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Chapter I

Advances in the Archaeology of Andean Pastoralism

Nicholas Tripcevich and José M. Capriles



The landscape of the highland Andes provides an enduring record of the practices of generations of camelid pastoralists. This record can inform anthropological studies of ancient and modern herders. Mobile herds allowed many puna communities to prosper as their flocks took advantage of the expansive grasslands, generated valuable secondary products, and provided caravan animals for linking dispersed communities, exchanging goods, and sharing information. The cyclic movement of herds and caravans also influenced ethnic borders and crossings as well as the configuration of political structures. The chapters in this volume survey recent research on Andean camelid pastoralism, provide a theoretical framework for further studies, and explore future lines of research. They consider a diverse array of topics, including camelid domestication and the development of specialized forms of animal husbandry, animal sacrifice, and social interaction through llama caravans. More importantly, these works emphasize that identification of the long-term trajectories of Andean pastoralism can make a substantial contribution to the comparative understanding of herding societies around the world.

In this chapter we provide an overview of the archaeological study of pastoralism with an emphasis on camelid herding in the Andes and then consider themes explored in the other chapters of this volume. The book comprises a collection of archaeological studies of Andean pastoralism that examine the topic of pastoralist societies from numerous angles and using different lines of evidence. Emerging from a multi-session event (20 talks) presented

in November 2012 during the 111th Annual Meeting of the American Anthropological Association in San Francisco, this work aims to build on and contribute to the literature on the anthropological study of Andean pastoralism (Bonavia 2008; Browman 1974; Flannery et al. 1989; Flores Ochoa 1979; Kuznar 2001; Mengoni Goñalons and Yacobaccio 2006; Núñez and Dillehay 1995; Núñez and Nielsen 2011; Wheeler 1995).

PASTORALISM AND HERDING SOCIETIES

The origin, spread, and evolution of pastoralist societies is a fundamental anthropological inquiry that is directly related to understanding cultural change, human-environment interactions, social complexity, and ecological adaptations. Pastoralism is a general form of economic subsistence that is fundamentally (but not exclusively) based on the management, production, and consumption of herding animals (see Barfield 1993; Capriles 2014; Chang and Koster 1986; Cribb 1991; Dyson-Hudson and Dyson-Hudson 1980; Ingold 1980; Khazanov 1994; Marshall and Capriles 2014; Wendrich and Barnard 2008). In addition, pastoralism can be conceived of as an environmental adaptation and risk management strategy that upholds the productivity and safety of the herding animals as commensurate with the stability and security of the human community. Therefore, pastoralism is more than an economic activity and involves ecological, social, political, and ideological elements. Often complemented

by cultivation, exchange, and sometimes hunting and gathering, the primary activity of pastoralist societies is raising and managing their herds.

Herds or herding animals are domesticated animal species that can be kept in large groups, generally have medium-to-large body sizes (over 20 kg), usually have a dominance hierarchy, and are managed by their human herders to produce direct, indirect, primary, and secondary products (Marshall and Capriles 2014). Sheep, goats, and cattle are good examples of domesticated herding animals, as are yaks, horses, donkeys, and dromedary and Bactrian camels. In the Andes the domesticated camelids, llamas and alpacas, were the center of herding societies, but since the Spanish conquest, Andean herders have adopted a number of Old World domesticates such as sheep, cattle, and donkeys. Pastoralist societies often employ diverse types of herding animals, including various species, numbers of animals, sizes, ages, and sexes. Herd size can vary from a few animals to several thousand. The composition of a herd in terms of species, breed, age, and sex is often conditioned by factors such as wealth, seasonality, idiosyncratic preferences, and access to pastures, human labor, and markets.

Pastoralists are the beneficiaries of animal products and services that result from the feeding herds transforming cellulose, which is indigestible by humans, into energy. The resulting products consumed by humans include meat, fat, marrow, blood, and milk. Herds also provide secondary products and services that include milk by-products, transportation and draft, dung for fuel and fertilizer, fiber, hides, and raw material from bones and horns (Chang and Koster 1986; Sherratt 1983). The primary responsibility of the herders is to protect the herd from predators, pests, and rustlers, and to ensure the animals have adequate access to grazing land and water (Dyson-Hudson and Dyson-Hudson 1980; Flannery et al. 1989). Access to feeding grounds is generally achieved through landscape management and cycles of mobility of varying length depending on several factors such as seasonality, climate, and local flora as well as the enforcement of some form of property rights to pastures (Frachetti 2008, 2012; Fratkin 1997; Khazanov 1994; Salzman 2004).

DOMESTICATION OF CAMELID HERDS

The earliest evidence of a pastoral lifeway in the Andes spans a long period between the early and late Holocene

(ca. 8000–3000 BCE). Traditional interpretations suggested that hunter-gatherers who specialized in hunting wild camelids eventually adopted camelid pastoralism during this time (Bonavia 2008; Kent 1987; Tomka 1992; Wheeler et al. 1976; Wing 1978). The first archaeologically derived models for explaining camelid domestication developed from investigations in caves and rock shelters in the Peruvian central highlands (Moore 1989; Rick and Moore 1999; Wheeler 1984, 1985). At the same time, these studies also addressed the methodological problems associated with identifying correlates for domestication in the archaeological record, such as interspecific osteological differentiation.

