

# Learning from the llama: on the broad contours of cultural contributions and geographic expansion

*Aprendendo com a lhama:  
sobre os amplos contornos  
de contribuições culturais e  
expansão geográfica*

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## Abstract

The llama (*Lama glama*) is the largest domesticated animal species from South America and is today found worldwide. Andean peoples have used the llama for millennia for meat, wool, packing, spiritual etc. In order to know the history of the llama, we must learn about the peoples that have known the animal and the ways those relationships have changed over time. While also considering closely related species, including alpaca, guanaco, and vicuña, this article posits three eras of llama/human entanglements: the era of domestication in pre-Columbian Andean sites; the era of dispersal and comingling, from 1530s to the 1890s; and finally popular fads and global appeal.

Keywords: domestication; culture; animal history; llama; biopolitics.

## Resumo

*A lhama (Lama glama) é a maior espécie animal domesticada da América do Sul e atualmente é encontrada em todo o mundo. Os povos andinos a utilizam há milênios para transporte de carga, obtenção de lã e carne, uso espiritual etc. Para conhecer sua história, precisamos aprender sobre os povos que conhecem e se relacionam com esse animal, e como esses relacionamentos se transformaram ao longo do tempo. O artigo considera ainda outras espécies relacionadas, incluindo alpaca, guanaco e vicunha, e apresenta três eras da interação lhamas/humanos: a da domesticação em sítios andinos pré-colombianos; a da dispersão e mistura, dos anos 1530 à década de 1890; e, finalmente, modismos e interesse global.*

*Palavras-chave: domesticação; cultura; história animal; lhama; biopolítica.*



Upon first glance, llamas appear almost comical; they seem like they were invented for a Disney cartoon. With their long legs and necks, furry bodies, oversized eyes, and attentive ears, as Jesuit priest and Chilean naturalist Juan Ignacio Molina (1810, p.289) said in 1786, llamas make their cousins the camels look like monsters. They have in recent decades become incredibly popular in the United States. While the peak of the llama population in the US occurred in the 1980s, the idea of the animal as magical and fantastic persists. For example, llamas superseded unicorns as the most sought-after toys at the 2020 American International Toy Fair (Lieber, 14 Apr. 2020). They also make regular appearances at petting zoos, weddings, music festivals, and even social protests (O'Brien, 5 Aug. 2020). They have even been in the news for helping the fight against the pandemic: their antibodies are being used for potential covid-19 treatments (McFarling, 11 Aug. 2020). A black llama named Wally provided researchers with promising nanobodies – even smaller than antibodies – which proved more stable and effective at neutralizing the SARS-CoV-2 virus than human antibodies.

But unlike unicorns, llamas are not imaginary. They did not magically appear just to delight Western children (and, let's face it, adults) or cure a pandemic. Llamas have thousands of years of interwoven history with the people who share their South American homelands. Everything from the length and color of their wool to their spirited disposition and reproductive habits have been shaped by interactions with peoples from the Andes Mountains. Few popular sources acknowledge the animal's long and intertwined history, treating llamas either as a fun new discovery or an ancient relic. While Wally the research llama might earn a humanlike name, imagining llamas as either new or stuck in a time-warp promotes stereotypes that leave out the significant contributions South Americans have made to modern science and culture. To be clear: Wally's nanobodies evolved through centuries of interaction with the needs and desires of Andean peoples, meaning these people and their ancestors merit a place in every story about llamas. Just as the colorful ribbons on toy llamas are a nod to the continued practice of llama adornment, the attributes that make llamas popular and ubiquitous today did not appear out of nowhere. The nanobodies and the ribbons have a history, a llama-centric history, that is continually evolving as the species does itself.

This article aims to provide some historical context for the llama and its kin, both human and camelid. "Camelid" is the name given to llamas, camels, and their closely related domesticated (alpaca) and wild (guanaco and vicuña) species. The genetic transferability and aesthetic similarities make the telling of llama history necessarily entangled with the histories of these affiliated species. Similarly, while the llama's origins are closely tied to Andean societies, its past can be traced to extinct North American species. Llamas' modern uses are diasporic, in that they stretch far into the reaches of other continents, especially Europe and North America (Wakild, in press). In recounting these movements, this article borrows from relational views of the world, as described by Emily O'Gorman and Andrea Gaynor (2020, p.716), that envision the past and present as "dynamically co-constituted by multiple organisms" and argue that due to these emerging and evolving relationships, neither the landscape (the Andes mountains), the animals (the llamas), nor the people (Andeans and others) can be understood in isolation, but must be contextualized as co-constituted. O'Gorman and Gaynor's relational concept of multispecies history provides an approach

that is centered on nonhuman animals without separating them from their entanglements and relationships with humans. The primary contention that emerges here is that the llama is a llama because of Andean people – it cannot be understood apart from them no matter where an individual llama resides. A llama cannot be plucked from context like an imaginary unicorn or dragon without damage to the animals and humans involved. The damage occurs by denying Andeans agency and authenticity in the creation of the modern world and by falsifying the lived and real experiences of animals. Sidelining, ignoring, and erasing the contributions of Andeans and llamas to the modern present denies them both the capacity to shape their own worlds and the power to contribute to shared global trends. Placing llamas in the realm of fiction rather than in the dramatic domain of knowledge production impoverishes the possibilities for multispecies entanglements going forward. Andeans were not simply stewards of llamas any more than you are a steward of your mother; they are “of” and “for” llamas in a rich and wide-ranging context that expands understandings of the past. A llama does not exist in isolation; llama is what it is today because of the processes of domestication, colonialism, liberation, and expansion experienced by Andean peoples.

