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Chapter 13

The Ethnoarchaeology of a Cotahuasi Salt Caravan

EXPLORING ANDEAN PASTORALIST MOVEMENT

Nicholas Tripcevich



The prominent role of regional mobility and caravans among Andean communities over the past few millennia is evident in the broad distribution of stylistic traits, in the geochemical diffusion of certain artifacts like obsidian, and in the enduring traces of prehispanic road systems. The dynamic practices of caravans, however, are difficult to reconstruct from archaeological evidence. This chapter presents an ethnoarchaeological project with llama caravan drivers in southern Peru focusing on travel strategies in steep terrain, river crossings, load-fastening methods, route selection, and the role of ritual. Four Quechua-speaking herders and 28 llamas were accompanied by researchers during a 230 km journey from Cotahuasi to Apurimac. Salt was procured from the Huarhua salt mine and transported northward on trails over the puna to a farming valley, where the salt was sold or traded for agricultural goods, which were then transported back following a different route.

In the Andes long-distance relationships and regular interaction bind far-flung communities and distant valleys; archaeological and ethnohistorical evidence suggest that it has been so for millennia (Bonavia 2008; Browman 1977, 1990; Dillehay and Núñez 1988; Flannery et al. 1989; Flores Ochoa 1968; Núñez and Dillehay 1995). Scholars have discussed the role of cargo llamas and Andean caravans in linking distant communities economically and in a variety of social and ritual capacities, which have regional implications for the emergence of political

alliances and cultural affiliation in antiquity. Whereas the evidence of such long-distance relationships existing throughout the Andean past appears in archaeological contexts, the actual practices of mobility and cargo transport are largely ephemeral and difficult to document materially. This project joins a number of recent studies of contemporary llama salt caravans in Bolivia in an effort to examine this mode of transport and to better understand its role in the prehispanic Andes (Lecoq 1988; Nielsen 2001; West 1981a). In the current study, demand for halite or rock salt from the salt mine at Huarhua, near Cotahuasi (La Unión, Arequipa, Peru), continues to provide an impetus to llama caravan drivers (*caravaneros*) from throughout the region to visit the salt source to purchase or barter for salt, and then distribute it to communities days or weeks away from the source (Flores Ochoa and MacQuarrie 1994:125–127; Jennings et al. 2013).

In these studies salt serves as a limited modern analog for the movement of certain materials, such as obsidian, that were transported great distances in antiquity and are found in archaeological sites today. For example, artifacts made from Alca-type obsidian, the source of which is also located in the Cotahuasi area, have been identified by archaeologists at many dozens of sites (Burger and Glascock 2009; Burger et al. 1998), including among the collections from Marca Huamachuco (Burger et al. 2000:336) nearly 1000 km to the north. Although salt is a very different class of artifact from tool-quality obsidian,

and salt mines and salt flats are distributed more evenly in the Andes, the modern exploitation and distribution of highland salt sources nevertheless shares characteristics with the procurement of regionally important mineral resources in the past. The intake of small quantities of salt is biologically necessary for humans and for herd animals, so salt sources are inviting to traveling herders and traders as the material can then be traded for other goods in salt-deficient areas.

Quantities of goods are also transported up and down the flanks of the Andes in the pattern of vertical complementarity encountered in some form in many mountain regions with access to multiple ecological zones (Guillet 1983). In this pattern highland communities have surplus animal products including meat, textiles, rope, and leather that they may trade for portable agricultural products from lower elevations such as peppers, coca, or dried items like fruit, beans, and maize (Browman 1990; Casaverde Rojas 1977; Concha Contreras 1975; Love 1988). These exchanges, together with labor exchanges, are often initiated by herders who have abundant cargo animals to transport the goods. Thus demand for salt and these many other goods facilitates interaction and inspires the development of the mobile sector of a pastoralist economy. There are opportunities and challenges associated with studies of mid- and long-distance transportation, providing helpful analogies for understanding similar processes around other artifact types in the past.

CARGO TRANSPORT CHOICES: INCENTIVES AND ALTERNATIVES TO CAMELID TRANSPORT IN THE PAST AND PRESENT

Both human power and cargo llamas were used extensively in the prehispanic Andes. The Inka were known to have used cargo bearers in great numbers in their supply lines (Murra 1980:53), perhaps because people could be compelled through a wide variety of means such as force, social control, and ideology. The labor of horses, donkeys, and mules was widely adopted in the Andes in the ensuing colonial period, while camelids persisted in greater proportions in certain regions (Lecoq 1988).

Llamas typically carry smaller loads than horses and mules and cannot be pushed as hard, but they are trained to walk untethered in a caravan and can subsist on local wild feed. These are a few of the clear advantages of cargo llamas over postcontact alternatives from Old World domesticates. Axel Neilsen (2001:165) reports that herders in

Lípez, Bolivia, with access to both donkeys and llamas prefer the former on shorter trips as they believe donkeys can walk faster and longer on a given day carrying heavier burdens, while llamas are thought to hold up better on long journeys.

Llama packing has been adopted in other regions of the world and a comparison with techniques of foreign llama packers, in the North American Rocky Mountains for example, provides some insights into cultural practices of Andean caravaneros. The pronounced differences between pack llamas in the United States and the group we traveled with in Peru are in animal size and methods of control. Grown pack llamas in the United States range from 92 to 200 kg (Harmon and Rubin 1992:77), and packers estimate that llamas can carry 25 percent of their body weight (mule and horse packers also use 20–25 percent body weight as a safe weight limit). Thus a cargo weight of up to 50 kg is possible with these large foreign pack llamas that are usually led on a tether like a pack-horse. A related issue is long-distance stamina and longevity for the animals, as Andean herders may be deliberately not overtaxing their animals if the priority is on the llamas' well-being while subsisting on wild feed. Llama packing outside of the Andes is associated with recreational wilderness tours, and therefore llamas rarely walk more than two or three days consecutively with a load before outfitters establish a main camp for conducting day hikes.

Bonavia (2008:45) reports an average weight of 110 kg for Andean llamas while the Cotahuasi caravan llamas in the present study had an average estimated weight of only 92 kg and carried approximately 23 kg apiece, which is consistent with the 25 percent of body weight limit for cargo. For most of the year the Cotahuasi llamas live in the hills near their community in a mostly wild state, eating feed that is often unusable by the rest of the herd animals until they are called upon for caravan work, and therefore they cost next to nothing to maintain. Factors such as the large size potential exhibited by some foreign cargo llamas and numerous historical reports of large llamas being ridden even by adults (Bonavia 2008:424) suggest that prior to the introduction of Spanish horses and mules there was likely demand for large llamas that could carry hefty loads. Furthermore, affixing the loads each morning is laborious, and loading fewer, larger *costales* would save time. Thus the different animal transport decisions made by caravaneros of the past and present should be considered when making archaeological inferences from the range of options available to modern herders.

TABLE 13.1. DISTANCES TRAVELED PER DAY, WITH NOTES AND FEATURES SUCH AS PASSES, RIVERS, AND VILLAGES.