Based on the integration of a large dataset of faunal identifications from a wide array of archaeological sites, Wing (1978, 1986) proposed a synthetic model for the domestication of camelids. This model proposed that hunting of wild camelids occurred mostly in the puna and in some highland valleys of the central Andes between 10,000 and 5500 BCE, followed by intensive use and the beginnings of camelid breeding control in the puna between 5500 and 2500 BCE. Subsequent camelid pastoralism was inferred by a pattern of continuous camelid use in the puna, their increased use in highland valleys, and their introduction to the coast and eastern and northern Andes (probably due to increased exchange networks) between 2500 and 1750 BCE. Continued herding intensification occurred during the remaining prehispanic period including the development of specialized and improved wool-producing breeds by 500 CE.

In a recent synthesis Mengoni Goñalons and Yacobaccio (2006) provide rich new data produced by a number of long-term research projects carried out in southern Peru, northern Chile, and northwestern Argentina that suggest multiple processes of domestication could have occurred around the same time in regions beyond the Peruvian central highlands (see also Aldenderfer 2006; Cartajena et al. 2007; Mengoni Goñalons 2008).

Molecular research has clarified the phylogenetic relationships among the extant four species (Kadwell et al. 2001; Wheeler et al. 2006). The purported ancestor of the llama (*Lama glama* Linnaeus, 1758) is the sierra guanaco (*Lama guanicoe cacsilensis* Lönnberg, 1913) whereas the purported ancestor of the alpaca (*Vicugna pacos* Linnaeus, 1758) is the northern vicuña (*Vicugna vicugna mensalis* Thomas, 1917), although hybridization among all species is substantial. Furthermore, recent genetic work has identified early divergences within the guanaco

clade supporting the existence of more than one domestication center for the llama as hypothesized by archaeological research (Barreta et al. 2013).

PASTORALISTS AND SOCIAL LIFE

The structure of pastoral production results in recurring political institutions among most pastoralist societies. Competition for rich pastures is linked to pressure to minimize risk by increasing herd size above a threshold; this leads to the appearance of at least one level of political organization (which is traditionally kin-based) for enforcing communal rights to feeding territories and individual (or household) property rights to animal herds and individual animals. Because grazing territory is essential for the reproduction and growth of a herd, disputes among herders are common historically and violence and warfare have been associated with pastoralist societies (e.g., Arkush 2011; Evans-Pritchard 1940). Generally, disputes occur more often among members of the same herding group than they occur between pastoralist groups and groups that practice other types of subsistence economy (Dyson-Hudson and Dyson-Hudson 1980).

Herding animals can be accumulated and they constantly reproduce. They can therefore be used as a measure of exchange, but also as an investment, a symbol of wealth, and a source of incipient capital accumulation. Ownership of herding animals can be transferred horizontally or vertically through gift giving, exchange, and inheritance but also through raiding and rustling. In this sense pastoralism can potentially trigger (or enhance) broader processes of sociopolitical complexity, separately and independently of agricultural societies. In some cases the social investment in herds is connected to ritual and symbolic adoration of the animals, as seen, for example, in the cattle songs, myths, and deities described by Evans-Pritchard (1940) in East Africa.

A consideration of the social dimensions of herding necessarily involves attention to social obligations of the herder to the herd and to the larger community of pastoralists that share access to pasture (Fratkin 1997). The juxtaposition of providing for the family herd animals, frequently a private resource, with managing pasture that falls within community-held lands (the commons) is often negotiated through ritual practices that affirm the broader social contract.

THE HUMAN ECOLOGY OF PASTORALISM

Pastoralism allows human groups to exploit ecological niches such as arid and semiarid grassland environments limited by factors that include poor soils, low water availability, and low or unpredictable rainfall cycles (Marshall et al. 2011). Pastoralism provides an efficient strategy for reducing risk when residing in extensive grasslands and scrublands where intensive and extensive cultivation is either not feasible, less reliable, or would require substantial labor investment. Risk is managed because it allows people to cope with environmental variability by relying on mobile living animals as opposed to spatially bounded annual harvests (Browman 1987, 1997). The risk managing aspect of pastoralism is central to understanding the human occupation of agriculturally marginal regions such as deserts and steppes in antiquity, and it has contemporary relevance with increased aridity and unpredictability resulting from climate change.