To make these claims, this article posits a roughly chronological argument drawn from a variety of primary sources that provide evidence as to the wide-ranging experiences that have shaped three generalized eras of llama-human entanglements. Sources for llama history are both obvious and elusive. My methods are historical in that they take all past productions – written, archaeological, oral, cultural, and more – as potential sources and testimonies. Here, I employ sources that range from archeological studies of ancient remains to modern media and news reports. I utilize and synthesize the work of other historians and anthropologists, many of whom have looked deeply at specific places in the Andes, who address llamas tangentially rather than centering them. Additionally, I consider scientific writing, especially naturalists and botanists, and the writing of animal husbandry experts, in particular in the mid-twentieth century, when llama populations expanded in conjunction with these interest groups. Animal history faces the challenge of bearing witness to an experience that cannot fully be grasped – that is, the role and experience of a more-than-human subject. As Nigel Rothfels (2021) argues, attempts to include animals in history expand ideas of history and more fully account for the past, but these attempts are ultimately always about how humans have viewed animals, even when they draw upon science or descriptions of animals.

In rapidly exploring a broad set of eras, this article aims to elucidate relationships, events, and episodes that have meaningfully shaped both humans and llamas. These epochs include: the era of domestication and use in pre-Columbian Andean sites; the era of global dispersal and co-mingling, from roughly the 1530s to the 1890s; and popular fads and global appeal in the modern era. While raw population data are difficult to ascertain, whenever possible figures and chronologies are provided.

### **Fleece and species**

Although North America today has no native camel species, the origins of all camels are within the family Camelidae in the suborder Tylopoda originating on this continent about 45 million years ago. The Bactrian and dromedary species went across the Bering land

bridge to Asia, while what became llamas traveled south to the Andes about three million years ago during the Great American Interchange. The formation of the Panamanian land bridge between North and South America merged distinct fauna in one of the greatest natural experiments of all time. Fossil records from the interchange provide evidence as to equilibrium among speciation rates as the appearance and disappearance of taxa after this interchange balanced to maintain previous diversity levels (Terborgh, 1992, p.139). Llamas are one of four camelid species (llama, alpaca, guanaco, and vicuña) native to what are now Ecuador, Peru, Bolivia, Argentina, and Chile. Llamas and alpacas were domesticated from wild species – guanaco and vicuña – as far back as 4500 BCE (Cowie, 2017). Genetically, all four species of South American camelids possess the same pairing and ordering of chromosomes, which indicates they have not diverged as much as felids or canids, for example. After decades of debates, DNA tests further indicate that the llama is descended from the wild guanaco, and the alpaca is descended from the wild vicuña (Casey et al., 2018). But hybridization has been the rule across the two domesticated species, llamas and alpacas, which cannot always be identified by sight and usually produce fertile offspring. Deep nature shapes the human panorama because the absence or presence of large animals appropriate for domestication allows for different adaptations and specializations among humans (Wakild, 2018).

What might we learn from the llama? The llama is good to think about because it is neither highly symbolic of the ubiquity and excess of the Anthropocene, like the chicken, whose bones may form a geological layer, nor is it like a pangolin, so rare and near extinct that its exoticism is blamed for the toxic fetishization of animals (Bennett et al., 2018). Perhaps the llama is a condiment in the cuisine of capitalist desire, not necessary but exquisite enough to make the rest of the ingredients seem well-paired. The llama is consistently described by its promoters throughout time as attainable, accessible, flexible, easy, and even common. So the llama is seen to be understood but not entirely understandable.

Three theoretical approaches provide a window into the utility of the llama. First, Michel Foucault's concept of biopolitics allows us to ground the animal in the regimes of power and systematic knowledge of life, while also attending to important subjectivities. As a frame, biopolitics provides an alternative to bioethics, which seeks more expansive questions and moves beyond arbitrary and abstract answers.<sup>1</sup> As Lemke (2011, p.121) posits, "an analytics of biopolitics demonstrates not only how, in the past few centuries, the importance of 'life' for politics has increased but also how the definition of politics itself has thereby been transformed." By grounding the analysis in context and bringing together domains that might otherwise be separated by cognitive, disciplinary, or administrative boundaries, a biopolitical perspective can illuminate phenomena – like the dispersal and popularity of llamas in the West – that are shaped by social and political decisions. For example, there is nothing preeminently natural about llamas living in Idaho, a remote western state in the US with much designated wilderness and a low human population density. That llama farms, individual llama pets, and llama packers exist there is primarily the product of the biopolitical desires of agents with the power to make it so that these animals do live in a place such as Idaho. Such desire-based decisions are supported by a legal and economic

apparatus that makes the reproduction of the animal bodies feasible. And in doing so, these biopolitical structures facilitate the emergence of new cultural strains of value and, potentially, new animal body-constitutions as well.

Second, the colonial and postcolonial language we use to talk about the llama does not provide a full glimpse into its existence or importance. Using a European frame and terminology, as I have done here, may not make sense when applied to large Andean animals. Such terms inherently privilege the types of animal relationships that Europeans prioritize and that disrupted pre-Columbian systems already at play. Quite clearly, as David Gade (2013) has noted, Spaniards arriving in the Andes saw llamas and alpacas as sheep, and in doing so perpetuated the idea that European knowledge was universal and superior. Two examples of the potential theoretical bias of this language are pasturage and domestication. Treated largely as states of nature rather than processes under negotiation, the use of pasturing animals and the processes of herding and moving llama flocks differed greatly from sheep in the Alps, for instance. Herders never became separate ethnic groups as they did in the Near East, and while herders spent most of their lives above the peasant settlements, they nevertheless continued to “belong” to the villages (Flannery, Marcus, Reynolds, 1989). Domestication has also earned notorious critique as a spectrum for development rather than a perpetual state (Moore, 2016; Goñalons, Yacobaccio, 2006). Along these lines, the European terminology of science is also confusing and largely misapplied to the behavior, appearance, and expertise on the distinctions among camelid species (Flores Ochoa, 1988, p.121). The proto-nationalization of the animals in the nineteenth century and the challenges to the European structures have come from genetic studies and also debates over ancient remains and artifacts.

