both a medicinal and luxury item. Records also show that some horns were described as *tongtian*- a term denoting extraordinary properties and even a passage to heaven.[137] The *Baopuzi* by Ge Hong is the most widely cited source that explains these qualities:

> the horn can part water, providing safe passage across rivers. It is also known to scare chickens when employed as a vessel for their feed, a property that extends to frightening other birds, and in other sources even to foxes. The horn can also aid in keeping courtyards free of moisture, and is luminescent. Elsewhere the rhinoceros horn is said also to dispel dust.[138]

Hong also suggests that the horn may be used as an antidote for poison arrow wounds as well as for poison detection generally. As a technique to acquire the valued tongtian horn, Hong encourages readers to locate a spot where a rhinoceros 'sheds and drops their horn' each year, make a replica out of wood and return it to that spot as a substitute, allowing them to take the true horn and ensure that the rhino returns to shed at that spot the following year.

The rhinoceros was also the subject of poetry in Chinese culture. In particular, Heller refers to two Chinese poems, *Tame Rhinoceros* by Yuan Zhen (809 AD) and *Ballad of the Stone Rhinoceroses* by Du Fu (712–770 AD). The former speaks of a rhinoceros that was offered as tribute, but died in the Imperial Park from the bitter cold.[139] The latter tells the story of the third century protagonist Li Bing who sought to guard his irrigation system from flooding by the Min River.[140] He created five stone rhinos to satiate the water spirit. Heller goes onto explain Du Fu's extended metaphor where rhinos were associated with 'methods to suppress things', further linked with 'strange beings' like demons and monsters contrasted with the natural order, good government as the 'way of former kings', and a means to control water.[141]

Where Heller's representation accounts for rhino iconography in Buddhism, Majupuria provides a brief description of some of the rhino's connotations within Ancient Hindu culture.[142] Not dissimilar to other societies, the rhino was the subject of woodworks and sculptures, being depicted on the seals of the Indus Valley Civilisation, appearing as statues on the steps of the Temple of Batsala Devi in Bhaktapur and even being portrayed in artwork depicting it

136. Heller, 'Why Has the Rhinoceros Come from the West?', 355.
137. Ibid., 358. See also Harris, 'China and the Rhino', 8.
138. Ibid., 358.
139. Ibid., 360–1.
140. Ibid., 367–70.
141. Ibid., 369.
142. T.C. Majupuria, *Sacred and Symbolic Animals of Nepal: Animals in the Arts, Culture, Myths and Legends of the Hindus and Buddhists* (London: Sahayogi Prakashan, 1977).

living among domesticated animals in the Indus Basin.[143] Consistent with the Western sources examined so far, the desire to pit animal against animal for human entertainment was also prevalent. In his account of Lucknow, Abdul Halim Sharar states that at the time of Nasir ud Din Haidar there were fifteen or twenty fighting rhinoceroses kept at Chand Ganj.[144] Further, at the time of King Ghazi ud Din Haidar, some rhinoceroses, besides being made to fight, were supposedly so pacified that they were harnessed to carts and mounted by riders.[145]Rookmaaker, Vigne and Martin provide commentary on rhinoceros fights in India in considerable detail.[146] An account of Mogul Emperor Shah Jahan (1627–1658) states that the ruler would 'witness contests between elephants and other wild animals, such as lions, tigers, *abbadas* or rhinoceros, and wild buffalos'. The authors elaborate on the description of Nasir ud Din Haidar, adding that the rhinos were prepared for battle by ingesting stimulants and that rhino–rhino fights were a regular pastime in the 1820s.[147] The authors also refer to two later incidents in Baroda in 1864 and 1875. The first was recounted by the French traveller Rousselet in his 1877 book entitled *L'Inde des Rajahs*, including a particularly detailed description of a typical fight where opposing rhinos were chained at opposite end of the arena with their horns painted either black or red to aid spectators in distinguishing between the opponents.[148] In the second, in November 1875, the Rajah was entertaining the Prince of Wales when the rhinos withdrew from combat after a few passes and could not be convinced to continue even when attendants proceeded to throw cold buckets of water onto the competitors and thrust at them with lances.[149] It is unlikely that the similarities in the use of rhinos in the public life of leaders, be it in formal processions or as part of arena fights, across Greco-Roman, European and South Asian cultures are mere historical coincidence. An explanation may be extracted from Enright's example of Ptolemy II where the rhino became 'an exotic symbol of his empire … a representative of lands he had explored, conquered, and held tame'.[150] Reflecting on this notion, perhaps the common thread between the societies who arranged these duels is less about attitudes toward the rhino itself, but rather located within the broader context of empire, wherein rulers or the ruling classes demonstrated their ability to exercise dominion as part of public spectacle. Herein, the rhino was forced into a narrative where it was paradoxically a powerful device and subjugated victim.

143. Ibid., p. 128.

144. Abdul Harim Sharar, E.S. Harcourt and Fakhir Hussain (trans. and eds) *Lucknow: the Last Phase of an Oriental Culture* (London: Paul Elek, 1975), p. 120.

145. Ibid., p. 120.

146. L.C. Rookmaaker, Lucy Vigne and Esmond Bradley Martin, 'The Rhinoceros Fight In India', *Pachyderm* **25** (1998): 28–31.