DATE (JULY 2007)	DISTANCE (KM)	NIGHT CAMP	COMMENTS ON THIS DAY
14	5.00	Lancarolla	Beginning Cotahuasi River bridge to Lancarolla camp
15	6.92	Huarhua	Climb to Huarhua town
16	1.29	Mine	Huarhua to salt mine (one way)
17	10.70	Chancara	Climb from Huarhua near Quebrada Cruzpata then onto the <i>puna</i> near Condorillo
20	19.30	Quilcata	Passed by Anillo obsidian source and near Cerro Quilcata
21	21.23	Jalcachi	Near Cerro Puyunco and west of Cerro Chancaña
22	21.98	Huanaqmarka Alta	Crossed Chanchhuaña and Escalera, above community that stopped us
23	24.56	Chuko Chuko	Puycuto, Huarhuacucho, under Cerro Pelloni and Qaicho and over three more saddles
24-25	16.69	Calcauso	Descent of Quebrada Sillajasa through Laymiña and Trapiche
26	7.15	Yanahuaraja	Along Río Mollebamba up Río Yanahuaraja past Chiclla
27	19.46	Aparuni	Steep climb past Coempanza, up Quebrada Malpaso, near Cerro Tarayoj and Cerro Yanasallahi
28	26.08	Chanchhuaña	Decend to cross R. Yanahuarajo, around west side of Cerro Pucaranra near Tayapampa and up to saddle
29	26.81	Yanajaja	Back through Jalcachi stay on Quebrada Huancapampa east of Cerro Chancaña through Huilachiri
30	14.94	Chancara	East of Cerro Rumipunta cross Río Larjo at Tastapi and near Cerro Pircatoma near Anillo obsidian
30	8.27	Pampamarca	Chancara to Pampamarca. Combi from Pampamarca Journey Complete

PROJECT GOALS AND METHODS

The present ethnoarchaeological study sought to document general characteristics of caravan practices with an emphasis on spatial dimensions of travel and the negotiation of impediments along the way. Ethnoarchaeological research involves decisions regarding the realism, modeling goals, and the role of analogy in the study (David and Kramer 2001). A principal challenge lies in the vast changes in transportation technologies and navigation practices, and the role of markets in ascribing value to different goods, all of which have of course been radically transformed over time. Yet remnant trails connect most archaeological zones in the Andean highlands, inviting speculation about the transport practices that leave little mark of their passing and are hard to document directly through archaeology.

Our interest was in documenting multi-day travel involving a journey of at least four nights when routines get established and we may observe the adjustments in schedule occasioned by fatigue, foot sores, and other features of longer trips. A journey lasting more than one

week would provide a better analog to long-distance caravans in the past. Previous studies have noted that the few hours that llamas are allowed to graze in the afternoon after traveling results in a deficit after a few days and caravans exceeding four to five days in length will schedule rests lasting one or two layover days (Lecoq 1988; Nielsen 1997:352–355; 2000:24; West 1981a). During prolonged rest stops the animals feed and recuperate, and the caravaneros do maintenance work on panniers, spin wool, and interact with neighboring communities. Our two-week journey (Table 13.1) involved a variety of trail types, creek fords, steep climbs, and descents, and variety in the use of brief stops and overnight camps.

Recent improvements in geospatial technology, such as Global Positioning Systems (GPS) and Geographical Information Science (GIS) software dedicated to the analysis of detailed spatial data have much to offer ethnographic studies (Cromley 2013). The instruments linked to geographical location in this project included the iTrek Z1 data logger attached to Cantu, our focal llama for the study, a Trimble GPS unit running Arcpad mobile GIS for

making observations along the trail, and a human heart-rate monitor GPS. In addition, photographs, a voice recorder, video, and an equine heart-rate monitor worn by Cantu were linked indirectly to GPS location by synchronizing clocks. These instruments contributed to project goals by providing GPS coordinates and time stamps for exploring the resulting data and media using spatial software, and the GPS track served to measure travel speed for evaluating existing travel speed estimates used by archaeologists that are based primarily on distance and topographic variables such as slope (Tripcevich 2008).

THE CARAVANEROS OF CHANCARA AND LAKSA AND THE ETHNOGRAPHIC TEAM

As in much of the Andes, altitude and local conditions structure productive activities in the Cotahuasi valley in a vertically organized economy that reflects differences in plant growth and geomorphology (Concha Contreras 1975; Flores Ochoa 1985; Inamura 1981; Kariya et al. 2005). The mid-altitude valleys of Cotahuasi have agriculturally oriented economies at elevations around 2,600–3,000 m above sea level (asl), while the upper reaches and the rolling puna grasslands, situated at over approximately 3,600 m asl, are primarily devoted to herding (Figure 13.1). Our caravanero collaborators in this project came from two communities at 4,400 m asl in the highland area and, as is typical for the area, they manage mixed herds of llamas and alpacas as well as Old World domestics that include over 100 sheep as well as some cattle and a few horses and donkeys.

Saturnino Fidel Cruz Anco and Virginia Gonzalez Gutierrez live with their five children and two related nuclear families at Chancara (Figure 13.2), while Tadeo Anco Cahuana (a cousin of Fidel Cruz) and his children reside at the ranching settlement of Laksa 30 minutes away. Our caravan consisted of llamas from two herds. From Chancara came Fidel Cruz, his nephew Rómulo Cruz, and their 15 cargo llamas. From Laksa came Tadeo Anco and his son Raúl, and their 13 llamas that were on loan from Tadeo's father. Four investigators traveled with the caravan: ethnographer Félix Palacios Ríos (Universidad Nacional de San Agustín in Arequipa), Edison Mendoza Martinez (Huamanga, Ayacucho, and native interpreter of Southern Ayacucho dialect of Quechua), Nicholas Tripcevich (University of California, Berkeley), and Cheyla Samuelson (San José State University).

The Cruz and Anco families are constituents of the Pampamarca district in the Cotahuasi Valley (La Unión, Arequipa), where 63 percent of the population is classified as rural (INEI 2007). The district seat is the town of Pampamarca with a population of approximately 1,100 (Figure 13.1). Herders residing on the periphery of the expansive puna grassland zone have mutually beneficial relationships with the farmers residing in the valleys below, and in some cases individual households may have access to land in both zones (Guillet 1992; Kariya et al. 2005). In the Pampamarca area the Cruz and Anco families both provide cargo-hauling labor in the Cotahuasi valley and along the margins of the valley principally using mules and llamas. During the harvest season herders are particularly in demand and their services are typically repaid with grain from the harvest. While contemporary Peruvian ranches often focus on the more lucrative wool and meat markets, the demand for hauling goods persists in the steep topography of Cotahuasi, where maintaining graded roads is difficult but ancient trail systems featuring stairs following ridgelines are relatively durable (especially prior to the introduction of shod, hooved animals). Controlled experiments have shown that llamas adapt to altitude-induced hypoxia better than most large mammals (Banchemo et al. 1971), and during the off-season llamas can survive on puna grasses without the cost of supplementary feed. It is not surprising that in this area where one may climb 2,000 vertical meters in only 10 km, cargo llamas continue to be in use.

Planning and Carrying Out the Study

Fidel Cruz had not ventured on this caravan route since 1994, but he maintains caravan llamas and continues to travel shorter circuits near his community (Figure 13.3). As a youth Fidel Cruz would travel north through the departments of Ayacucho and Apurímac with his father to trade Huarhua salt for tubers, maize, and other products. During the late 1980s political violence in this region severed many of the long-distance trading links, but it was the arrival of trucks into the mountain valleys on improved roads, and the resulting access to larger markets, that fundamentally altered the economics of these long exchange journeys for caravaneros.

This particular study emerged from conversations between Fidel Cruz and Willy Yepez, a Peruvian archaeologist working in Cotahuasi in 2005 after they were introduced by Catalina Borda, a Pampamarquiña. Inquiring about caravan routes, Cruz described the journeys he