Perhaps, the use of Andean terms to describe Andean animals makes more sense. Anthropologist Marisol de la Cadena (2015, p.100) has elaborated the concepts of *tirakuna* and *apukuna* as “earth beings” to recognize the blurred and mutual entanglements of Indigenous worlds and the earth, of humans and nature. The practices of Andean peoples who enact knowledge about their local worlds exceed, in this framing, the historical or political modes and the fractal existence of earth beings as both part of how people are defined and more than nature alongside those representations. Certainly, the endurance of Indigenous cosmovisions does not render them timeless and unchanging. Indeed, the flexibility and adaptability of Indigenous ways of seeing and knowing has made them able to endure. Similarly, Nicolas Cuvi (2018, p.67) points out how Ecuador and Bolivia, two Andean countries, became the first in the world to recognize the rights of nature and the right to a good life in their constitutions by incorporating the concepts of *sumak kawsay* and *sumac qamana*. This formalization of Indigenous concepts into political documents represents many things, foremost of which is the alternative cosmovision that persists despite the Eurocentric projects of colonialism, development, and modernization in Latin America. Cuvi notices the remnants and traces of Indigenous actors in the animals, seeds, soils, forests, and other elements that persist today. These geographical imprints include the llama and alpaca, around three million of each of which exist today, mainly in Peru and Bolivia. Andean communities continued their use from pre-Columbian times, but some breeds, including a short-legged variety, did not survive. As a consequence of their

persistence and, in some places, reintroduction, bogs of succulent plants have been created and are possible only due to the animals' maintenance by Indigenous peoples, not the State. Perhaps no Andean term has more enduring significance and resonance than the *ayllu*, which is a fundamental unit of social organization that includes family lineages, people with common origins, and agricultural rights, including the right to pasturage. Despite this complexity and the changes from Inca and colonial eras, the *ayllu* remains a powerful concept for understanding relationships of reciprocity and resource use in the Andes (Flannery, Marcus, Reynolds, 1989, p.28-30). The *ayullu*, then, links place with relationships and includes the nonhuman world, thus the llama as an earth-being in this domain.

Third, llamas constitute a lively commodity and belong within the collective biographies and conceptualizations emerging from geographers and anthropologists interested in the economies of care and culture (Parreñas, 2018; Lorimer, 2010; Roe, Greenhough, 2021). Among these, the concept of mobility provides insights into the relationships of power that have constrained animal movements. For instance, Hodgetts and Lorimer (2020) argue that animal mobility has been spaced by humans, not created by a singular lived geographic experience. As such, considering mobility beyond movement opens a conceptual approach by which to examine affect and care as part of the lived animal experience. The authors are also concerned with the spatial power deployed differentially across relational assemblages, beyond regional topologies. Concern with biopower across socio-ecological systems includes aggregations of animal bodies and collective circumstances that become territorialized. In short, past animal movements can help us explain llama dispersal, including the power and connectivity of cultural habits and habitats.

Along these lines, Benedicta Boisseron's (2018) analysis of the connections between racism and speciesism reveals the ways that extending intersectional bonds across racial and animal categories can render them mutually visible. She argues that "overdetermining race or animality may ultimately lead to the erasure of both, the alternative is to reclaim their addressable condition instead" (p.8). By illuminating how the "history of the animal and the black in the black Atlantic is 'connected,' rather than simply comparable" (p.8-9; emphasis in original), the discussion can be re-oriented towards one of empowerment that elaborates on not just subjugation and humiliation, but also emerging interspecies alliances. While not explicitly connected to race in the same way as the Afro-Dog, the llama provides an opportunity for familiarizing the modern world with the wisdom and insights of native Andean Indigenous practices, in all their persistence, malleability, and power.

How might we learn about the llama? Sources for animals in history prove ubiquitous and also complicated. While historians may listen to all sorts of different ways people have described llamas – using archeological or scientific data, using colonial chroniclers, using images and artifacts, using trade and export data, using trade publications and more – they can never quite get to the llama's perspective. Any story a person tells about a llama is ultimately about that person and human history (Rothfels, 2021). Synthesizing secondary material and opening it up to the questions unique to animal history can provide windows and mirrors that expand the scope of history and the breadth of animals within its remit. But all sources have limits, and the desire for sources exceeds their existence, particularly

in pre-Columbian societies with few written documents. Nevertheless, llamas are often what researchers find in the archive as they are looking to tell other stories. Listening to those llamas and reading against the grain for their voices and presence illuminates new insights into the past.

### **Deep history and domestication**

While paleontology explains that the llama emerged from the ancient North American Tylopoda, some Andeans have other explanations for the animal's origins. The expansion, contraction, and extension of the Andean civilizations prior to European contact contextualizes the origins of alpacas and llamas. Inca mythology placing their emergence in lakes and figurines excavated from the bottom of Lake Titicaca suggests associations of the herds with Mama Cocha, or the Mother of Water goddess, and rituals related to asking for rain (Delaere, Capriles, 2020). The origins of ritual offerings in the lake reinforce the idea of the lake as a site of religious and ritual importance and pilgrimage. However, llamas have roots that stretch back long before the Inca empire. In the 1990s, archaeologists unearthed perfectly preserved mummified alpacas and llamas that were more than a thousand years old in El Yaral, Peru (Pringle, Delin, 31 Mar. 2001). The animals had been ritually sacrificed and buried with beads, wool, and silver pieces. Periodic sacrifices of the animals were common in Inca and pre-Inca religious ceremonies because the blood and the meat symbolized the fecundity of future herds (Flannery, Marcus, Reynolds, 1989). Many divine beings, including of the sun, thunder, and moon, were understood to have their own flocks of camelids, and the deity Urcuchillay was depicted as a multicolored llama. Llamas have been associated with religious sites and ceremonies at multiple locations and throughout long spans of ancient time.