147. Ibid., 28.

148. Ibid., 29.

149. Ibid., 29–31.

150. Enright, *Rhinoceros*, p. 29.

The cultural significance of the Indian Rhinoceros in its homeland is inextricably linked with the region's colonial past. The species was on the brink of extinction in the early 1900s (fewer than fifty Indian Rhinos in 1910), due to the mass conversion of alluvial plains grasslands to agricultural development which resulted in an increase in human–rhino conflict.[151] Rashkow writes of the colonial regime's extensive vermin eradication programme in which 'subaltern *shikaris*' (a class of poor, rural hunters) were employed.[152] The programme 'targeted tigers, wolves, bears and other species identified by the state as "dangerous beasts"'.[153] In fact, Martin, Martin and Vigne indicate that these eradication schemes had a greater impact on rhino populations than hunting for sport, with the government offering a bounty of Rs20 for killing a single rhino, and where 'a rhino rampaging a tea planation was anathema'.[154] That is not to say that sport hunting, which had become common in the late 1800s and early 1900s, did not contribute to the decline of the species. For example, Ray indicates that it was excessive hunting that left only 240 rhinos in northern Bengal by the end of the 1920s.[155] In West Bengal and Assam, the Maharajah of Cooch Behar boasted of having shot 207 himself between 1891 and 1907,[156] with the practice of decorating dining room walls of the Cooch Behar royal palace with rhinos' heads continuing until the early 1970s.[157] It should also be noted that practices involving the subjugation of the wild to reinforce kingship were a part of pre-colonial Hindu monarchy, with Rangarajan describing the killing and displaying of dead mammals and birds as 'a rite of passage into adulthood, especially manhood, for a number of dynasties'.[158]

The wildlife population declines of the early twentieth century coincided with the introduction and enforcement of laws targeting locals as poachers, and so hunting tribes were forced to stop their traditional means of existence and become 'detribalised', and local hunters sought employment with elite British sports hunters[159]Rashkow describes how hunting became a locus for Indian-Western conflict, suggesting that a variety of motivators explains Hindu

151. B.K. Talukdar, R. Emslie, S.S. Bist, A. Choudhury, S. Ellis, B.S. Bonal, M.C. Malakar, B.N. Talukdar and M. Barua, *Rhinoceros unicornis*. The IUCN Red List of Threatened Species. Version 2014.3 (2008), accessed 30 Jan. 2015. www.iucnredlist.org

152. Ezra Rashkow 'Making subaltern shikaris: histories of the hunted in colonial central India', *South Asian History and Culture* 5 (3) (2014): 292–313, 292.

153. Ibid., 292.

154. Esmond Bradley Martin, Chryssee Bradley Martin and Lucy Vigne, 'Conservation crisis – the rhinoceros in India', *Oryx* 21 (4) (1987): 212–218, 212.

155. Niladri Ranjan Ray, 'The Princely Hunt and Kshatriyahood', *Global Environment* **8** (2015): 446–472, 467.

156. Esmond Bradley Martin, Chryssee Bradley Martin and Lucy Vigne, 'Conservation crisis – the rhinoceros in India', 212.

157. Ray, 'The Princely Hunt and Kshatriyahood', 468.

158. Ibid., 448; Mahesh Rangarajan, *India's Wildlife History: an Introduction* (Permanent Black, 2001), pp. 36–37.

159. Ibid., 293.

interest in the conservation of some species (including religion, 'anti-colonial consciousness, assertions of local authority and territoriality and an environmental ethic').[160] While the conservation laws of the empire were dominantly informed by the 'sportsman's ethic' by the mid-twentieth century, conflict between sportsmen and villagers in India periodically moved the British to institute measures to 'regulate the types of weapons, methods, times, places, and species permissible for hunting'.[161] While no express mention is made of rhinos in Rashkow's analysis, the period studied overlaps with the establishment of what is now Kaziranga National Park, which became a reserve in 1905 for the last ten to twenty Indian rhinos in Assam, and was found to be home to seventy per cent of the global species population in May 2007.[162] Conservation of the Indian Rhinoceros was supported further in 1910 when the government officially outlawed rhino hunting, although poaching remained a constant threat to recovering populations.[163] Given the rate of decline in the late nineteenth century, it appears that some form of developing conservation ethic was at play in the *in situ* protection of the species in the early twentieth century upon which instruments could be enacted including the Wild Birds and Animal Protection Act of 1912 and the 1915 Bengal sanctuary regulations.[164]

Lastly, an analysis of non-western rhinoceros significance would be incomplete without an examination of the Black and White Rhinos of Africa. A particularly pivotal study was undertaken by Boeyens and van der Ryst who collated ethnobiological, archaeological, linguistic and historical ethnographic data to ascertain the significance of the African rhinoceros in agro-pastoralist

160. Ezra Rashkow, 'Resistance to Hunting in Pre-independence India: Religious environmentalism, ecological nationalism or cultural conservation?' *Modern Asian Studies* **49** (2) (2012): 270–301**,** 288. Rashkow refers to local resentment over India becoming the 'happy hunting grounds of the British' and specifically cites negative Hindi and Urdu press concerning atrocities committed by the British while hunting. Further, on p. 283, the author indicates that 'Caste Hindus, Jains, and Bishnois in Marwar often attempted to protect wild animals from any, and all, hunters'.