Although pastoralists are often viewed as transitory occupants of a given territory, they are also actively involved in transforming and engineering their surrounding landscape. An obvious impact of herders and their herds is the temporary depletion of plant species that are grazed, browsed, and trampled. The spatial and temporal scale of the impact can vary substantially depending on the herding species, density and intensity, and a combination of other ecological factors such as phenology, climate, and soil nutrients. Moreover, by depleting certain plant species, herding has variable impacts on different ecosystems, often determining specific vegetation-succession cycles. In fact, some scholars believe that the disturbance on local plant communities produced by herding promoted the domestication of certain plant species such as quinoa (Kuznar 1995).

In general, the largest infrastructural investments that herders make are to overnight base camps where animals are typically kept in corrals for protection and where butchering and shearing usually occur (Nielsen 2000). Through time, the accumulation of dung in corrals and other features can potentially produce nutrient enhancement because of the soil's enrichment with phosphates, nitrates, and other nutrients (Korstanje 2005). In addition, pastoralist societies can directly modify their landscape by investing in the creation of engineering works such as irrigation canals used to water pastures and broader areas for herding (e.g., Browman 2008; Lane 2009; Lane and Grant, this volume). Pastoralist societies are dynamic and

vary a great deal depending on location, environment, climate, species composition, and interaction with full-time farmers and urban centers, as well as social identity and religious ideology.

PASTORALIST ECONOMY AND MOBILITY

The extensive use of surrounding landscapes in search of feeding grounds and the associated interaction with neighboring groups is a distinctive attribute of the pastoralist lifeway. The variable rate at which herds move through different feeding areas can result in residential relocation movements at seasonal, yearly, decadal, and even longer cycles depending on a combination of environmental and social factors (Cribb 1991:18–20). Typologies have been developed based primarily on herder residential mobility; however, more recent conceptualizations involve a combination of elements of mobile societies such as moment (length of movement), motion (pattern of the movement), motivation (reason for movement), and segment (social groups involved) (Wendrich and Barnard 2008:8–9). In many regions pastoralist communities will participate in a mixed economy by sharing or trading with non-herding groups. This distinction between herding and non-herding can lie within families who may have differential access to arable land and animals, within communities that have agricultural and pastoral sectors, or within larger socioeconomic units that interact to complement different economic resources.

The broad and continuous use of the surrounding landscape promotes social interaction between pastoralists and other socioeconomic groups. The interaction may develop into institutions governing transactions between communities that persist in some form over long time periods. Interaction between herders and farmers involves a long-standing—though sometimes fraught—complementarity that may lie between or within communities (Khazanov 1994; Parsons et al. 2000). In mountainous regions of the world this interaction is commonly encountered between lower-elevation farming groups and grazing communities higher up, with herders typically providing the transportation labor (Guillet 1992). Institutions develop around these relationships that may be centuries or millennia in age and become associated with distinctive cultural traditions, such as colonial outposts in other ecological zones, as has been documented in studies of Andean vertical complementarity (Murra 2002; Van Buren 1993).

CONTRIBUTIONS TO THIS VOLUME

The 14 chapters in this volume cover a wide array of topics including pastoralist landscapes, ritual, human-animal relationships, intensification and environmental change, and climate and resilience (Figure 1.1). Included chapters range from field locations in highland and Sierra mid-altitudes to two archaeological contexts on the Peruvian coast, span the region from southern Bolivia to northern Peru, and comprise the complete temporal range of human presence in the Andes.

Lawrence Kuznar explores the effects of pastoralists on social stability with the goal of developing a generalizable model. The cultural and psychological differences between farmers and herders, for example, have commonalities all over the world. And yet biases in the published record abound, as textual descriptions of “barbaric raiders” often have their origins in pejorative accounts recorded by settled folk (Bernbeck 2008). Kuznar examines the stabilizing or destabilizing role of caravan trade during the Spanish conquest, ultimately arguing that, among other things, caravans provided a stabilizing element.

Katherine Moore provides an overview of the domestication process in the Andes, beginning with a detailed consideration of the geography and behavior of wild camelids and hunting. She approaches the domestication process by looking at evidence coming from range extension, changes in body size, herd mortality, corrals, and the role of fiber. Moore draws insights about range territoriality and domestication from descriptions of wild camelid roundups and her 1981 observations of vicuñas establishing territory following reintroduction in the Junín puna. She foresees a better understanding of the complexities of camelid domestication events in multiple regions emerging from improved metrics as well as isotopic, micromorphological, and genetic studies.

José Capriles provides insights into the Formative Period pastoral economy from the Wankarani cultural complex in Oruro (western Bolivia), focusing on the site of KCH56 and its faunal remains. Zooarchaeological evidence from excavations at this herding site show delayed culling. Three stages of culling emerge from studies of epiphyses and teeth: neonates, subadults (presumably males), and older animals. The evidence points to seasonal use of the site and an economy oriented toward secondary products from camelids.