Prior to the Inca, a wide panorama of cultures flourished in the Andes, each adding to the cultural apparatus inherited by the Incas (McEwan, 2006). Most relevant to the history of llamas and alpacas include Chavin, a religious cult with a ceremonial center in northern Peru, representing a synthesis of a variety of traditional religious beliefs until about 1400 BC. While Chavin does not appear to have reached Cuzco, the region that would become the Inca heartland, it did have influence up to Ayacucho. The Nazca and Moche culture on the south coast built on the complexity of Chavin and may have developed into centrally governed states by 540. The Tiwanaku culture built a city on the plateau around Lake Titicaca and sustained a population of up to one million people with high-altitude crops such as the potato and oca and the meat of llama and alpaca, animals who found prime grazing land in the altiplano grasses around the lake. It is thought that the Tiwanaku reached north into today's Peru and through Bolivia down to northern Chile. Platform mounds and temples dominated the cities and the expansion of the state, including land reclamation, with both monumental structures and fine pottery. Economic expansion and consolidation was supported by these constructions and the establishment of economic colonies in a variety of ecological zones. But critically, expansion was based on llama caravans. Llamas could carry up to 40kg of cargo and travel up and down the peaks and valleys bearing goods to exchange and redistribute (McEwan, 2006, p.38).

The Wari culture, located about 1000km north of Lake Titicaca, near Ayacucho, emerged about 200 BC and grew rapidly between 500 and 900. The Wari imperial economy was also based on agriculture and herding, with llamas and guinea pigs raised as sources of meat to complement a tuber-heavy but diverse set of products. The Wari and Tiawanaku introduced the imperial state and their collapse left a period of political fragmentation into which arose the Inca. The Inca version of their history begins with a small group of highlanders moving into the Valley of Cuzco around 1200. Ancestors came forth into the world from three caves, led by Manco Capac, the first Inca ruler. Other stories place their origin on an island in Lake Titicaca. When Manco and his brothers and sisters arrived in Cuzco, they settled and expanded until the arrival of Pachacuti, who reorganized and rebuilt the empire, extending its domain across the four quarters of the world – the *suyus* – and extending their reach and the use of llamas as well.

The four South American camelid species are, then, closely related but distinct geographically. In the wild, the vicuña and guanaco developed in tighter niches, but aridity, high elevation and the associated sparse vegetation and rockiness, and the ability to withstand large daily fluctuations in temperature stand out as critical commonalities. The unique geography of the Andes provides such a setting for these animals. Anthropologist John Murra (2017) famously described the Andean imperial zones as “vertical archipelagos” to capture the systems of resource distribution across steep slopes and distinct ecological zones and elevations. Along with the potato, cotton, cacao, and fish, the llama also played a key role in this distribution system (partly enabled by the freeze-drying of these resources for storage and future use) and allowed for sophisticated empires to emerge at altitudes otherwise difficult to inhabit and in distinct contrast to the emergence of sophisticated and stratified societies in lowland, riverine areas, such as in Mesopotamia. The llama had dual purposes, as both the pack animals transporting other staples, and as dried llama meat itself, which could be transported alongside wool and other products. Critical to understanding the efficacy and extent of kingdoms across the Andes is Murra’s insight that the archipelago was connected by islands and no attempt was made to place the territory in between under control. Multiethnic settlements were the norm and Inca complexity and continuity was tied to ideas of reciprocity and the exchange of labor, rather than goods or tributes. Animals played a key role as transporters and transactional recipients in this system. Political scientist James C. Scott (2009) has noted that the Andes are unique globally in providing an example of an empire (several, including the Inca) that developed a seat of power and population density at altitudes above 3400 meters. While Scott generally concludes that peoples have taken to the highlands to avoid the state imposition of power upon them by putting distance between themselves and the states wishing to subject them to taxation or other types of social organization, the Andes provide an important counter-example, because the state learned how to inhabit the highlands and rule from there with the help of llamas and alpacas.

Karen Spalding’s (1984, p.12-14) masterful study of southern Peru, *Huarochiri*, illustrates the ways that the steep slopes of the Andes seemed harsh and forbidding to a person from Europe or the United States, but that the alterations to the land through terracing and irrigation as well as the farming of the flat plain, or puna, on often frozen ground had long created the

staples of Andean society. The core of this world is in the valleys found between 9,000 and 12,000 feet above sea level, which can be worked with care and attention to provide for a population. People hunted wild vicuña and guanaco, and above the agricultural zone the puna provided pasture for llamas and alpacas, which in turn served as sources of wool and meat and as carriers of cargo. Camelid bones are common in sites in the central highlands and have been found alongside remnants of ceremonial and luxury goods. The exchange of foods and objects is impressive because of the lack of evidence of trade networks or markets of any sort. Production was organized by relations that ensured the maintenance of llama herds. The household was the basic productive unit, and young people, especially girls, cared for the llamas and spun and wove fine cloth (Spalding, 1984, p.25).