161. Ibid., 299.

162. B.K. Talukdar, R. Emslie, S.S. Bist, A. Choudhury, S. Ellis, B.S. Bonal, M.C. Malakar, B.N. Talukdar and M. Barua, *Rhinoceros unicornis*. The IUCN Red List of Threatened Species. Version 2014.3 (2008), accessed 30 Jan. 2015. www.iucnredlist.org. Kaziranga became a formal reserve forest in 1908, a game sanctuary in 1916, and officially closed for shooting in 1926. Following the independence of India, it was declared a wildlife sanctuary in 1950. In 1954, the Assam (Rhinoceros) Bill was passed by the Assam Legislative Assembly to impose serious sanctions for poaching. The passing of the *Assam National Park Act of 1968* was required to declare Kaziranga a national park as existing forestry instruments did not provide for the creation of national parks. The national park was granted status by the government on 11 February 1974 and several expansions have occurred since. Kaziranga National Park was declared a World Heritage Site by UNESCO in 1985.

163. Ellis, *Tiger Bone and Rhino Horn*, p. 113.

164. Ray, 'The Princely Hunt and Kshatriyahood', 470–1.

communities.[165] The authors located similarities in the meaning of the rhino between groups of varying adherence to class structures.[166] For example, the Mapungubwe (a class-based society) not only adopted a golden rhino as an 'emblem of royal power', but would present the breast meat of a rhinoceros as tribute to the chief who would carry a rhino horn club as 'the symbol of the dignity of the chief' (and who could have the head of a decapitated rhino served to rivals to send a political message).[167] Horns were also fashioned into 'receptacles for rainmaking medicines, whereas rhino bones, especially foot and leg bones, became important elements in rainmaking rites'.[168] Finally, rhinoceros figurines were 'used as didactic tools during initiation ceremonies', providing instruction on values, laws and other subjects.[169] Black and White Rhinos were also significant to the Sotho-Tswana (a less-stratified society) who had five distinct names for the former and two for the latter (in addition to the generic term *tshukudu* used for both).[170] Rhinos were employed as a device in poems of praise for Tswana chiefs where the anterior horn was wielded as a weapon of attack and defence, with its 'cutting action' representing the chief's authority to make final decisions. This metaphor carried as a reference in the architecture of nineteenth century Tswana central courts and appeared on the entrances and walls of Venda and Zimbabwe cultural locales.[171] Results across communities demonstrated that belief in the cultural and symbolic significance of African rhinos was widely entrenched for an expansive period of time among south-eastern Bantu speakers.[172] For instance, conceptions of leadership could be derived from the traits of both species, wherein the Black Rhinoceros reflected a more aggressive and solitary archetype in comparison to the more sociable, protective and territorial White Rhinoceros.[173]

PART III: THE RHINO HORN: MORPHOLOGY AND CONSUMER DEMAND

What emerges from the analysis in Part II is a longitudinal collective experience of rich human fascination with the rhinoceros that persists today. Yet, it is not exclusively the innate qualities of the rhinoceros as it exists in reality that account for the extent of its appeal. It is the anthropocentric, value-laden

165. Jan C.A. Boeyens and Maria M. van der Ryst, 'The cultural and symbolic significance of the African rhinoceros: a review of the traditional beliefs, perceptions and practices of agropastoralist societies in southern Africa', *Southern African Humanities* **26** (2014): 21–55.
166. Ibid., 21.
167. Ibid., 49.
168. Ibid., 49.
169. Ibid., 48.
170. Ibid., 49.
171. Ibid., 49.
172. Ibid., 21
173. Ibid., 21.

interpretation of the rhinoceros, as symbol and caricature, which has imposed cultural significance beyond its physical presence, extraordinary as that is. This captivation spans millennia, transcends cultural bounds, and paradoxically drives some to save the rhinoceros and others to kill it. The relentless market for rhino horn embodies the interminable desire to possess a piece of the animal as a token or for other uses. It was best put by Rabinowitz who observed that 'the focus of our obsession with the animal has revolved around the protuberance of hardened hair on the animal's head known as rhino horn'.[174] Accordingly, the following section will examine the morphology and uses of rhino horn.

Horn morphology

Dinerstein provides a succinct description of rhinoceros horns. Of the five species, Black and White Rhinos have the largest horns, bearing both an anterior and posterior horn.[175] The anterior horn of a Black Rhinoceros can reach 130 cm, whereas its posterior horn ranges widely from 2–55 cm. By comparison, the anterior length of a White Rhinoceros typically ranges from 94–102 cm, whereas the posterior can grow up to 55 cm. The Sumatran Rhino also has two horns, and while some horn specimens identified have been large (25–80 cm), these are generally much smaller than the other four species. The Indian and Javan species possess a single horn, with males of both species averaging a length of 25 cm. Horns grow from the base (as much as 7 cm annually in White Rhinos).

A formative analysis of horn morphology was published by Ryder.[176] The investigation found that unlike sheep or cattle horns, which fray into sheets, rhino horn frays into tubules (filaments). In fact, the author mused that the myth of rhino horn simply being matted hair arose from the appearance of this fraying. Ryder's work was corroborated by a study published in 1973 by Lynch, Robinson and Anderson.[177] The team studied the horn of a White Rhinoceros using a scanning electron microscope and reported findings 'broadly consistent' with Makinson[178], Earland et al.[179] and Ryder. Hieronymus, Witmer and

174. Alan Rabinowitz, 'Sumatran Rhino Conservation', *Conservation Biology* **9** (1) (1995): 482–488, 482.

175. Dinerstein, 'Family Rhinocerotidae (Rhinoceroses)'.

176. M.L. Ryder, 'Structure of Rhinoceros Horn', *Nature* **193** (4821) (1962): 1119–1201.

177. L.J. Lynch, V. Robinson and C.A. Anderson, 'A scanning electron microscope study of the morphology of rhinoceros horn', *Australian Journal of Biological Sciences* **26** (1973): 395–399.