To gain insight into camelid management, Maria Bruno and Christine Hastorf bring an archaeobotanical

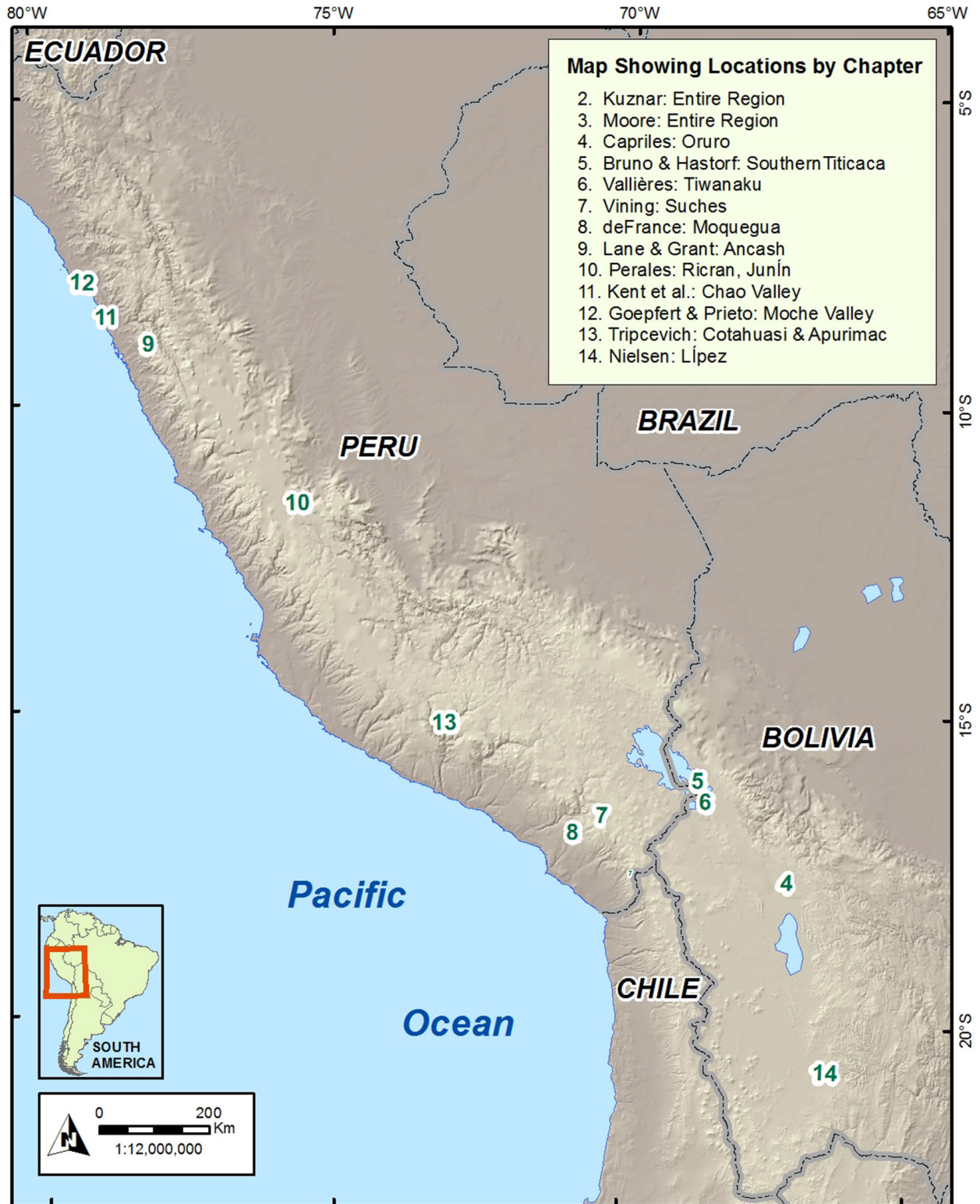


Figure 1.1. Map showing the geographic focus of each chapter. Courtesy Nicholas Tripcevich.

perspective to the study of animal dung used as fuel in the southern Lake Titicaca basin. Seeds identified in samples from hearths dating to Formative Period contexts are linked to vegetation in the surrounding Tiwanaku Valley and the Taraco Peninsula, where the camelids are assumed to have fed. The seeds identified largely confirm expectations about plants in the areas surrounding the sites, although intriguingly the researchers found that Tiwanaku camelids had access to plants from the wet zones to a greater degree than did those on the Taraco Peninsula.

Synthesizing many lines of evidence, Claudine Vallières considers the question of how people in the Tiwanaku urban center, estimated at up to 20,000 people, were provisioned with meat. Following a review of the issues surrounding Tiwanaku population size and food supply, she presents her zooarchaeological evidence of a variable mortality profile from Mollo Kontu domestic contexts and finds many camelids were probably acquired “on the hoof” and processed by the consumer. Vallières concludes that Mollo Kontu residents managed their own camelid herds that were at times pastured at *gochas* within the city proper. A review of osteological evidence for camelid offerings in ritual and public spaces is followed by an exploration of the structure of regional caravans during Tiwanaku. She reviews the production and exchange of secondary products—dung, fiber, and bone tools—and concludes with ideas for future research.