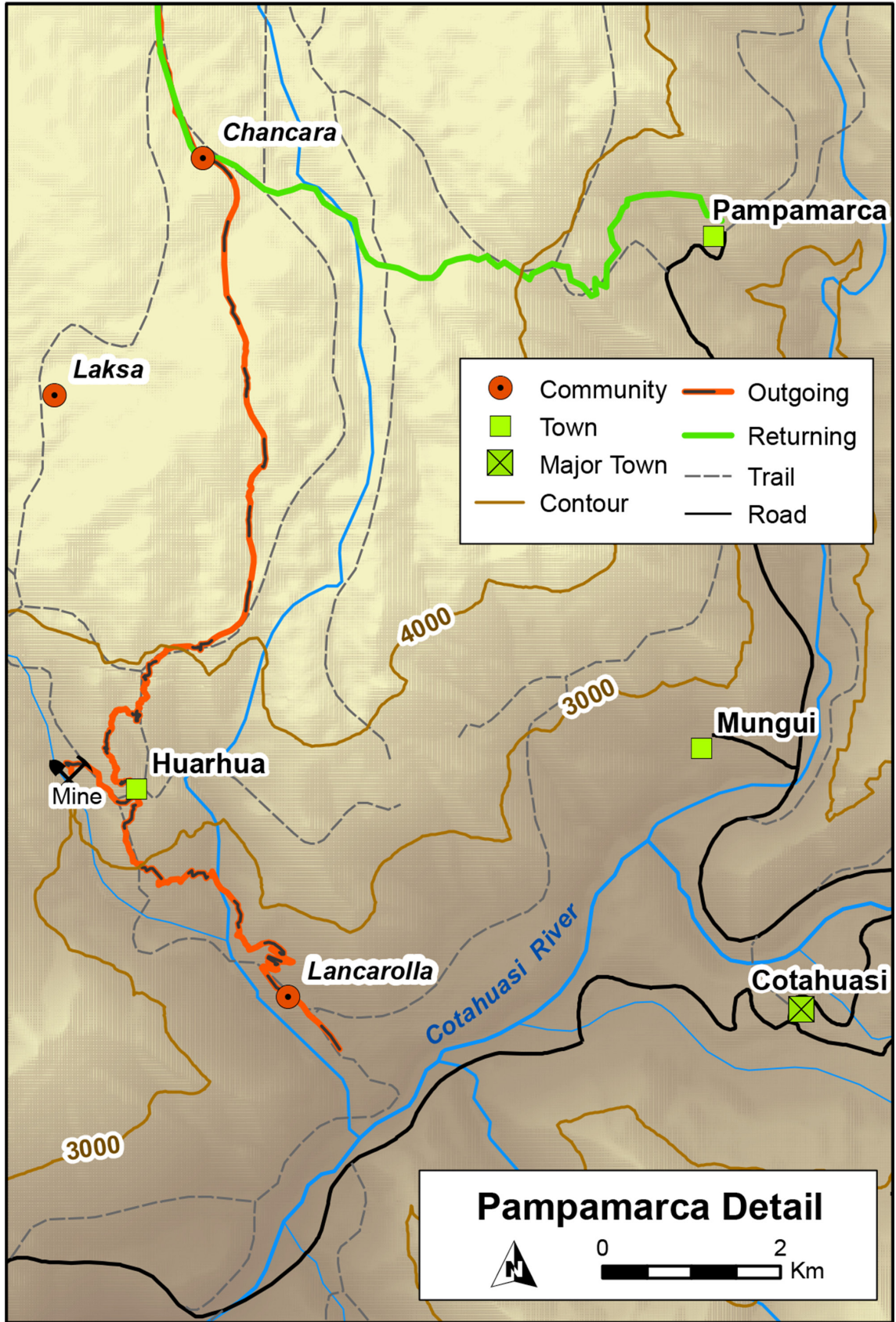


Figure 13.1. Detail map of the Cotahuasi area showing Chancara, Huarhua, and Pampamarca. Courtesy Nicholas Tripcevich.

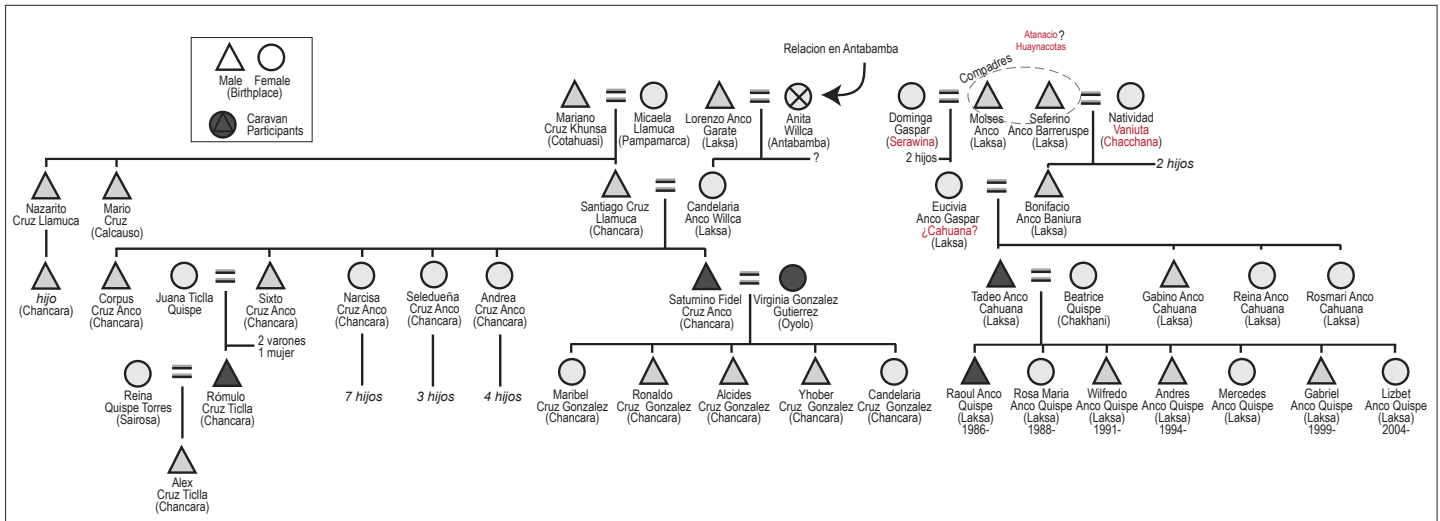


Figure 13.2. Cruz and Anco genealogy.

formerly made many days to the north to the communities of Calcauso, Antabamba, and Caraybamba. In recent years Cruz has fewer reasons to travel 10 days round trip to Calcauso in the Antabamba district: he has lost kinfolk along the route, the value of salt was unknown since road improvements had dramatically increased the availability of products brought in on trucks, and he is not training his children to continue the tradition. Fidel Cruz was motivated to work with us by an interest in promoting an awareness of the caravanero tradition in the younger generations; he is actively involved with cultural events in other ways, such as participation in the local *Feria Agropecuaria* festivals featuring camelids. Furthermore, a financial incentive of \$1000 from our project budget divided between the two families offset economic uncertainty about the value of bringing non-iodized Huarhua salt to trade in the Antabamba area.

The Caravanero Families

Fidel Cruz's family herd includes a number of dedicated transport animals, primarily gelded llamas between the ages of two and eight years. Small horses, mules, and donkeys are also available for loan by family members residing nearby, but Cruz primarily used llamas for hauling tasks.

On longer caravan journeys it is common for several caravans to travel together for safety and for camaraderie, and Fidel Cruz Anco's cousin Tadeo Anco was invited to join the expedition. A cousin through Cruz's matrilineal side and of approximately the same age, Tadeo Anco

is also an experienced herder from an adjacent community who uses various cargo animals to transport goods on shorter trips in and around the lower Cotahuasi Valley. Anco had not participated in this particular caravan route to Antabamba, and indeed he did not have his own cargo llamas, but he was able to borrow 13 cargo llamas from his father's herd of 70 camelids for this journey. The loan of pack animals in exchange for a portion of the proceeds of the journey is a tradition in the Andes known as *al partir* (West 1981b:139). Our group also included Anco's son Raúl (age 21) and Fidel Cruz's nephew Romulo (age 20), who assisted the elder caravaneros on the journey. The participation of caravan animals from the separate Cruz and Anco llama herds provided an opportunity for us to observe variation in herd-management styles between the two cousins, and for witnessing the dynamics of herd interaction along the route (Table 13.2).