178. K.R. Makinson, 'The elastic anisotropy of keratinous solids', *Australian Journal of Biological Sciences* **7** (3) (1954): 336–347.

179. C. Earland, P.R. Blakey and J.G.P. Stell, 'Molecular orientation on some keratins, *Nature* **196** (4861) (1962): 1287–1291.

colleagues[180] have also contributed significantly to the literature on rhinoceros horn morphology, emphasising that, unlike most ungulate horns, the rhino horn lacks a bony core, but is instead anchored to the skin covering the frontal and nasal bone.

A more contemporary overview of the horn was provided by Yang in 2011.[181] The primary component of rhinoceros horn is keratin, which is a tough, fibrous protein. Keratins exist in many biological materials and form the protective covering of all land vertebrates: skin, fur, hair, wool, claws, nails, hooves, horns, scales, beaks, and feathers.[182] Keratinous structures are composed of dead cells that are packed full of the keratin,[183] and so the horn cannot immediately repair itself once broken. Smaller components of calcium and melanin affect the behaviour and structure of the horn: calcium deposits harden and strengthen keratin, while melanin deposits protect the core from ultraviolet rays.

The research into horn morphology has been harnessed for conservation aims. In 2003, Amin, Bramer and Emslie of the African Rhino Specialist Group published a paper exploring the technology behind horn fingerprint identification and how it could be employed to gather intelligence, monitor illegal supply chains and provide evidence for criminal prosecutions.[184] The study found that it is possible track the movement of a rhino by analysing the chemistry of its horn because the composition of the horn reflects what the animal has consumed over time (the analysis is aided by knowledge of the types of food sources available in different regions as influenced by other variables such as climate).[185] The scale of the study was unprecedented, and with the financial assistance of the World Wildlife Fund, samples from 27 Black Rhino populations and 22 White Rhino populations were collected with coverage across South Africa, Namibia, Kenya, Swaziland and Zimbabwe.[186] This began the establishment of a continental horn database still utilised today.

180. T. Hieronymus, T. Witmer and R.C. Ridgely, 'Structure of white rhinoceros (Ceratotherium simum) horn investigated by X-ray computed tomography and histology with implications for growth and external form', *Journal of Morphology* **267** (2006): 1172–6; T. Hieronymus and T. Witmer, 'Rhinoceros horn attachment: anatomy and histology of a dermally influenced bone rugosity', *Journal of Morphology* **260** (3) (2004): 298.

181. Sam Yang, *A Review of Rhinoceros Horn*, 2 May 2011. Franklin W. Olin College of Engineering (ENGR3810 Structural Biomaterials).

182. Ibid., 3.

183. S.A. Wainwright et al., *Mechanical Design in Organisms* (Princeton, NJ: Princeton University Press, 1982), pp. 187–190.

184. Rajan Amin, Max Bramer and Richard H Emslie, 'Intelligent data analysis for conservation: experiments with rhino horn fingerprint identification', *Knowledge-Based Systems* **16** (5) (2003): 329–336.

185. Ibid., 330.

186. Ibid., 330.

Established uses for rhino horn: Trophies, traditional medicines, cups and dagger handles

Much of the literature on rhino horn consumption focuses on 'exotic' or 'oriental' uses and ignores the demand posed by Western trophy hunting. Western sport hunting was discussed earlier in relation to the Indian rhinoceros, however rhino hunting continues today predominantly on the African continent. In his discussion of 'consumptive wildlife tourism' ('a form of leisure travel undertaken for the purpose of hunting or shooting game animals, or fishing for sports fish, either in natural sites or in areas created for these purposes').[187] In 2007, Lovelock identified North America and Western Europe as significant longitudinal nodes of both supply and demand for the international market. South Africa, Zimbabwe and Botswana remained part of the 'mainstay of outbound CWT', whereas Mozambique, Ethiopia, Central African Republic, Congo and Cameroon were categorised as emerging destinations.[188] Trophy hunting is a type of CWT that entails the killing of wild animals for their body parts, such as head and hide, for display but not primarily for food and sustenance. A study by Radder suggests that trophy hunters possess a range of motivators 'within realms of spiritual, emotional, intellectual, self-directed, biological and social motives'.[189] Further, hunter typologies extend beyond the imperialist archetype (e.g. meat hunters, nature hunters, sports hunters).[190] This is supported by the work of photographer David Chancellor who released his acclaimed monograph entitled 'Hunters' in 2012, where he observed that twenty-first century trophy hunters 'include hedge fund managers, doctors, attorneys, their wives and children'.[191] The most viable data as to consumption in the West comes from the United States, where safari clubs drive 'Big Five' hunting in Africa through global competitions and large hunting conventions. Data collected from the United States Fish and Wildlife Service between 2005–2014 found that more than 1.26 million wildlife trophies, spanning nearly 1,200 species, were imported into the US, mostly from Canada and South Africa (other highly ranked countries included: Namibia, Mexico, Zimbabwe, New Zealand, Tanzania, Argentina, Zambia and Botswana).[192] Of the 32,500 'Big

187. Brent Lovelock (ed.), *Tourism and the Consumption of Wildlife: Hunting, Shooting and Sport Fishing* (Milton Park, Abingdon: Routledge, 2007), p. 5.