Llamas and their alpaca kin formed part of the cultural institutions of the largest empire in the Americas, the Incas. The animals labored along the Inca road system (more than 25,000 miles) carrying goods and providing wool and meat (Bloch, 26 Jun. 2015). Besides their nutritional and ritual significance, Andeans used selective breeding to create a constellation of favorable traits, including soft, fine, fast-growing wool. Microscopic projections of mummified fleece show the wool fibers were finer than today's best cashmere (Pringle, Delin, 31 Mar. 2001). Moreover, these animals produced longer wool more quickly, as noted by the age of the animals. Llamas were sometimes offered during state-sponsored feasts and celebrations, seasonally timed to honor deities governing rain, for example. Scholars have argued that llamas were the preferred sacrificial animals of the Inca empire, their value second only to the sacrifice of human beings. Ritual sacrifice and burials may have also signified authority over newly conquered lands (Valdez, Bettcher, Huamani, 2020). A recent excavation at Lake Titicaca unearthed a llama figurine carved from a coral-colored mollusk. It is thought to be more than 500 years old. Encased in a stone box floating on a reef about 18 feet below the surface, it is likely the small figure represented a request for fertility within a herd or a successful harvest. Found with a gold bracelet, it is likely the gold represented the human side of a human-camelid dyad. Underwater ritual offerings in Lake Titicaca and in high mountain peaks have been associated with human sacrifice (Delare, Capriles, 2020). But as important as these shifts in animal characteristics are, so too are the cultural reasons why people insisted on modifying the animals.

Geographical, community, and political systems structured Andean society. Further cultural evidence suggests value indicative of custom and tradition. Geographer Karl Zimmerer points out that the Andean languages of Quechua and Aymara have nearly ten million native speakers today, and yet no word exists that captures the generalizing term "crop" or "food plant" because every specific landrace has a unique name. Specificity dominates the lexicon, leaving no need for such a sweepingly generalized concept. Similarly, the concept of domesticated livestock is largely foreign. One byproduct of Inca labor redistribution was agricultural diversity: as peasants worked their own plots and those for the Inca as well, variety became an engine for new landraces. Alternative activities, such as labor in the mines to extract gold or silver or textile production based in the fleece from flocks of llamas and alpacas provided complimentary products (Zimmerer, 1996, p.26).

And yet the question of domestication lingers, if not to contrast with agricultural produce and the introduction of sheep upon European arrival. Here, the scholarship is neither unanimous nor clear, though it is ample. According to Zeder (2006), these cumulative works “produce a convincing body of evidence in the form of abundance data, age profiles, and morphological change, showing that people across the central and south-central Andes were all embarking on a similar process that eventually resulted in the domestication of alpacas and llama, perhaps multiple times in multiple places.” In pre-European times, as we have established, camelids were widely distributed throughout the highlands, the coasts, and the lowlands and formed a primary element of Andean social and economic life. Despite this, there is no general agreement on the timing of the process or whether or not it occurred at one or many sites. There are debates about the nomenclature and where the specific species taxonomies have been derived. Jane Wheeler, a preeminent expert on camelid genetics and archaeology, posts that there previously existed lots of breeds with fiber components that no longer exist among living animals (Wheeler, 1984, 1995; Wheeler, Russel, Redden, 1995; Kadwell et al., 2001).<sup>2</sup>

Inca feasting rituals and pottery provide another important insight as to the social relations among both Inca and present animal relations. Tamara Bray investigates pottery as culinary equipment to analyze not just the physical properties of pottery, but also its uses and their cultural significance. She demonstrates that camelids make up about 10% of campesino diets, according to modern ethnographic studies, and posits that a similar component existed in Inca times (Bray, 2003, p.8). Camelid and guinea pig were the main sources of meat in pre-European times, and were reserved largely for special occasions. For instance, Bray demonstrates that the Inca ruler Atahualpa, who encountered Pizarro, first sent him cooked and dried llama meat as a gesture of respect and honor.

Much of what the animals are today is a result of how they were raised, pastured, and bred. Murra (2017, p.14) highlights the detail that individual households reported 1500 to 2000 head of llamas and alpacas and often grouped them into multiple households, resulting in tremendous herds. Yet Murra and others dismiss the role of the llama in making any significant difference to the establishment of a sophisticated state apparatus. He argues that there are “no animals in the New World or in Africa that provide the energy to pull and push and haul, and no technological things which are symbolized for the Europeans by the wheel” (p.71). He goes on to say that this “no beasts, no wheel” method of “achieving civilizations” means that the only way to build a state is by “beating it out of people” (p.71). For Murra then, the ways people were organized, manipulated, cajoled, and convinced to produce the energy of empire were the unique contributions of the Andes.

Religious reverence also must have shaped the animals, if not directly then by association. For instance, Andean communities have long maintained mechanisms to preserve particular privileges and expectations. Mummifying and richly dressing the bodies of dead leaders is one example; honoring ancestors through offerings of chicha and coca is another. Ceremonies and festivals throughout the Andes and through the centuries have ensured good harvests and increases in llama herds. Spanish priests in the late sixteenth century found that offerings were requests to guard, help, and cure against illness (Spalding, 1984, p.61). But if preferred animals were mummified young, before

they had a chance to reproduce for example, the practice may have been scientifically counterproductive to the religious aims.

### **Dispersal and co-mingling**

The arrival of the Spanish in the Andes disrupted – though certainly did not destroy – nearly every aspect of social and environmental continuity. Disease and the arrival of the European “portmanteau biota” set about infiltrating ecosystems and bodies at an accelerated pace. The transformation of Spanish political systems atop and instead of Inca power had catastrophic effects on individuals, communities, and resources. The impact on camelids of this disruption was neither more nor less dramatic than it was on other subjects, but the patterns that emerged had significant effects on the camelids themselves in at least two ways. First, the replacement of camelids with Spanish livestock, largely sheep, meant camelids escaped eradication but lost the specifics gained through pre-Inca and Inca breeding practices. Second, the dispersal and distribution of camelids around the world, both in terms of products and individual animals, led to new circuits of economic power and ideas about the animals (Wernke, 2007). But ebb and flow and genuine curiosity in a scientific sense led to important conclusions about the animals and allowed for the persistence and stability provided in Indigenous communities by the continued maintenance of local herds.