In Pampamarca women also participate in local caravan transport and it is common to see a woman on the footpaths around the district with a half-dozen loaded animals. Virginia Gonzalez, Fidel Cruz's spouse, explained that she had done multi-day caravans with her father as a girl although she did not join us on this trip due to her young children and other family obligations. Long-distance caravan journeys are frequently considered a male activity due to trail robberies and other safety concerns when crossing into neighboring regions. Nevertheless there are several reasons why women in this region are likely to be integral to the development of trade relationships. For one thing, as a result of exogamous patrilocal marriage patterns it is

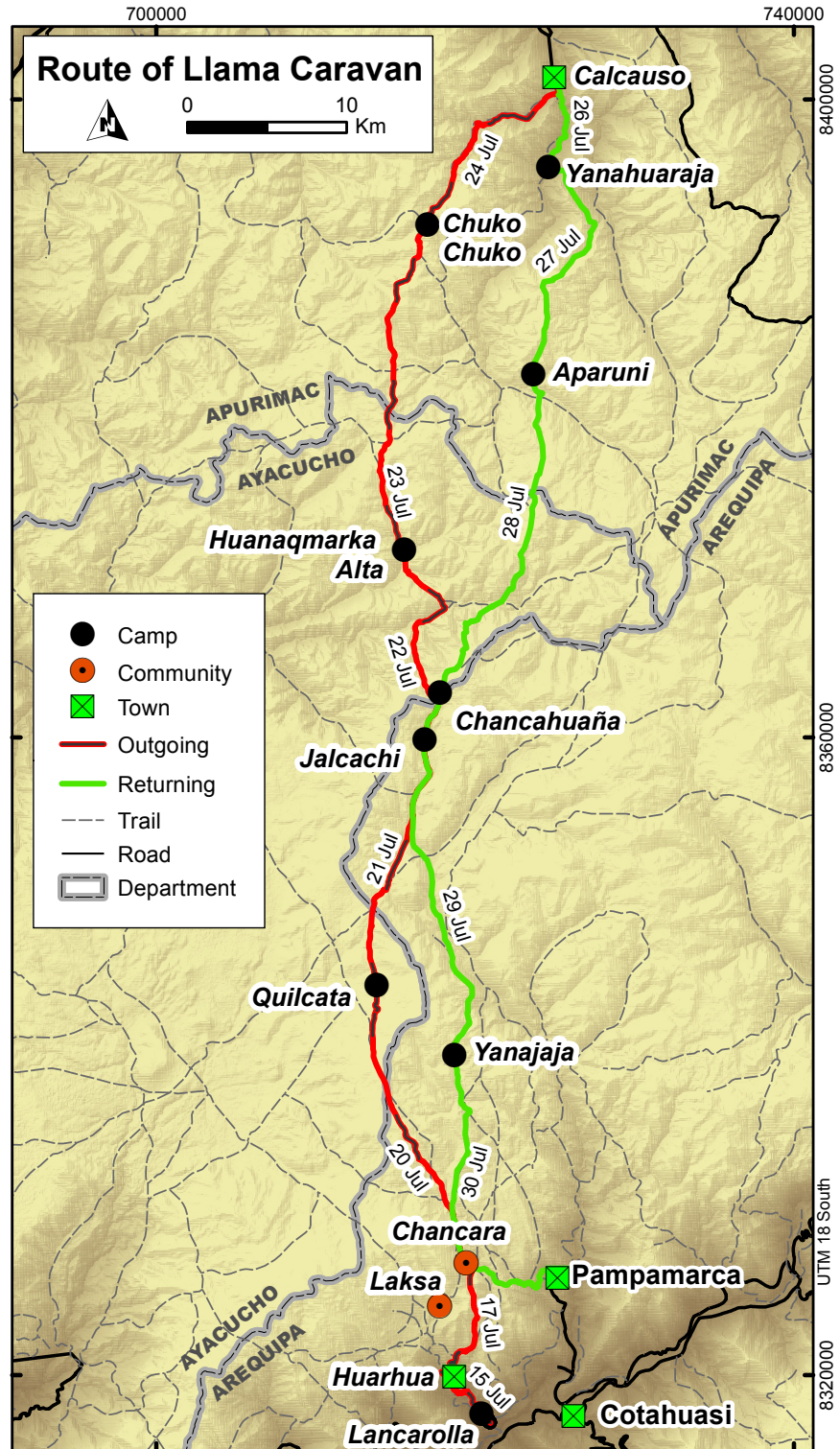


Figure 13.3. Map showing route with camp spots. Courtesy Nicholas Tripcevich.

common for women to have strong family ties in neighboring regions. In addition, market familiarity and household economics are often the domain of women (Bolin 2006:23, 139). Many of the tasks around herding and working fleece are gendered: women are responsible for

spinning, textile weaving, and embroidery used to decorate caravan animals, while men spin and plait to produce rope and slings (Dransart 2002:121–125). Thus, while the long-distance caravan journey may be nearly an all-male activity, in practice it is closely intertwined with subjects

TABLE 13.2. ANIMALS IN TWO CARAVAN GROUPS, POSITION IN THE CARAVAN, AS WELL AS SIZE AND ESTIMATED WEIGHT EXTRAPOLATED FROM DIMENSIONS OF ONE ANIMAL THAT WAS WEIGHED. NOTE THAT MANY OF THE ANIMALS' NAMES ARE DESCRIPTORS IN QUECHUA (DRANSART 2002:69-81; FLORES OCHOA 1978).

CODE	NAME	OWNER	LENGTH	HEIGHT	ESTIMATED WEIGHT (KG)	AGE	POSITION
3	Ñato Paucaray	F. Cruz	90	110	96.42	4	Leader
4	Hoyllirqui	F. Cruz	92	108	96.95	8	Front on descents
5	Sandwicho	F. Cruz	90	104	88.64	4	Front on flats
12	Qillu Qantu	F. Cruz	92	120	113.55	9	Front
1	Condorchua	F. Cruz	104	115	128.03	6	Rear
6	Carpanillo	F. Cruz	90	120	109.86	7	Middle
7	Coripata	F. Cruz	80	112	83.02	4	Front
8	Anayrumi	F. Cruz	86	110	90.06	7	Middle
9	Chunto (montaño)	F. Cruz	93	113	105.45	7	Middle
10	Olljallosi (Puca misa)	F. Cruz	78	108	75.68	5	Middle
15	Araranca (ph 3475)	F. Cruz	95	116	113.24	4	Middle
13	Anuquiño	F. Cruz	82	106	79.32	4	Rear
14	Un sol	F. Cruz	88	108	90.69	3	Rear
16	Cuculi	F. Cruz	82	104	77.09	2	Rear
17	Pallar	F. Cruz	92	110	99.65	2	Rear
2	Ojesara	F. Cruz	100	120	128.68	6	
11	Qantu mage	F. Cruz	78	113	81.00	3	
21	Chiñaqe	T. Anco	90	107	92.50	5	Leader
23	Oje Allqa	T. Anco	85	106	83.72	5	Front
25	Chasa	T. Anco	89	100	82.19	5	Front
30	Moro	T. Anco	90	115	103.07	5	Front
31	Chumpi Allqa	T. Anco	90	115	103.07	5	Front
24	Lulo	T. Anco	80	106	76.44	3	Middle
26	Aquya	T. Anco	76	113	77.90	4	Middle
27	Huango	T. Anco	81	112	84.58	4	Middle
32	Chumpi Ulitu	T. Anco	83	114	90.09	3	Middle
22	Mage	T. Anco	84	104	79.93	4	Rear
28	Chiñaqe	T. Anco	80	108	78.61	3	Rear
29	Chulkinpi Huanco	T. Anco	83	97	70.71	3	Rear

traditionally linked to women's roles, including regional marriage networks, family information sharing, and household economics.

Herd Sociality

Camelid behavioral hierarchy is apparent in llama caravans in the order in which the animals arrange themselves. A caravan will contain a *delantero* or lead llama, a number of llamas that tend to walk in the middle, and llamas that bring up the rear of each herd. When Cruz and Anco were asked about the characteristics of each

animal the primary attribute they described would be the position the animal assumed in the caravan (see Figure 13.4). The disposition of a llama is important because, with the exception of loading and unloading, the Andean llamas are not haltered and led like mules in a mule train (Bonavia 2008:424), nor are they controlled with halters, reins, or whips besides the rare cracking sound of a sling overhead. The Andean practice has animals loaded less heavily and trained to travel in caravans following the assertive *delantero* lead animal (Flores Ochoa 1968:81). The *delantero* perhaps carries even less cargo weight but is first in crossing bridges,