188. Ibid., pp. 8–9.

189. L. Radder, 'Motives of International Trophy Hunters', *Annals of Tourism Research* **32** (4) (2005): 1141–1144, 1143.

190. Lovelock (ed.), *Tourism and the Consumption of Wildlife*, p. 4; Stephen R. Kellert, *The Value of Life: Biological Diversity and Human Society* (Washington D.C.: Island Press, 1997), pp. 71–72.

191. Tom Seymour, '"After a kill, some pray, some smoke": the man who shot the trophy hunters', *The Guardian*, 5 Aug. 2015.

192. Humane Society of the United States, *Trophy Hunting by the Numbers: The United States' Role in Global Trophy Hunting*, Feb. 2016, 1. http://www.hsi.org/assets/pdfs/report_trophy_hunting_by_the.pdf

Five' trophies imported, 337 were Southern White Rhino trophies (317 trophies, and 20 pairs of horns imported exclusively from South Africa).[193] Two Black Rhino trophies were also imported from Namibia in 2015, including one shot after the Dallas Safari Club auctioned off a permit for USD$350,000. By comparison, the cost of a Southern White Rhino hunt generally ranges between USD$55,000–USD$150,000. With the debate around so-called 'conservation hunting' resurfacing in recent times, it is important to factor in western consumer typologies, particularly in assessing whether effective regulation is possible to avoid intersection with the illicit market, or whether this would merely provide another driver.

While the West's use of rhino horn is primarily for ornamental display, the dominant use in Asia is in Traditional Chinese Medicine (TCM).

> It should not be taken by pregnant women; it will kill the foetus. As an antidote to poisons (in Europe it was said to fall to pieces if poison were poured into it). To cure devil possession and keep away all evil spirits and miasmas. For gelsemium [jasmine] and snake poisoning. To remove hallucinations and bewildering nightmares. Continuous administration lightens the body and makes one very robust. For typhoid, headache, and feverish colds. For carbuncles and boils full of pus. For intermittent fevers with delirium. To expel fear and anxiety, to calm the liver and clear the vision. It is a sedative to the viscera, a tonic, antipyretic. It dissolves phlegm. It is an antidote to the evil miasma of hill streams. For infantile convulsions and dysentery. Ashed and taken with water to treat violent vomiting, food poisoning, and overdosage of poisonous drugs. For arthritis, melancholia, loss of voice. Ground up into a paste with water it is given for hematemesis [throat hemorrhage], epistaxis [nosebleeds], rectal bleeding, heavy smallpox, etc.[194]

The extract above appears in Read's 1931 translation of Li Shih-Chen's 1597 *Materia medica*, *Pen Ts'ao Kang Mu*. It explains the plethora of symptoms and afflictions rhino horn was alleged to remedy. A keen observer may note that the category of ailments is left open by the use of 'etc.' at the end of the account. As the author is regarded as a key proponent, if not the father of TCM, it may assist to understand his methods within the context of the broader practice and beliefs underpinning TCM.

TCM is comprised of 'a system of medical practices embedded in the ethic which understands health-as-balance'.[195] There is a general objective to reinstate balance by curing and preventing imbalances caused by illness. The concept of *Qi* as the vital energy of life is fundamental, as when the body is in a state of imbalance it requires a readjustment to ensure Qi is restored. Where deficiencies occur, there is a choice of eight therapeutic methods: diaphoretic,

193. Ibid., 18–19.

194. B.E. Read, 'Chinese Materia Medica: Animal Drugs', *Peking Natural History Bulletin* **5** (4) (1931): 37–80.

195. Felix Patton, 'Understanding Chinese Medicine- the Scourge of the Rhino' *SWARA, Nairobi* **4** (2011): 38–40.

emetic, downward, dispersing, mediating, warming, clearing, and tonifying.[196] When a therapeutic method is established, a therapeutic strategy (or *materia medica* formula) is assembled. It is at the point that *yao* is introduced.[197] The *Chinese Medical Dictionary* defines *yao* as 'all objects or substances which can be used to treat diseases',[198] whereas the Kang Yan Classical Chinese Dictionary defines *yao* as 'those categories which can heal diseases such as grass, trees, metal, stones, birds, beasts, insects, fishes'.[199] The principle behind the use of yao is that each possesses its own condensed Qi factor which may be used to restore a patient's balance. In the marketplace, Asian horns (known as 'fire' horns) are more valuable than African horns (known as 'water' horns), as consumers typically believe that their smaller size indicates a more concentrated potency.[200]

Following the Opium Wars, China's ports opened to the West, resulting in the inter-cultural exchange of medical techniques, ingredients and approaches to healing. In an article published in *The Lancet*, Scheid provides a succinct categorisation of how TCM is integrated into China's healthcare system.[201] Scheid identifies three methods by which TCM is integrated into China's healthcare system as follows: (1) the use of TCM drugs or treatment techniques to enhance effectiveness of biomedical treatment or manage its side-effects; (2) use as a medical system in its own right; and (3) an integration of both Chinese and Western medicine.[202] The internationalisation of TCM sees it now practised in one form or another in over a hundred countries.