The collapse of the Inca and other states after 1532 greatly changed how llamas were herded. What happened to the genes that produced such high-quality wool? The early Spanish saw no such distinctions among these foreign animals and slaughtered prize animals for meat or sent them to work as pack animals in the silver mines. As the animals were left to go feral, they were still hunted for pelts, but they lost the specifics of Inca breeding (Ebel, 1989, p.3). Many more died from diseases carried by the foreign sheep and cattle. Colonialism decimated not just native peoples, but carefully curated attributes in animals as well. The Inca and other empires provided a series of social mechanisms for merging and grouping small flocks into larger ones and for rotating the animals across long distances in caravans. Some of these herds supported imperial herds and others provided reserves that seemed almost inexhaustible. The mixing of the herds provided a set of animals that were healthy and robust and nearly immune to the demographic problems of small herds, including genetic atrophication (Flannery, Marcus, Reynolds, 1989, p.206).

Guaman Poma’s *El primer nueva crónica y buen gobierno*, a text of nearly 1200 handwritten pages and almost 400 drawings from 1615, captures in prose and illustrated form a wide range of attributes of the Inca culture. The incredible chronicle lay unknown in a Danish library for nearly three hundred years until 1908, when it was uncovered by a German scholar. Among the many themes covered in this text is agriculture, and llamas are depicted in at least three of the drawings. Consider this drawing of an Inca ruler singing with his red (*pucca*) llama during a festival (Figure 1). The “y” notes from their mouths indicate the song and the red dye marks the significance of the ruler’s stature. In the textual description that accompanies the image, the author describes a song from a marriage celebration and the llama as forming part of a gift given along with the bride. The llama signifies that the bride will bear the receiver children.

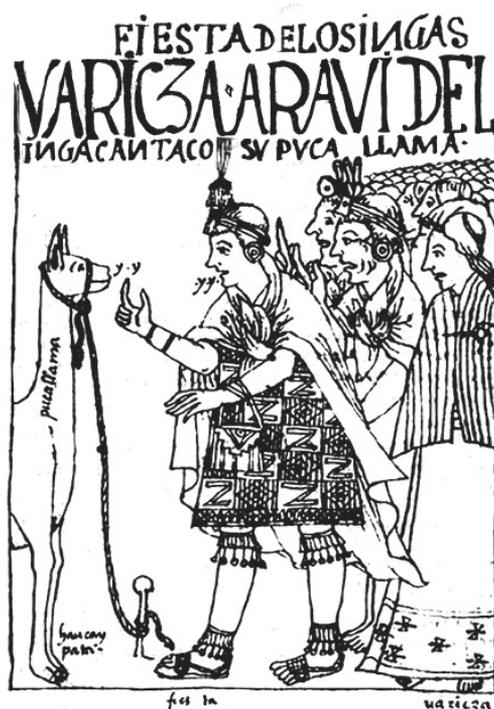


Figure 1: Llama decorated at festival (Guamán Poma, *Nueva crónica y buen gobierno* [1615], available at: <http://www5.kb.dk/permalink/2006/poma/320/en/text>)

The initial and subsequent declines of camelid populations did not escape the notice of the Spanish colonizers. In fact, the vicuña quickly turned into a symbol of luxury, and vicuña wool, once only reserved for the Inca, was now restricted and reserved for Spanish royal lineages. It is not surprising, then, that the first policies restricting the hunting and harvest of an animal applied to the very same vicuña in 1557, when the crown imposed a five-year moratorium on vicuña hunting. Similarly, Simon Bolivar issued a decree prohibiting the killing of vicuña in 1827. Both of these measures had limited impact, as various naturalists and travelers describe versions of a “round-up” called a *chaccu* or *chakkum*, where wild animals were roped into a temporary pen and shorn or culled for their wool, while others were then released (Cowie, 2017, p.78; Flores Ochoa 1988, p.110). This annual ritual (minus the killing) has been reinvented in protected areas throughout Peru, especially Pampa Galeras, where the shearing produces wool for cooperatives (Wakild, 2020).

A unique and under-recognized use of llamas and their kin comes from the bezoar stones formed in the digestive tracts of ruminants, which are calcinated concretions, somewhat like pearls. As Marcia Stephenson (2010) argues, these strange and less-than-glamorous gastrointestinal stones have played an outsized role shaping the social and economic history of early modern Europe and Spanish America. Healers and medicinal consultants in Europe widely regarded bezoar stones as effective and excellent remedies for poisons and serious illnesses, including plague, typhus, and fevers. The stones became so highly esteemed that they were grouped with diamonds, pearls, emeralds, and other precious

stones and often mounted in gold or silver inlays. Europeans were not the only people to admire the stones: colonial religious authorities found them ubiquitous in idolatry. Spanish soldiers discovered the bezoar stone in Peru in 1568 and chronicle this significant event in the medical book written by Nicolas Monardes, *Historia medicinal de las coasa que se traen de nuestras Indias Occidentales que sirven en medicina*. As Stephenson (2010) argues, these glorious objects, literally embedded in the stomachs of Andean animals, symbolized the fantastical relationships of commerce, knowledge, awe, and colonial power literally embodied in the viscera of the camelid.