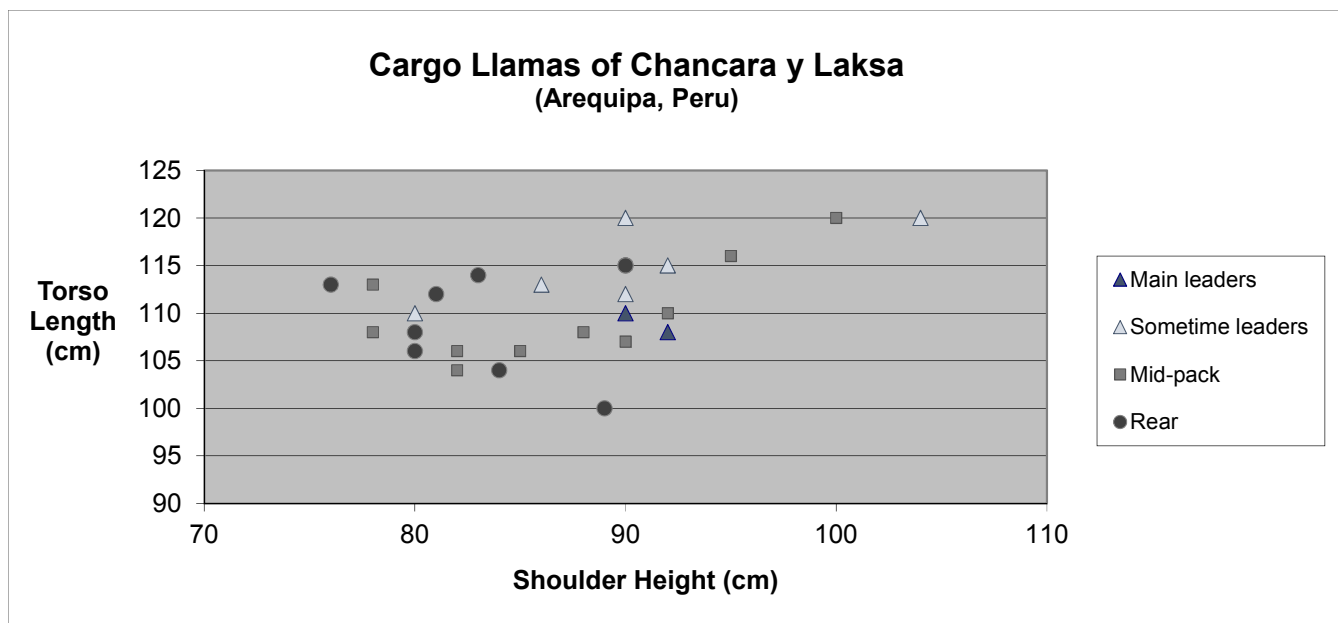


Figure 13.4. Proportion of llama length and height in relation to the role each animal assumes during the caravan movement.

streams, bogs, and other obstacles, and is expected to be familiar with the route, which allows the herders to walk behind on known routes. As a manifestation of human domination of animals (Ingold 2000: 73), the control of caravan llamas is more akin to the other large domesticates in the prehispanic Andes: the dog. In both cases voice command and the threat of force may be involved, but it is largely a relationship of mutual benefit with relatively little direct restraint of the animal, either with halters during the day or secure corrals at night. Grown llamas can easily jump the corral walls should they need to. Human domination is largely in manipulating breeding, protecting the herd from theft and predation, and notably in gelding the males.

Thus the Andean caravaning practice allows just one or two caravaneros to control 15–30 animals and thereby move a large number of animals and their cargo. While loading and unloading involves at least two people to hold the animal while affixing a properly balanced load, a single caravanero can walk a loaded caravan between communities. There is also considerable effort involved in loading and unloading which uses time and energy when there are many animals in a caravan. Cruz describes traveling alone with a caravan of 25 llamas and he asserts (in Spanish) that “they behaved well, knowing that he was on his own.” The practice of walking them in an untethered caravan provides clear advantages in moving goods in the sparsely populated expanses of the

Andean puna, an element that would have promoted developing large herds in the prehispanic Andes.

A Visit to the Salt Mine

Our journey began with a visit to Huarhua with Fidel Cruz and his wife Virginia Gonzalez, where we stayed in a structure behind the house of Fidel’s cousin Vicente. The colonial town of Huarhua, still only reachable by foot, is an *anexo* or dependency of the town of Pampamarca. Those linked to Pampamarca have rights to salt from the quarry, but to save time visiting caravaneros may buy or barter for salt extracted by local miners. The access rights that have developed for these ancient sources provide insights into how raw-material sources may have been managed in antiquity. It is apparent that these policies vary from source to source. While Pampamarca locals retain preferential access to the Huarhua salt mine (Jennings et al. 2013), other major salt sources in contemporary Peru, such as Campa Ashaninka salt in the Amazon basin, provide examples of multi-ethnic access sources (Varese 2002).

The multicolored halite known as Huarhua salt occurs in the Murco Formation, an ancient strata of marine sediments exposed in Quebrada Espanja (Olchanski and Dávila 1994), a tributary to the Cotahuasi River. This tributary joins just upstream of the deepest part of the Cotahuasi Canyon that formed where the river cut

deeply from the puna of the Andean plateau through Miocene volcanic flows to the Precambrian gneiss (Schildgen et al. 2007). The salt mine entrance on a steeply eroded southwest-facing slope is accessed by a 1.3 km switchback trail traversing into the quebrada from the town of Huarhua that lies on a wide bench on the nearby ridge. Middle Horizon pottery found on this bench indicates that Huarhua resources have been utilized for at least the past 1,500 years (Jennings 2002:248–251). Today, the Huarhua mine consists primarily of a single tunnel with galleries branching off approximately 100 m underground where miners chisel rock salt using small metal implements and then carry a salt load over their shoulders wrapped in a textile to the mine entrance where the load is weighed. Once loads have been prepared on the landing by the mine entrance, animals are brought to the landing for loading and promptly led away. Cruz reports that there are four colors of salt: light pink, white, light yellow, and a black salt that breaks into larger blocks. After visiting the interior of the mine, Fidel Cruz purchased 325 kg of salt from a local man and loaded it on 12 llamas for transport to Vicente and Emilia's house back in the village of Huarhua.

The following day the loads were reconfigured for the climb up to the puna (Figure 13.5) and 11 llamas carried salt loads that totaled 331.8 kg, including the sack (costal) they were carried in ($N = 11$, $\mu = 30.16$ kg, $\sigma = 2.52$). For this climb, animals were loaded with approximately 15 kg per side, which is somewhat in excess of the one arroba (11.5 kg) per side estimate for longer journeys provided by the caravaneros. The llamas transported salt as well as our equipment for the ascent to the puna hamlet of Chancara near the rim of the Cotahuasi canyon, the residence of Fidel Cruz and his extended family for generations. In Chancara two days of preparations ensued in anticipation of the 200-km round-trip journey to Calcauso, Apurimac.

PREPARATIONS FOR THE JOURNEY

Prolonged journeys to neighboring regions require physical preparation, schedule adjustments, and extended ritual preparation for the voyage. Consistent with ethnographic accounts from the region (Bolin 1998, 2006; Dransart 2002; Flores Ochoa 1968, 1976), ritual preparations prior to departure included decorating the llamas with a particular focus on the head and chest, and extensive use of materials such as ochre, colorful yarn, alcohol,

and coca leaf. The larger aim of the journey in terms of economic exchange—in our case this was trading salt for goods from Apurimac, and our ethnographic participation—was coordinated ahead of time, but preparations continued up until the morning of departure. In the week before the journey the caravaneros gathered and repaired necessary equipment, completed remaining work on chest and head adornments for the lead animals, and purchased new colorful yarn to replace the ear tassels on the caravan animals (Browman 1974:192; Dransart 2002:94). Food preparation included grinding maize to produce the staple cornmeal (*maschka*), toasting corn (*cancha*) and drying camelid meat (*ch'arki*) for consumption along the trail, and slaughtering an alpaca two days before the departure to take larger meat packets on the journey. On this trip one hindquarter, a forelimb, and the ribs of the slaughtered alpaca were brought along. One kilo of coca leaf was purchased in town in part for consumption by our group as well as for use in rituals and for sharing along the trail. Trail supplies and camping gear were separate from salt and other cargo to make camp organization simpler.