As demonstrated in Li Shih-Chen's entry, rhino horn was alleged to be a veritable one-stop-shop remedy in the Chinese pharmacopoeia. Looking to other jurisdictions, Martin and Martin examined popular trends in rhino horn use in the Taiwanese market, listing these as: 'tranquilizers, relieving dizziness, building energy, nourishing the blood, curing laryngitis or simply, as the old snake-oil salesman would have it "curing whatever ails you"'.[203] In Nepal they found a wider use of rhinoceros anatomy, wherein rhino urine is said to ease asthma, congestion and stomach disorders; rhino meat is consumed with

196. Ibid., 39.

197. Rey Tiquia, 'Tiger bones, Rhino Horns, Bear Bile, Manchurian Ginseng and Traditional Chinese Medicine Practice in Australia', Proceedings of the Second Australian Symposium on Traditional Medicine and Wildlife Conservation, Melbourne, Australia Mar. 1999, 52.

198. Ibid., 52.

199. Ibid., 52.

200. J. Still, 'Use of animal products in traditional Chinese medicine: environmental impact and health hazards', *Complementary Therapies in Medicine* **11** (2003): 118–122, 119; David Holt-Biddle, 'Rhino Horn: Miracle Medicine or Mythical Magic?' *REF News* **13** (4) (1995): 5.

201. Volker Scheid, 'The Globalisation of Chinese Medicine', *The Lancet* **354** (10 Dec. 2000): 10.

202. Ibid., 10.

203. Ellis, *Tiger Bone and Rhino Horn*, p. 124; C.B. Martin and E.B. Martin, 'Profligate spending exploits wildlife in Taiwan', *Oryx* **25** (1) (1991): 18–20.

spices to ward off disease; rhino liver is eaten to cure tuberculosis; and rhino kneecaps are used to create oil lamps for religious ceremonies or turned into charcoal (which when fired produce fumes to cure disease in penned cattle).[204] There have even been accounts of rhino horn being used to relieve distemper in lapdogs in Taiwan.[205] In surmising the regional use of rhino anatomy in traditional medicine, Leader-Williams found that Chinese, Burmese, Thai and Nepalese practices utilise a variety of rhino parts whereas Japanese and Korean communities exclusively use the horn.[206] In 1985, Martin advanced that the Nepalese use more parts of the rhino than any other people in the world for religious, medicinal, and decorative purposes such as bracelets, earrings and walking sticks.[207] In doing so, Martin offered the following example of the range of products made from a single rhino:

> in 1938, when Kiran Shumsher Rana, the son of the Prime Minister then, shot a rhino in southern Nepal, he gave almost all of its skin to a craftsman in Patan to make a spice container, a flowerpot, picture frames, two table lamps, a chandelier, a bowl and a jewel box, all of which he still keeps as very special treasures.[208]

Fascinatingly, Li Shih-Chen did not refer to one purpose that preoccupies Western perceptions of the Eastern consumption of rhino horn. Authors including Martin,[209] Ellis[210] and Dinerstein[211] concur that the supposed widespread use of rhino horn as an aphrodisiac in TCM is no more than a myth promoted by Western writers, perhaps aided by both the phallic shape of the horn as well as the animal's capability to copulate for as long as ninety minutes, with the male achieving climax at two minute intervals.[212] Up until recently, rhinoceros horn was used as an aphrodisiac only by the Gujarati community in India,[213] with contemporary evidence now suggesting that some is being used for this purpose in Vietnam, consumed as *tuu giac* ('rhino wine') as a sexual enhancer for men.[214] It should be noted, however, that other parts of the rhino

204. Ibid., 114.
205. Holt-Biddle, 'Rhino Horn: Miracle Medicine or Mythical Magic?' 5.
206. Nigel Leader-Williams, TRAFFIC, *The World Trade in Rhino Horn: A Review* (TRAFFIC International and the People's Trust for Endangered Species, 1992) 4.
207. E.B. Martin, 'Religion, royalty and rhino conservation in Nepal', *Oryx* **19** (1) (1985): 11–16; Ellis, *Tiger Bone and Rhino Horn*, p. 114.
208. Ibid.
209. E.B. Martin, 'Deadly love potions' (1987) 90(1) *Animal Kingdom* **90** (1) (1987): 16–21.
210. Ellis, *Tiger Bone and Rhino Horn*, pp. 121–3.
211. Ibid., p. 123; Eric Dinerstein, *The Return of Unicorns: The Natural History and Conservation of the Greater One-Horned Rhinoceros* (New York: Columbia University Press, 2003).
212. Ellis, *Tiger Bone and Rhino Horn*, p. 121.
213. Nigel Leader-Williams, TRAFFIC, *The World Trade in Rhino Horn: A Review*, 4.
214. Tom Milliken and Jo Shaw, TRAFFIC, *The South Africa-Vietnam Rhino Horn Trade Nexus: A Deadly Combination of Institutional Lapses, Corrupt Wildlife Industry Professionals and Asian Crime Syndicates* (TRAFFIC, 2012), p. 122.

are used for aphrodisiac purposes. For example, some people from northern India, Burma, and northern Thailand consume rhino blood, urine, and penises for sexual enhancement. Further, in Nepalese medicine, the penis is sold dried and then rehydrated and consumed to cure impotence.[215] In 2012, Milliken and Shaw identified four user typologies in the Vietnamese market: 'the terminally or seriously ill', 'habitual users on the social circuit', 'protective young mothers' and 'elite gift givers'.[216] The latter category alludes to the use of rhino horn as a status symbol, coveted as a luxury item and even investment for the rich.