Llamas also went across the Atlantic. The first llama to be described in Europe was probably an animal called “Allocamelus,” taken to the Netherlands as the property of a Dutch merchant. Described as an “Indian Sheep,” the animal was brought as a present for the Holy Roman Emperor, Ferdinand I (Cowie, 2017, p.7-8). Gifting llamas formed part of the dispersal of American curiosities, including plants, animals, and humans, as European knowledge brokers sought to make sense of the now more complete world. Llamas contributed to the revisions necessary to scientific ideas, as their unique features and attributes challenged the emerging systems of nature classifications.



Figure 2: Llama (Buffon et al., 1778)

Identifying and describing the llama and its kin has produced no small amount of confusion in European scientific literature. One of the more interesting contributions comes from a man widely regarded as the first naturalist of Chile, Juan Ignacio Molina. A Jesuit priest with deep curiosity for the natural world, he did not record his observations until after he and the entirety of the Jesuit order were forced to evacuate the Americas as of 1767.

Writing from Bologna, where he fled upon expulsion, he began to chronicle his observations into a compendium of biological evolution for the region (Molina, 1810, p.289-292). His comments on llamas are worth considering at length because of the ways they present an intimate and internal look from Chile. Notably, he described a separate Chilean version of a camelid, one he called the Chili-hueque, which had previously served Chileans in the mountains, but which had by then been replaced by the mule. He identified this animal as residing between 36 and 40 degrees latitude South, and described the ways ancient Chileans had shaped the physiology of the animal – namely, lengthening the ears – by pulling cords through the ears. Molina described the solemn sacrifice of the animals on special occasions and the ways the wool was shorn and used to produce clothing prior to the arrival of sheep. Certainly, Molina’s layers of memories have a palimpsestic leaning and yet they celebrate and signify the loss of the attributes and activities noted in archeological and genetic studies. He notes that the threads of the Chili-hueque fiber prior to the arrival of sheep were so fine that it seemed as if they were made of silk.

Molina also writes from a worldly and well-connected position. Knowledgeable as he must have been about the emerging debates over classification, he makes a point to compare the llama and kin to their Eurasian peers, remarking: “American camels’ like those in Africa and Asia, have a natural sweetness are apt for education and willing to carry cargo, slowly but firm and secure along steep roads of mountains” (Molina, 1810, p.291). Their differences are also notable, as he observes that the characteristics which separate them from “the true camel”, such as their ability to live in snow and ice, to store ample fat under their skin, and to circulate more blood through their veins, makes them suited to the Andes. Their legs – longer than necessary to hold their bodies – and their short tails and long hair ideal for shearing similarly made them suitable companions for their Andean environments (p.291).

## **Modern llamas**

Charisma and companionship must be added to Molina’s list of sympathetic characteristics of the llama. While important continuities exist across the centuries, a truly modern shift happened when llamas and alpacas moved, as one promoter put it, “from a zoo curiosity to a multi-million-dollar industry” (Ebel, 1989, p.1). According to Ebel, although that industry did not launch until the 1980s, llamas moved out of the “zoo curiosity” category in the decades before that.

In terms of the importing of animals, the legality was often in question. Although entrepreneurs such as Charles Ledger imported more than 250 alpacas to Australia by 1850, the Peruvian government did not give official permission for the export of llamas and alpacas until 1993 (Ebel, 1989, p.3). Nevertheless, anecdotes of gifted animals abound. P.T. Barnum’s catalog of animals contained the llama by 1879, and his circus often boasted the animals as well. William Jennings Bryan, presidential candidate and US Secretary of the Interior, was sent a gift llama by the mayor of Buenos Aires in 1914 (Llama..., 16 Mar. 1914). The animal languished in customs and was ultimately slaughtered for fear of disease. Publishing powerhouse William Randolph Hearst’s California estate, San Simeon,

was one of first to have a herd of twelve animals, but the growth of the herd was cut off in the 1930s due to similar concerns over foot-and-mouth disease.

While gifted and individual llamas existed among wealthy and well-connected individuals, one likely origin of the camelid “industry” in the United States lies with Arabian horse breeders Dick and Kay Patterson, who began to breed guanacos in 1958. After moving their ranch to Sisters, Oregon, and switching from guanacos to llamas, they grew their herd to more than 500 animals by the 1970s.<sup>3</sup> A boom in price occurred and females that had sold for \$1,000 in 1975 were selling for ten or twenty times that by 1989. Several factors account for this boom, although no economic calculation can fully account for the rapid growth and decline of llama and alpaca breeding in the United States. One expert argues that the llama was a pet foremost, and its companionship is unrivalled. The animal’s “intelligence, personality, and elegant carriage make them appealing” and their hardiness and low-maintenance make them attractive as an “exotic pet” (Ebel, 1989, p.7). As the population increased and luxury investors and part-time owners bought and bred more animals, a suite of activities and events developed. Performance competitions, halter events, and specialty activities – cart-driving and llama-packing – came to serve a spectrum of well-to-do people who saw the animals as a hobby and a business. Most new llama owners came from urban environments had little to no livestock experience. A shifting set of tax subsidies encouraged investment in these animals, but even combining these with their personality, utility, and companionship hardly explains how the population ballooned to nearly 145,000 by 2002 (McCausland, 14 Apr. 2019). Llama ownership has declined over the last decades, only to be replaced by plastic, wooden, and foam toys. Pretend llamas have come to replace living ones at a time when our distance from other living things is greater than ever. The effects of this boom and their role in supporting the expansion of popularity in the non-living toy llamas and characters in children’s books today has yet to be fully understood.