Equipment and Regalia

Cargo was carried in various basic systems that all ensured that the load could be balanced while the spine of the llama was protected with a folded blanket placed under the cargo. The system that appears to be traditional is the use of a single, large woven costal sewn shut for the journey. The contents were configured in two roughly equal portions in the costal and draped across the llama's back. The load was then affixed using a single braided wool rope 9–10 m long that was looped over several times, then cinched and tied off. The caravan also made extensive use of strong plastic sacks that appear to have contained rice and were reused for carrying Huarhua salt divided into two portions, as was done with the textile sack. Several open-mesh carriers were also used for carrying blocks of salt. These carriers had a circular wooden frame laced with a mesh made from sinew that vaguely resembles that in a snowshoe. The caravaneros were also able to attach large backpacks and other luggage, provided it was balanced and the spine was padded. Llama packers from abroad visiting rural Peru (Harmon and Rubin 1992:84) noted that a principal innovation in cargo systems allowing larger loads to be carried is that the spine is protected through the use of a padded pack-saddle system fitted with twin detachable panniers.

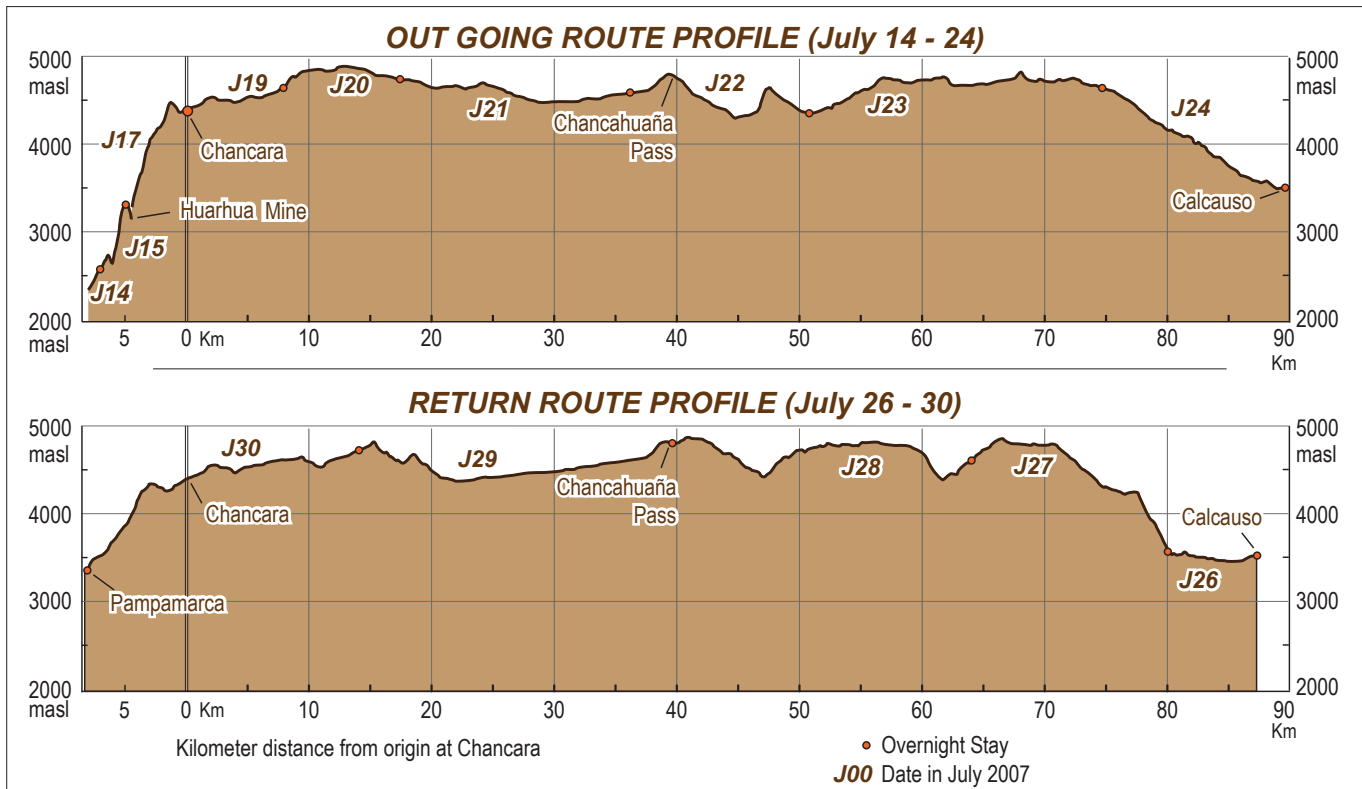


Figure 13.5. Vertical profile diagrams of outbound (107.3 km) and return (95.4 km) routes. Circles indicate overnight stops.

Color and sound were an important part of the caravan presentation, and substantial effort was put into the proper presentation of the animals. This included ear tassels, as well as decorative woven tack consisting of a bridle (*cabecero*) and a woven breast piece (*pechero*) for each of the delantero llamas. Bells of varying sizes and tonality were affixed to the llamas' necks as well, which resonated acoustically and enlivened the landscape as the caravan moved across the puna and through canyons. The red-and-white Peruvian flag on a small mast was affixed to the cargo of each of the delantero llamas. Cruz asserted that the flags were not a political statement but rather expressed *alegría* and honored the *apus* (sacred high peaks) along the route. Notably, as we entered into Calcauso the caravaneros adopted a more muted presentation with no adornments or bells.

Ceremonial Preparation

The day before the departure the caravan llamas were outfitted with bright new ear tassels and were brought to the patio for a departure ceremony. A pigment paste (*tacu*) was prepared with ochre acquired from across the

Cotahuasi Valley in Orcopampa and from Santo Tomás, and the *tacu* was applied to the body and neck fleece of each animal. Ocher is central to many rituals among herders; for example, coating young camelids with red ocher is said to avert disease and accidents (Bolin 2006:127).

During the preparation Cruz spoke soothingly to the animal, repeating his name with complimentary Quechua phrases and describing the passes and places we would be traversing. The bold delantero animals from each of the two herds were particularly well-coated with ochre and were the focus of further ritual preparation. The ears of Andean camelids have various ritual associations that include piercing, cutting off the tips of the ears, and decorative tassels (Bolin 1998:84; Dransart 2002). During the caravan the colorful renewed ear tassels and ochre were visible from afar and contributed to the lively display along the trail.

The focal point of the ceremony occurred when Cruz produced a curved ceramic tile holding a smoldering pile of burning llama dung and herbs from a niche in a wall where it had been burning and held it aloft, and then he set it out on a raised portion of the patio. The delantero

llamas were brought before the altar for a ceremony that involved syncretic elements of the indigenous *tinku* and Christian ritual. The *tinku* included libations of corn beer (*chicha*) from a wooden cup and offering it to the four directions, naming of the apus of the nearby snowy peaks Coropuna and Solimana, and splashing *chicha* on the ground before holding the delantero llama's head steady and pouring it generously into the llama's mouth. The focus on the llamas, speaking to the animals, and the consumption by the llamas of human drink are examples of a boundary-crossing between animals and humans (Ingold 1988), underscoring a perceived affinity between camelid and human communities. Both caravaneros made an offering at the altar, some emphasizing indigenous *pago a la tierra* elements of ritual with offering to the apu, some including more Christian ritual, kneeling before the burning herbs and crossing oneself while reciting Ave Maria. Libations of *pisco puro* or hard alcohol were drunk from a cup made from the tip of a cow horn with decorative engravings. More toasts (*tinka*) occurred before setting out the next morning. The animals were loaded and all the decorative regalia was attached, including bridles, breast decorations, and bells, and after a brief *tinka* the animals set out from the north gate of the patio.

THE DAILY SCHEDULE

Daily routine during the journey had much in common with other documented caravans in the Andes, which include studies in Bolivia (Lecoq 1987, 1988; Nielsen 1997, 2000, 2001; West 1981a, 1981b) and Peru (Custred 1974; Flores Ochoa and MacQuarrie 1994). Anticipating the day ahead, the caravaneros would rise before dawn and begin heating water for food. Despite cold morning temperatures there are many advantages to traveling early in the day. By leaving early there is a greater likelihood of arriving at the planned destination that night, or at some suitable alternative; mountain weather is generally more stable in the morning and midday; and an early arrival at the destination for the night means that the llama herd will have more time to feed before sunset. Unlike equids, camelids must graze during daylight hours and retire to the camp at night, and consequently the caravaneros are motivated to rise early and travel during the morning hours. Higher afternoon temperatures are another reason to attempt to do big climbs early and complete most traveling in the morning, as llama performance is often hampered by heat (Middleton and Parish 1999).