Efforts have been made to curb the use of rhino horn in traditional practices in some countries. President of the American College of Traditional Medicine, President of Council of Colleges of Acupuncture and Oriental Medicine and council member of the WWF, Lixin Huang, has spearheaded action to see endangered animals taken off the shelves of the TCM pharmacopeia. On the topic of rhino horn, Huang issued a statement, reiterating that rhino horn is no longer appropriate for use in traditional Chinese medicine and called for the members of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Standing Committee to take strong action where breaches occur.[217] During a *New Scientist* interview in 2014, Huang responded decisively to popularised myths, stating that rhino horn is not a cure for a hangover or cancer.[218] It should also be noted that the reasons against animal yao in TCM are numerous and extend beyond conservation goals. In 2003, Still argued that the use of animal parts in TCM was a direct threat to public health through the transmission of infectious diseases between human and non-human species. Even discounting this concern over zoonotic disease, there are obvious risks flowing from the lack of quality control in the life cycle of many of the products used, let alone those traded illegally. For example, a study of 260 Chinese patent medicines imported to the USA uncovered that almost half contained potentially harmful levels of contaminants, such as heavy metals (lead, arsenic and mercury), drugs (ephedrine, salicylates, caffeine, phenacetin, etc.) and other potentially harmful chemicals.[219]

Measures to ban the use of rhino horn in TCM have run in tandem with the funding of research into viable alternative materials. In the early 1990s, Paul Pui-Hay But, Yan-Kit Tam and Lai-Ching Lung found buffalo horn to be a viable substitute for rhinoceros horn in replicating the antipyretic effects of a traditional Qingying Decoction (saiga antelope horn was also tested

215. Ellis, *Tiger Bone and Rhino Horn*, p. 114.

216. Milliken and Shaw, TRAFFIC, *The South Africa-Viet Nam Rhino Horn Trade Nexus*, pp. 134-7.

217. *Convention on International Trade in Endangered Species of Wild Fauna and Flora*, opened for signature 3 Mar. 1973, 993 UNTS 243 (entered into force 1 July 1975).

218. Lixin Huang, 'Rhino horn is no medicine', *New Scientist* 2996 (26 Apr. 2014).

219. J. Still, 'Use of animal products in traditional Chinese medicine', 118–122.

but found to not be as effective).[220] The team's findings were consistent with results from a 1979 study published out of the School of Pharmacy, Beijing Medical University.[221] The search for alternatives has also sparked debate over the use of artificial synthetics.[222] Biotech companies including Pembient and Rhino Horn LLC have announced current projects underway to manufacture synthetic rhino horn for commercial use aided by technological developments such as 3-D printers[223] (albeit with significant opposition from the NGO sector).[224] While limited studies have endorsed the position that rhinoceros horn possesses medicinal qualities, the preponderance of scientific evidence has found such claims wanting. In any case, the narrow list of afflictions where positive results have been observed possess readily accessible treatments from both traditional and conventional medicine.

In addition to its use as yao, Li Shih-Chen advocated the use of the horn as a drinking vessel to reveal the presence of poison. He explains 'the unicorn horn is a safe guide to tell the presence of poison: when poisonous medicines of liquid form are stirred with a horn, a white foam will bubble up, and no other test is necessary'.[225] Anne and Steve Toon have tested this claim and found that 'improbable as it sounds, there may be some justification for the belief as the alkaloids present in some poisons do react strongly with the keratin and gelatin in horn'.[226] Beyond traditional cups, another customary practice associated with rhino horn is the use of *jambiyas* in Yemen. Jambiyas are daggers given to young Yemeni boys as a rite of passage into young adulthood. The horn is not used for the blade, but rather the handle of the dagger, and because the handle is not shaped like the horn wastage runs to over sixty per cent, with the remains sent to pharmacological factories.[227] The relationship between poaching and the jambiya market has been studied, drawing a direct correlation between the

220. Paul Pui-Hay But, Yan-Kit Tam and Lai-Ching Lung, 'Ethnopharmacy of rhinoceros horn. II: antipyretic effects of prescriptions containing rhinoceros horn or water buffalo horn', *Journal of Ethnopharmacy* **33** (1991): 45–50. The Decoction includes horn and eight herbs: bambusa, coptis, lonicera, ophiopogon, forsythia, rehmannia, salvia, and scrophularia.

221. Healthy People – Healthy Wildlife: Proceedings of the Second Australian Symposium on Traditional Medicine and Wildlife Conservation (Melbourne Australia, March 1999) Jerry (Jiangsheng) Zhang.

222. Steven Broad and Gayle Burgess, 'Synthetic biology, product substitution and the battle against illegal wildlife trade', *TRAFFIC Bulletin* **28** (1) (2016): 22–28.