Benjamin Vining examines a shift in the settlement pattern in the Lake Suches basin (southern Peru) from Formative Period small villages to dispersed hamlets in the Middle Horizon, with temporal affiliation based on pottery styles. During the Middle Horizon the dispersed hamlets were found to be located in areas spatially associated with modern *bofedales* using vegetative indices derived from multispectral satellite imagery. Careful management of bofedal grazing areas permitted intensification of fiber production that is interpreted as belonging to a larger effort to commoditize animal wealth in this period. Vining suggests that this fissioning of villages into dispersed hamlets involved indirect costs to the social cohesion and continuity of highland communities.

Susan deFrance offers a sweeping view of historical ecology and camelid use in the Osmore drainage in Moquegua (southern Peru). The Osmore River is an excellent place for the study of human-camelid interaction over the long term given the exceptional preservation and sustained human occupation. Moreover, during the

last 25 years Moquegua has been the subject of many archaeological studies that largely complement one another. DeFrance’s summary points to the resilience of pastoralism in the face of major social and environmental changes in the region.

Kevin Lane and Jennifer Grant consider evidence of herders expanding the range of pastoral production into lower elevations during the Late Intermediate Period in Ancash (north-central Peru). Evidence of the use of silt dams and other hydraulic controls to improve grazing in the 3,600–3,900 m above sea level band substantially increased the area of available land for pasture by extending it down to the broad highland flanks where vegetative growth is more rapid and largely constrained by water availability. The authors take a political ecology approach and examine these data in light of the modern decline and marginalization of camelid pastoralism. They note that ecological limits are not rigid and moving the herding zone into an area that is potentially agriculturally productive demonstrates the vibrancy of the herding economy at this time.

Manuel Perales’s chapter looks at shifts in settlement patterns with the Inka conquest of the upper Ricrán in Junín (central Peru) with a focus on corrals and mortuary features. He describes large corrals attached to distinctive rectangular structures made up of approximately 20 cells that he identifies as ceremonial constructions and interprets as representing a new form of ritual performance and legitimization of power appearing in the Late Horizon. Large pastoral settlements in the Late Intermediate Period are replaced with an economic emphasis on agriculture during the Inka occupation of the area. This shift, together with a movement away from defensible locations and toward a clustered pattern, may reflect the increased power of particular lineages of local elites endorsed by the Inka.

Two chapters in this volume explore the sacrifice of humans and camelids on the north coast of Peru. Jonathan Kent, Teresa Rosales, Víctor Vásquez, Catherine Gaither, and Jonathan Bethard present findings from an excavation at Santa Rita B in the Chao valley (on the northern coast of Peru) where two episodes of sacrifice are described. In the Chimu transitional episode two human individuals were placed above a floor. In an earlier episode, found below the floor, seven camelids were aligned in a ceremonial arrangement in a Late Moche context. The authors then examine the sequence and transformation of ritual, starting with camelid and then human sacrifice documented in this location in light of

other transformations in ritual, economy, and socio-political organization in the area.

The second chapter discussing an excavation containing human and llama sacrifices on the north coast of Peru is by Nicolas Goepfert and Gabriel Prieto. They describe findings at Gramalote A–Huanchaquito, a Chimu site adjacent to Chan Chan. The settlement is a ceremonial space within a dune near the sea, and it contained a large number of remains of both young humans and young llamas that were sacrificed by removal of the heart and deposited at the edge of a sandy slope. While analysis is still underway, the finds are interpreted as llamas raised locally for ceremonial purposes. Temporal association with other Chimu sacrificial sites raises the question of whether the motivation behind these offerings can be linked to particular maritime events, such as El Niño–Southern Oscillation (ENSO).

The two final original chapters present studies among modern communities that continue the Andean tradition of using llama caravans to transport salt from the highlands to distant and lower-elevation communities. Nicholas Tripcevich provides an account of a 2007 journey from the Cotahuasi area in southern Peru to a valley 100 km to the north, near Antabamba, Apurímac. The chapter opens with an overview of caravan mobility and an introduction to the geography and to the Quechua-speaking herder community near the Huarhua salt source. The account of field research begins with a visit to the salt mine and the ritual activities prior to the caravan departure. The overall focus of this contribution is on features of movement such as trail widths and travel speeds, as well as the social and family ties that underlie many of the persistent exchange routes.

Axel Nielsen provides a chapter on ritual practices in a community of Bolivian llama herders and the role of ritual in negotiating the tension between caring for family herds and accessing pastures belonging to the commons. Nielsen presents three ritual events: earmarking, sacrifice to the mountain spirits, and the principal annual ritual associated with llama caravan trips. Focusing on these events, Nielsen interprets how the *llameros* fulfill their part of a social contract between herders with their herds and, more broadly conceived, with the agents in the ritual landscape such as place-spirits that inhabit mountains.

David Browman wraps up the volume by providing a general overview of the chapters, making suggestions for advancing these studies, and developing future lines of inquiry.