When a long travel day is planned the caravaneros would eat hastily and begin to load the animals in the corral at daybreak around six o'clock. On more leisurely days the travelers may stay in bed until dawn and the animals are briefly allowed to graze nearby before loading. Animals were loaded by hitching the necks of two animals loosely together while the loads are fastened. When the caravan is ready a rope tied across the corral entrance is removed and the delantero llama follows one of the herders out the gate and down the trail. The caravaneros generally carried small day bags with a bit of food and perhaps a bundle of wool for spinning on the trail. While caravaneros in more arid regions (Nielsen 2001:170) carry plastic water jugs, and plastic bottles are widely available in local towns, the Cotahuasi caravaneros never carried water bottles on our journey even along segments of trail that were high and free of available surface water for an hour or more. Short breaks of varying forms occurred during travel, but no prolonged breaks exceeding 30 minutes were enjoyed while animals remained loaded.

Camp Routines

Four camps were established during the five-day journey out to Calcauso, and four different camps were set up on the return journey to Chancara by a different route; thus observations are based on eight overnight stays. Camps were chosen by balancing a number of criteria including local landownership and safety, proximity to grazing and water, sheltering geography and the existence of a corral or other natural or constructed features that could be incorporated into a wall. Secondarily, the needs of the humans are factored in, including the availability of firewood, the sleeping surface, and protection from the elements using walls and tarps. The locations selected were typically camps that required little improvement to suit the needs of the caravan for the night. At times fallen rocks were returned to walls, and hearth windbreaks might be improved.

Routinized camp activities during one-night stops are consistent with camps or *jaras* described by Nielsen (2001:186) for an overnight camp. When a suitable location was selected (often based on prior knowledge or a recommendation) the group aimed to arrive at camp by mid-afternoon to allow for grazing. The animals were promptly unloaded and the center of the enclosed or corral space was generally the unloading site. The cargo was stacked, each family caravan unloading and arranging their own cargo according to preferred herder sleeping

locations. Stacked loads were used to create windbreaks. Woven blankets that act as saddle blankets beneath the cargo during the day to protect the llamas then serve as extra layers of sleeping blankets for the herders at night. To deter theft the caravaneros slept immediately next to their cargo, and the camp kitchen pans and coiled ropes are close by during the night. By modern camping standards caravaneros are minimalist campers, pulling only a few extra layers of clothing, cook pans, and food out of a pannier each evening. Most of the cargo bags are never opened on the trail; in most cases the bags are sewn shut, as the contents are destined for trade at the far end of the journey. Equipment can thus be organized so that only one or two panniers are opened during the evenings during the journey.

We noted that Fidel Cruz and his nephew consistently slept next to all their cargo on the right side of the entryway as one entered the corral or enclosure, and Tadeo Anco and his son slept with their cargo on the left. Each family had their own meals, but food supply was coordinated from the beginning and they regularly shared. A hearth was built (or an existing one was improved) and evening food was often begun on a small cooking fire while the herd was still grazing. Depending on the daily schedule the evening meal was sometimes eaten around five o'clock, while the animals continued to graze. At dusk the animals were brought into the corral area and the caravaneros returned to a single hearth for warmth and conversation. The next day's breakfast and trail food was anticipated and stowed accordingly. One evening an alpaca femur that had been used in a soup was toasted in the fire. The next day the toasted long bone was produced during a short break on the trail and cracked open to reveal a marrow snack, which was shared. After dinner, light permitting, any urgent repair work on equipment would take place together with quiet conversation before going to sleep, which was usually before eight o'clock.

Calcauso, at the Far End

The 15 km descending 1,100 m in elevation along Quebrada Sillajasa from Chuko Chuko to the town of Calcauso took only a half day, and the caravaneros suggested that the morning prior to the descent was an opportunity to have a slow morning lingering at the site and allowing the animals to recover and graze in rich *puna bofedal*. We recorded interviews first with the older caravaneros and then the younger men, and before midday the animals were loaded for the descent. Feeding

opportunities were few in and around Calcauso, and it was clear that the caravaneros anticipated this issue when they proposed a morning of grazing in *puna*. There are inherent problems with herds in town centers as a hungry group of caravan llamas is liable to break into areas fenced off for crops that ring the community.

The first priority arriving in Calcauso was finding a place to unload and keep the cargo and the llamas for two nights. As we walked through the outskirts of town, Cruz noted that corrals that had been available for use by visiting caravans during his prior visit in 1994, at a time when caravans were more common, were now in cultivation. We continued with the caravan through town, on the principal street, to the house of Cruz's aunt who had married into a Calcauso family. Initially they could not suggest a place to keep the llamas, indicating only a dump zone in town. Eventually an older woman agreed to have the llamas in her neighboring yard, enclosed by a low wall, in exchange for some alpaca meat.

Regular caravaneros have maintained relationships in distant communities through succeeding generations that may be framed in terms of fictive kin relations with *compadres* (Browman 1990:404), although with the diminished participation in the caravaning tradition by the young these multi-generational ties are, in many cases, being lost. Cruz and Anco spent time locating potential buyers for their salt. Some paid in cash, and others traded goods such as tubers, maize, and beans. The long-standing exchange rate was 1:2, or one unit of salt for two units of farmed products. In most cases sacks were weighed using a hanging scale. Some items, such as large blocks of dark rock salt, were sold as salt licks for cattle. The Calcauso area is known for raising cattle, including spirited bulls that are sent to Lima for bullfights. Cruz spent the final morning before we began our return journey locating townsfolk who had stated that they wanted to trade with him, but many of these people were up in their fields making *chuño*, thus causing some delays. Eventually others were found and the final exchanges were concluded.

The Return

The return route involved a shorter route that Cruz was not familiar with, because on other trips he always sought to visit his sister, now deceased, who had lived in Santa Rosa along the outgoing route. As will be discussed below, the return by a different route provided an opportunity to witness the process of route-finding using trail

descriptions from the occasional local herder that we passed. On July 27 the return route was particularly fast because we followed a direct—but very dry—sandy ridge, which offered few navigational markers and, given the aridity of the area, a good chance of camping without water if we got off route.

The camp on the last night of travel was less than a full day's walk back to Chancara, and the caravaneros noted the higher energy of the animals “flying” across the puna as they returned to their home territory. A cheerful reception greeted us upon our return to the family in Chancara. As our research team prepared to depart from the highlands, Cruz spread a textile in the patio and arranged some colorful small cobs of maize to show his children the many varieties of maize available from farmers in the Antabamba Valley.

DISCUSSION

Some generalizations may be formulated about the role of caravans in antiquity. Elements of prehispanic road construction and the temporality of travel become more apparent when observing a modern caravan on a multi-day journey. The strategies for managing the flocking of the animals, load distribution, rest periods, and navigational methods were evident during the caravan.

Trail Characteristics and Pace

Caravan pace is determined by various factors including the quality, consistency, and steepness of the trail, ascent or descent, the width of the trail, the energy level of the animals, and their willingness to travel rapidly. Llamas primarily walk or switch to a transverse gallop, but unlike Old World camelids they never trot or perform a symmetrically running gait. Graziotti and colleagues (2012:153) ascribe this characteristic to the evolution of Andean camelids in a high-altitude environment with relatively accessible resource patches compared to Old World deserts. The fastest caravan travel times were observed while descending quickly on sandy soil, where open terrain allowed the llamas to be grouped less tightly together, which reduced concern about llamas in front of them stopping suddenly.