223. Zoë Corbyn, 'Can we save the rhino from poachers with a 3D printer?' *The Guardian*, 24 May 2015.

224. Joint Statement from the International Rhino Foundation and Save the Rhino, 'Synthetic/Bio-Fabricated Rhino Horn: Will It Save The Rhino?' (July 2016) https://rhinos.org/tough-issues/synthetic-rhino-horn/

225. Ellis, *Tiger Bone and Rhino Horn*, p. 77.

226. Ibid., p. 78; Anne Toon and Steve Toon, *Rhinos: Natural History and Conservation* (World Life Library/ Voyager Press, 2002).

227. Ibid., p. 98.

rise in Saudi income and rates of African rhino poaching.[228] Prior to the 1970s, few could afford an authentic rhino horn jambiya; however this changed in the 1980s due to an increase in lucrative employment prospects linked to the Saudi oil boom. There was a sevenfold increase in the per capita income in Yemen during that time and a twentyfold increase in the price of rhino horn. Yemen then became the world's largest market for rhino horn. The collapse in oil prices in the mid-1980s, coupled with a government ban on rhino horn imports, significantly decreased the trade; however a black market still exists driven by northern tribesmen and younger affluent men in the capital Sana'a.[229]

As to more contemporary trends, Moneron, Okes and Rademeyer report that Asian trafficking syndicates have begun to fashion beads and 'disks' from horn to avoid detection in transit, in addition to packaging offcuts, shavings and powder.[230] Furthermore, it reports that 'rhino horn carvings, libation cups, bracelets, beads, bangles and powder are produced in parts of Vietnam and the Lao People's Democratic Republic (PDR), primarily for Chinese buyers.'[231] Interestingly, in 2016 Gao et al. reported on the disparate perceptions of Chinese rhino horn consumption by Western and Chinese media, with the former found to be fixated on medicinal value whereas the latter focused predominantly on rhino horn acquisition for investments and collectible value, followed by artistic value, and only then medicinal value.[232] The authors note that, while the auction market has stalled since 2012, the interest remains, thus requiring further analysis of different stakeholder groups to improve conservation outcomes. Indeed, it appears that the further researchers delve into the illicit trade in rhino horn, the more surprising linkages emerge. In 2017, as the international community grappled with the poaching of a white rhino at the Parc Zoologique de Thoiry, a violent attack on the Fundimvelo Thula Thula Rhino Orphanage, the lifting of South Africa's moratorium on domestic trade, and the continued targeting of museums and private collections, Rademeyer broke news of a North Korean connection, linking North Korean diplomatic passport holders to eighteen of at least 31 detected rhino horn and ivory smuggling cases involving diplomats in Africa since 1986.[233]

228. Ibid., p. 96.

229. Ayling, *What Sustains Wildlife Crime? Rhino Horn Trading and the Resilience of Criminal Networks*, p. 60.

230. Moneron, Okes and Rademeyer, *Pendants, Powder and Pathways,* p. 12.

231. Ibid., p. 2. See also Wildlife Justice Commission, *Overlooked: Rhino horn demand for decorative purposes in China. (The Hague: Wildlife Justice Commission*, 2016) https://wildlifejustice.org/rhino-horndemand-china-medicinal-investment/

232. Yufang Gao et al. 'Rhino horn trade in China: An analysis of the art and antiques market', *Biological Conservation* **201** (2016): 343–347.

233. Julian Rademeyer, *Diplomats and Deceit: North Korea's Criminal Activities in* Africa (Global Initiative against Transnational Organized Crime, 2017).

CONCLUSION

The value of many wildlife products does not hinge on a one-dimensional dollar amount, but is inextricably linked to the cultural practices and historically-laden significance of both the commodity and its animal of origin. The breadth of human captivation by the rhinoceros remains informed not only by the evolutionary resilience that bore it miraculously into the twenty-first century, but by a multiplicity of depictions since the *Coelodonta antiquitatis* was painted onto the walls of the Chauvet-Pont-d'Arc. As time progressed, these representations were accompanied by short stories and tall tales that sometimes found their way into the natural histories of the species, to its detriment. As demonstrated in Part III, myth can yield influence centuries removed, whereupon Western musings of rhino powder as an Eastern aphrodisiac have now become reality. This provides but one example of where a historiographical understanding of folklore could reset popular narratives to improve conservation outcomes.

So entrenched is the history between humans and rhinos that the international market in its horn persists decades after the 1977 *CITES* ban. Even if a decrease in horn use were to occur across any number of sovereign states, the danger would always remain that, like many cultural activities subject to fashion and trends, its use could return *in vogue* and initiate the next great extinction of the rhinoceros, assuming it survives the current poaching crisis. As evidenced by Milliken, while poaching effectively stopped in the 1990s (with limited incidents occurring in the early 2000s) it was the resurgence of Vietnam as a major destination of import in 2008 that helped to herald the beginning of the current wave of poaching.[234] As outlined in Part I, the impact on rhinoceros populations has been palpable, including extinctions of regional populations and entire subspecies. For regulatory responses to be truly effective in countering illicit trade in any species, conservation strategies must not only be robust in their standards and enforcement, but drafted with full acknowledgement of the established uses, including cultural connotations and significance, of the commodity being traded. As Earth faces down the Holocene extinction, interdisciplinary perspectives may well be the key to challenging the status quo by producing mechanisms that are scientifically evidenced, historically informed and culturally aware.

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234. Tom Milliken, TRAFFIC, *Illegal Trade In Ivory And Rhino Horn*, p. 15.