UNIFYING THEMES

Pastoralist landscapes represent one of the major themes discussed in the volume. Moore's contribution demonstrates the importance of highland wetlands (bofedales) and the constraints these present to camelid behavior and social organization with respect to climate change and seasonality. Vining addresses these constraints in relation to human settlement and carrying capacity. Other chapters consider the expansion of pastures through intentionally built silt dams (Lane and Grant) and irrigation networks (Kent and colleagues). Several chapters address the issue of historical-versus-prehispanic camelid distributions in lower-elevation areas, as well as the resilience of herding in light of past and present environmental change (deFrance, Goepfert and Prieto).

Intensification of camelid herding emerges as an important topic in this volume as many report an apex in camelid production during the Late Intermediate Period, and then a renewed focus on agriculture with a continuation of substantial herd sizes during the Inka period. The potential for intensification in pastoral systems is discussed by Vining, by Perales, by deFrance, and by Capriles. Kuznar places intensification, risk, and the nature of pastoral–agriculturalist relations in a global context. In the southern Titicaca basin, Bruno and Hastorf report that camelids had access to aquatic vegetation in certain contexts, and Vallières proposes that the qochas within the urban core of the Tiwanaku state during its height could have sustained enough animals to feed a city.

A recurring theme is the intertwining of human and animal relations in economy and ritual. In the story of camelid domestication (Moore) a mutually beneficial relationship between humans and camelids emerges. An alliance is implied in human–animal relations in practices such as the *tinku* prior to a caravan journey, where llamas are made to consume chicha (Tripcevich), and the *k'illpa* domestic ceremony honoring llamas (Nielsen). The presence of camelid sacrifices with human sacrifices affirms this connection (Goepfert and Prieto, Kent and colleagues) and camelid offerings are present in ceremonialism (Vallières). A rich theoretical study of the social contract between humans, animals, and the animated landscape (Nielsen) involves properly contextualizing the actions and obligations of the herders in the Andean setting where these occur.

The human and camelid ties are deeply social as well. Andean herding communities are responsible for creating and maintaining camelid breeds and the distinct and

complementary nature of llama and alpaca morphology despite their interfertility. Camelid labor must be credited for enabling human sociality to thrive in the puna by minimizing the cost of distance with caravans, enabling shared cultural community over the broad expanses, and supporting relatively large settlements and cultural formations. Furthermore, camelids generated considerable wealth for Andean communities through the production of fiber, dung, and other secondary camelid products.

CONCLUSIONS

The contributions in this volume touch on major aspects of the archaeological study of Andean pastoralism. This collection of chapters represents a mixture of new studies and critical surveys of existing literature. Most of these chapters discuss the nature and limits of their data sets such as geographical scope, the dangers of reliance on contemporary patterns, and the recently diminished status of herding. Broad topics include the domestication of South American camelids, changes in economic practices, development of pastoralist economies focused on animals, and affinity for camelids by Andean people expressed ceremonially. Together they articulate a major theme regarding the evolving relationship between humans, animal herds, and the Andean landscape. We hope this collection will encourage a new generation of studies that explore novel pathways for advancing the archaeology of Andean pastoralism.

REFERENCES CITED

- Aldenderfer, Mark S.
2006 Costly Signaling, the Sexual Division of Labor, and Animal Domestication in the Andean Highlands. In *Behavioral Ecology and the Transition to Agriculture*, edited by Douglas J. Kennett and Bruce Winterhalder, pp. 167–196. University of California Press, Berkeley.
- Arkush, Elizabeth N.
2011 *Hillforts of the Ancient Andes: Colla Warfare, Society, and Landscape*. University Press of Florida, Gainesville.
- Barfield, Thomas J.
1993 *The Nomadic Alternative*. Prentice Hall, Englewood Cliffs, New Jersey.
- Barreta, J., B. Gutiérrez-Gil, V. Iñiguez, V. Saavedra, R. Chiri, E. Latorre, and J. J. Arranz
2013 Analysis of Mitochondrial DNA in Bolivian Llama, Alpaca and Vicuña Populations: A Contribution to the Phylogeny of the South American Camelids. *Animal Genetics* 44(2):158–168.
- Bernbeck, Reinhard
2008 An Archaeology of Multisited Communities. In *The Archaeology of Mobility: Old World and New World Nomadism*, edited by Hans Barnard and Willeke Wendrich, pp. 43–77. Cotsen Institute of Archaeology, University of California, Los Angeles.
- Bonavia, Duccio
2008 *South American Camelids*. Cotsen Institute of Archaeology, University of California, Los Angeles.
- Browman, David L.
1974 Pastoral Nomadism in the Andes. *Current Anthropology* 15(2):188–196.
1987 Agro-Pastoral Risk Management in the Central Andes. *Research in Economic Anthropology* 8:171–200.
1997 Pastoral Risk Perception and Risk Definition for Andean Herders. *Nomadic Peoples* 1(1):22–36.
2008 Pastoral Nomadism in the Central Andes: A Historic Retrospective Example. In *The Archaeology of Mobility: Old World and New World Nomadism*, edited by Hans Barnard and Willeke Wendrich, pp. 160–173. Cotsen Institute of Archaeology, University of California, Los Angeles.
- Capriles, José M.
2014 *The Economic Organization of Early Camelid Pastoralism in the Andean Highlands of Bolivia*. BAR International Series 2597. British Archaeological Reports, Archaeopress, Oxford.
- Cartajena, Isabel, Lautaro Núñez, and Martin Grosjean
2007 Camelid Domestication on the Western Slope of the Puna de Atacama, Northern Chile. *Anthropozoologica* 42(2):155–173.
- Chang, Claudia, and Harold A. Koster
1986 Beyond Bones: Toward an Archaeology of Pastoralism. In *Advances in Archaeology Method and Theory*, Vol. 9, edited by Michael B. Schiffer, pp. 97–148. Academic Press, New York.
- Cribb, Roger
1991 *Nomads in Archaeology*. Cambridge University Press, Cambridge.
- Dyson-Hudson, Rada, and Neville Dyson-Hudson
1980 Nomadic Pastoralism. *Annual Review of Anthropology* 9:15–61.
- Evans-Pritchard, E. E.
1940 *The Nuer: A Description of the Modes of Livelihood and Political Institutions of a Nilotic People*. Oxford University Press, Oxford.
- Flannery, Kent V., Joyce Marcus, and Robert G. Reynolds
1989 *The Flocks of the Wamani: A Study of Llama Herders on the Punas of Ayacucho, Peru*. Academic Press, San Diego, California.