During the peak of llama production in the United States in the 1980s and 1990s, the *International Camelid Journal: Llamas* produced a bi-monthly magazine circulated to its membership. In October 1985, the journal featured a somewhat contradictory story: a trip by “American Llameros” to Peru to see the home of llama domestication (Peto, 1985). Several passages from the article highlight, through the traveler’s gaze, widespread amazement at the animals despite the landscape of difference among the llama cultivators. The author, Guy Peto, who, according to a full-page advertisement elsewhere in the magazine, owned a herd of breeding llamas in El Dorado, California, chronicled the seven-day trek embarked on by himself and his companions, hosted by a group of Peruvian cooks and packers. Peto observes the weather, the altitude, the coca leaf and pisco breaks, and the small stone corrals even in steep and narrow canyons. He prides himself on the Quechua words he masters (despite his lack of functional Spanish), and also observes with fierce amazement the existence of llamas at even the highest altitudes, noting, for example, the existence of llama dung at 16,300 feet. Peto and his companions witnessed a baby llama’s birth on the trail and prided themselves on a dinner of mutton roasted over a llama-dung fire. The contradictions and biopolitical entanglements of this episode illuminate phenomena grounded in life-processes and also endowed with social and political decisions. This

“Peruvian Adventure” demonstrates the contradictions and ways that the US fascination with llamas misread, misunderstood, and simultaneously celebrated the heritage of their counterparts to the south.

Despite the reproduction of these earth-beings, some of whom were witnessed as curiosities, it is worth noting the persistence of particular attributes of llama-related culture. Toy manufacturers are not the first to have dressed llamas in colorful adornments: it is a widespread tradition throughout the Andes in Guaman Poma and in the descriptions of cords through the ears of Chilean animals. In the Ayacucho region of Peru, llamas are thought to belong to the *wamani*, or mountain spirit, not the private property of their herders (Flannery, Marcus, Reynolds, 1989, p.30). Rather than ecological life zones as defined by western scientists, Andean peoples associate relevant animals with supernatural beings (*wamani*) that reside within landscapes. Because human relations with the *wamani* must be renewed regularly, llamas serve as an essential conduit for the kinship relations among humans and the mountain spirits. A powerful network of obligations, part of the process of renewal includes dressing the animals like humans or dressing humans like llamas. Llamas might be “married” on a wedding bed, given alcoholic beverages, or purified with a powder symbolizing snow.

Such ceremonies have obvious cultural significance, but their biological implications are less clear. Llama hair does not retain the color, nor is there evidence of llamas developing a taste for booze. Despite the fleeting impact of these rituals, animals that are receptive, or even just less aggressive, during such ceremonies stick around to reproduce longer, creating future generations with easy-going temperaments.

While the “modern,” or Western llama is surprisingly plastic and deconstructed (for antibodies, toys etc.), the pre-modern llama was holistically imbued with spiritual elements. Yet the dyad is incomplete. Llamas are now part of a diaspora: a distinct population forcibly dispersed to new places. Thinking in terms of a diaspora can shift categories of animals from domesticated, threatened, endangered, or exotic species towards the everyday and cumulative experiences of animals and the people who retain cultural knowledge about them (Wakild, in press).

## Final considerations

All camelids, including Wally, one of the llamas used to research antibodies for therapies effective against covid-19, generate single protein chains or nanobodies that bind tightly to viruses to combat them. Researchers around the world, including in Belgium, at the University of Bonn in Germany, the University of Chicago, the University of Pittsburgh, and the University of Texas, Austin, all in the United States, have used advanced technologies to analyze and understand these infinitesimal pieces of the llama to apply them against viruses, from influenza to HIV, and now coronaviruses. For example, Wally’s researchers use an advanced photon source, an ultra-bright, high-energy set of X-ray beams and diffraction devices used for research across disciplines. The pairing of the ancient genetic quirks of llamas with “cryo-electron microscopy” (Salles, 9 Mar. 2021) provides insight into the materials that make up our world. But deeper still than using animals and high-

powered technology to produce knowledge is the intent to use the insights to deal with the emergence of diseases from animals. Llamas' unique nanobodies provide potential cures for the zoonotic outbreaks that signal a ruptured set of relationships with human and nonhuman animals, fractured by inequality, exploitation, and colonialism (Lunstrum, 2021). In other words, Wally provides a face for the series of multispecies encounters that shape the modern world.

Scholars like Marisol de la Cadena have demonstrated that within an Andean worldview, a place is not strictly where someone is from; it is who they are. Similarly, if we consider the llama in this view, a llama is never just an animal, it is a being endowed with place, and that place is the Andes mountains, despite the residence of llamas around the world for multiple generations and centuries. A place is a dynamic space where a whole range of beings interact: humans, plants, animals, rivers, mountains, and even the rain and snow. From this perspective, ignoring the llama's origin and culture means denying the totality of these beings. Such erasure limits the ability to embrace the complexity and sophisticated entanglements between humans and our kindred animals.

Animals, like human societies, are never static. The animal known to the Moche 2.500 years ago in coastal Peru is not the same animal that Patricia Marx (20 Oct. 2014) walked through the streets of New York City as a companion animal today. And yet, strains of interest persist, and specific – and genetic – categories maintain their integrity and salience. Those that deserve our interest are the ones that center this imbalance and embrace its complexity as a platform for a more connected and empathetic future.

## NOTES

<sup>1</sup> Biopolitics largely refers to the efforts to put life in order, drawing upon particular mechanisms of power, or biopower. The right to decide life and death, in Foucault's formulation, is transformed in the development of subjectification and supervision into biological processes. Bioethics more explicitly takes up the use of nonhuman life in scientific research, including links between human values and policy.

<sup>2</sup> Over the past 30 years, Wheeler has pioneered research into camelid ancestry and has significantly resolved questions of lineage and species relationships. Her work is prolific and spans applied and academic approaches.

<sup>3</sup> In addition to Ebel's overview, sources for this emergence include Llama Association minutes and award celebrations (Central Oregon, International Llama Registry, Iowa) and the Patterson Llama Stud books.

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