- Flores Ochoa, Jorge
1979 [1968] *Pastoralists of the Andes. The Alpaca Herders of Paratia*. Translated by R. Bolton. Institute of the Study of Human Issues, Philadelphia, Pennsylvania.
- Frachetti, Michael D.
2008 *Pastoralist Landscapes and Social Interaction in Bronze Age Eurasia*. University of California Press, Berkeley.
2012 Multiregional Emergence of Mobile Pastoralism and Nonuniform Institutional Complexity across Eurasia. *Current Anthropology* 53(1):2–38.
- Fratkin, Elliot
1997 Pastoralism: Governance and Development Issues. *Annual Review of Anthropology* 26:235–261.
- Guillet, David W.
1992 *Covering Ground: Communal Water Management and the State in the Peruvian Highlands*. University of Michigan Press, Ann Arbor.
- Ingold, Tim
1980 *Hunters, Pastoralists, and Ranches: Reindeer Economies and their Transformations*. Cambridge University Press, Cambridge.
- Kadwell, Miranda, Matilde Fernández, Helen F. Stanley, Ricardo Baldi, Jane C. Wheeler, Raul Rosadio, and Michael W. Bruford
2001 Genetic Analysis Reveals the Wild Ancestors of the Llama and the Alpaca. *Proceedings of the Royal Society London B* 268(1485):2575–2584.
- Kent, Jonathan D.
1987 The Most Ancient South: A Review of the Domestication of Andean Camelids. In *Studies in the Neolithic and Urban Revolution. The V. Gordon Childe Colloquium in Mexico, 1986*, edited by Linda Manzanilla, pp. 169–184. BAR International Series 349, British Archaeological Reports, Oxford.
- Khazanov, Anatoly M.
1994 *Nomads and the Outside World*. Translated by Julia Crookenden. 2nd Ed. University of Wisconsin Press, Madison.
- Korstanje, Alejandra
2005 Microfossils in Camelid Dung: Taphonomic Considerations for the Archaeological Study of Agriculture and Pastoralism. In *Biosphere to Lithosphere: New Studies in Vertebrate Taphonomy*, edited by Terry O'Connor, pp. 69–77. Oxbow Books, Oxford.
- Kuznar, Lawrence A.
1995 *Awatimarka: The Ethnoarchaeology of an Andean Herding Community*. Harcourt Brace College Publishers, Fort Worth, Texas.
2001 Introduction to Andean Ethnoarchaeology. In *Ethnoarchaeology of Andean South America: Contributions to Archaeological Method and Theory*, edited by Lawrence A. Kuznar, pp. 1–18. International Monographs in Prehistory, Ann Arbor, Michigan.
- Lane, Kevin
2009 Engineered Highlands: The Social Organization of Water in the Ancient North-Central Andes (AD 1000–1480). *World Archaeology* 41(1):169–190.
- Marshall, Fiona, and José M. Capriles
2014 Animal Domestication and Pastoralism: Socio-environmental Contexts. In *Encyclopedia of Global Archaeology*, edited by Claire Smith, pp. 249–258. Springer, New York.
- Marshall, Fiona, Katherine Grillo, and Lee Arco
2011 Prehistoric Pastoralists and Social Responses to Climatic Risk in East Africa. In *Sustainable Lifeways: Cultural Persistence in an Ever-Changing Environment*, edited by Naomi F. Miller, Katherine M. Moore, and Kathleen Ryan, pp. 39–74. University of Pennsylvania Museum of Archaeology and Anthropology, Philadelphia.
- Mengoni Goñalons, Guillermo L.
2008 Camelids in Ancient Andean Societies: A Review of the Zooarchaeological Evidence. *Quaternary International* 185(1):59–68.
- Mengoni Goñalons, Guillermo L., and Hugo Yacobaccio
2006 The Domestication of South American Camelids: A View from the South-Central Andes. In *Documenting Domestication: New Genetic and Archaeological Paradigms*, edited by Melinda A. Zeder, Daniel G. Bradley, Eve Emshwiller, and Bruce D. Smith, pp. 228–244. University of California Press, Berkeley.
- Moore, Katherine M.
1989 *Hunting and the Origin of Herding in Peru*. PhD dissertation, Department of Anthropology, University of Michigan, Ann Arbor.
- Murra, John V.
2002 *El Mundo Andino: Población, Medio Ambiente y Economía*. Instituto de Estudios Peruanos, Pontificia Universidad Católica del Perú, Lima.
- Nielsen, Axel E.
2000 *Andean Caravans: An Ethnoarchaeology*. PhD dissertation, Department of Anthropology, University of Arizona, Tucson.
- Núñez, Lautaro, and Tom D. Dillehay
1995 *Movilidad Giratoria, Armonía Social y Desarrollo en los Andes Meridionales: Patrones de Tráfico e Interacción Económica (Ensayo)*. Universidad Católica del Norte, Antofagasta, Chile.
- Núñez, Lautaro, and Axel E. Nielsen
2011 Caminante, Sí Hay Camino: Reflexiones sobre el Tráfico Sur Andino. In *En Ruta: Arqueología, Historia y Etnografía del Tráfico Sur Andino*, edited by Lautaro Núñez and Axel E. Nielsen, pp. 11–41. Encuentro Grupo Editor, Córdoba, Argentina.
- Rick, John W., and Katherine M. Moore
1999 El Prececerámico de la Puna de Junín: El Punto de Vista desde Panalauca. *Boletín de Arqueología PUCP* 3:263–296.

- Salzman, Philip Carl
2004 *Pastoralists: Equality, Hierarchy, and the State*. Westview Press, Boulder, Colorado.
- Sherratt, Andrew
1983 The Secondary Exploitation of Animals in the Old World. *World Archaeology* 15(1):90–114.
- Tomka, Steve A.
1992 Vicuñas and Llamas: Parallels in Behavioral Ecology and Implications for the Domestication of Andean Camelids. *Human Ecology* 20(4):407–433.
- Van Buren, Mary
1993 *Community and Empire in Southern Peru: The Site of Torata Alta Under Spanish Rule*. PhD dissertation, Department of Anthropology, University of Arizona, Tucson.
- Wendrich, Willeke, and Hans Barnard
2008 The Archaeology of Mobility: Definitions and Research Approaches. In *The Archaeology of Mobility: Old World and New World Nomadism*, edited by Hans Barnard and Willeke Wendrich, pp. 1–21. Cotsen Institute of Archaeology, University of California, Los Angeles.
- Wheeler, Jane C.
1984 On the Origin and Early Development of Camelid Pastoralism in the Andes. In *Animals and Archaeology*, Vol. 3: *Early Herders and Their Flocks*, edited by Juliet Clutton-Brock and Caroline Grigson, pp. 395–410. BAR International Series 202. British Archaeological Reports, Oxford.
- 1985 De la Chasse d’Elevage. In *Telarmachay: Chasseurs et Pasteurs Préhistoriques des Andes*, Vol. I, edited by Daniëlle Lavallée, Michèle Julien, Jane Wheeler, and Claudine Karlin, pp. 61–79. Editions Recherche sur les Civilisations Synthèse 20, Paris.
- 1995 Evolution and Present Situation of the South American Camelidae. *Biological Journal of the Linnean Society* 54(3):271–295
- Wheeler, Jane C., Lounés Chikhi, and Michael W. Bruford
2006 Genetic Analysis of the Origins of Domestic South American Camelids. In *Documenting Domestication: New Genetic and Archaeological Paradigms*, edited by Melinda A. Zeder, Daniel G. Bradley, Eve Emshwiller, and Bruce D. Smith, pp. 329–341. University of California Press, Berkeley.
- Wheeler, Jane C., Eduardo Pires-Ferreira, and Peter Kaulicke
1976 Preceramic Animal Utilization in the Central Peruvian Andes. *Science* 194:483–490.
- Wing, Elizabeth S.
1978 Animal Domestication in the Andes. In *Advances in Andean Archaeology*, edited by David L. Browman, pp. 167–188. Mouton Press, The Hague.
- 1986 Domestication of Andean Mammals. In *High Altitude Tropical Biogeography*, edited by Francois Vuilleumier and Maximina Monasterio, pp. 246–264. American Museum of Natural History, Oxford University Press, Oxford.