The trail surface, including evenness and traction, is another important factor, although quadrupeds are less affected by insecure footing than bipeds, particularly when carrying loads. Descending on loose pebbles, for

example, can be relatively risky and slow for loaded bipeds, but we observed llamas moving rapidly on loose ground, and, when footing is slippery, they may lock up the back two legs and crouch slightly to regain control. Similarly, an obstacle up to approximately 50 cm in height on the trail is easily stepped over or around and seems to cause less slowing than it does for bipeds. The soft pads of llama feet are an advantage over shodden hooves of a horse or mule, particularly when it comes to stepping from rock to rock or on slick surfaces, although they are liable to be cut by sharp rocks. Leg and foot injuries from punching through a bridge or along a weak section of trail are prominent concerns. When crossing bridges a caravanero would often cross first and drop wood or stones into any gaps before coaxing the del-*antero* llama across.

Flocks on the Trail

Caravan travel speed is influenced by trail width: because of the inherent sociability and strong flocking tendency of camelids (Dyson-Hudson and Dyson-Hudson 1980:28), caravans tend toward moving in a wedge-shaped configuration (Figure 13.6). Where terrain and vegetation do not constrain the caravan width, such as in sandy expanses, the wedge was up to ten animals wide at the back, with the animals at the margins negotiating around the bushes and rocks found off-trail. The advantage of a wedge-shaped formation in open country is that it provides most animals walking on the edges an outlet route to the side if a llama in front of them stops abruptly.

Modern llama caravans provide insight into the question of the width of prehispanic roads. It has been noted that imperial roads in Inka times were sometimes 6 m wide and well in excess of local population needs. Despite the much greater effort involved in building wide roads in mountain terrain, it has been speculated that these wide roads facilitated troop movement for rapid access by Inka armies (Hyslop 1984:254–269; Murra 1980:130–151). However, this study notes that given the wedge formation that llamas naturally assume, a wide road would also hasten travel considerably and provide space for two caravans to pass one another when needed. The open puna where the width limitations are less present encourages rapid travel speeds, and narrow sections of road present a bottleneck. Perhaps wide-road construction was a component of *mita* road-building labor meant to expedite travel times for large caravans.

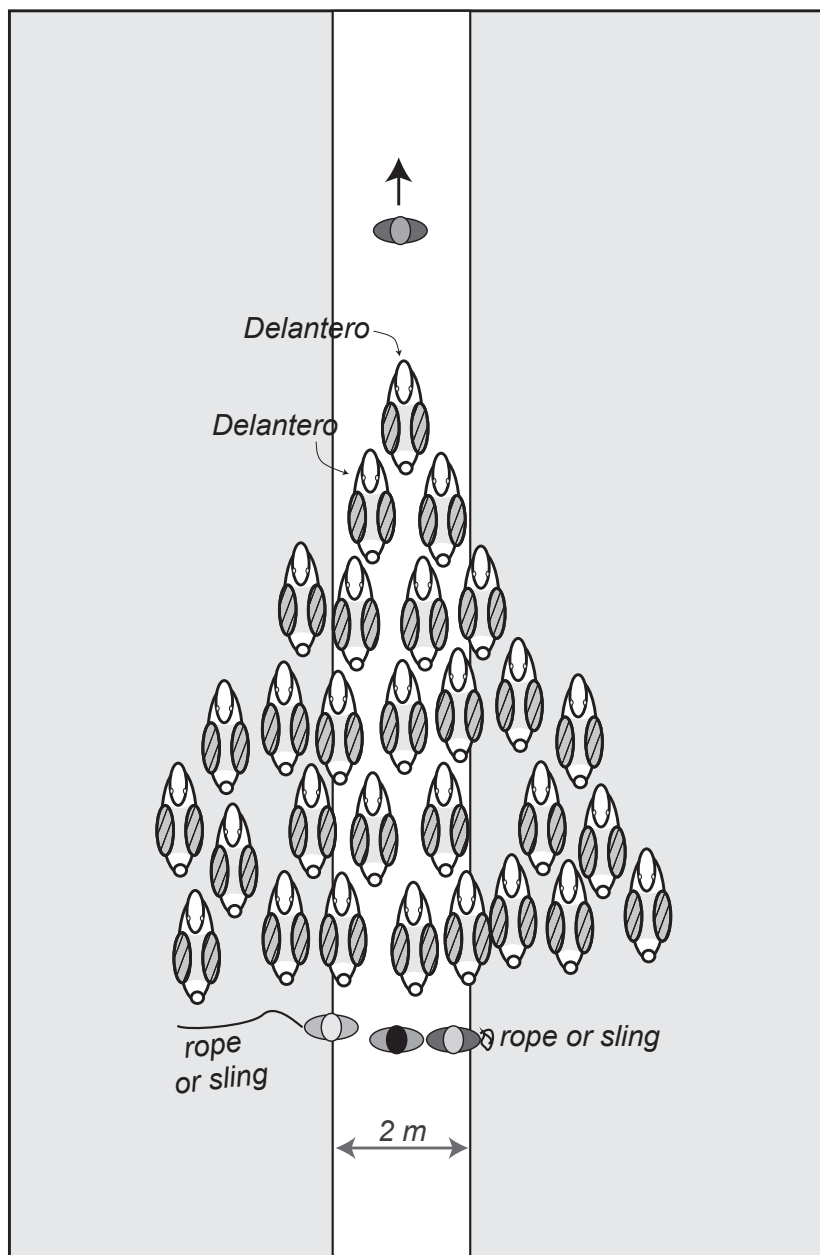


Figure 13.6. Example of a wedge-shaped caravan on a 2 m wide trail that is open and sandy along the sides of the path. Three caravaneros can converse in the rear and occasionally a rope or sling is cracked behind the rear animals on the margins to keep them with the wedge.

When complications are encountered due to rocky terrain, vegetation, or when passing a caravan traveling in the opposite direction, the caravaneros will deliberately slow down the group to enforce a single- or double-file line. For example, on July 24 while descending 1,100 vertical meters from the puna to Calcauso on the Río Mollebamba along Quebrada Sillajasa, the trail became well-defined with switchbacks but with a notable drop-off in places. The trail obstacles included narrowness, a few minor landslides, irregular stone stairs, a bog, a 50-cm deep stream crossing, a few deteriorating foot

bridges, and downed logs that needed to be stepped over. For the majority of this descent the caravaneros broke the caravans into their two respective family herds and walked single file with a caravanero on either end of the line, slowing travel speed considerably. In many places, particularly in the bog and stream crossings, the delantero llama had to be urged across with shouts and cracks of an *onda* sling in the air. In places llamas demonstrated a need to be carefully guided, such as when two animals attempted to cross a narrow bridge together, walking two abreast, and their cargo width could push

them off the bridge. The caravaneros were careful to enforce single-file progress in such circumstances.

Load Management

Load distribution is a consideration for those who use transport animals the world over. Drovers who have a sizable caravan or animal team have options with regard to moving loads around among animals (Jackson 2004). A strategy we observed was to leave one animal unloaded or only lightly loaded and then shift the loads daily so that an animal that was slow or injured on one day would carry little or no weight the next. While a load was not necessarily linked to a single animal for the duration of the journey, the caravaneros seemed to go with familiarity and would reload cargo that worked with a particular llama onto that same animal the next day. This was particularly true with oddly shaped or bulky cargo. Given this strategy of moving loads, a more detailed study of cargo weight and animal performance would involve tracking both the loads and the individual cargo animals.

Rests of Short and Long Duration

During a single day, 20–30 minute-long travel breaks occurred one or two times per day. These were generally in places with some grazing opportunities for the animals, although not necessarily near water. While terrain features led to short pauses for rest or for route finding, no extended rests were taken while the animals remained loaded.

Llamas need a rest period or “layover day” every three to five days of travel. The rest interval depends on various factors influencing the difficulty of a given journey, the itinerary, and the available rest locations. Ethnographic descriptions of longer caravan journeys all report layover days (Lecoq 1988:185–186; Nielsen 1997:352; West 1981:70) involving one or two full days of rest. The animals can graze and recuperate, and injuries such as foot sores can begin to heal. The caravaneros busy themselves with repairing equipment such as straps and footwear, including the leather llama shoes that are used in some regions (Nielsen 2001:Figure 6). Layover days are also an opportunity to visit and to trade with the communities in a particular region. The locations selected for these longer layover stops are perhaps among the best camp spots on the journey: excellent grazing and water, adequate corral infrastructure, and shelter from the wind. Human concerns such as social visits and trade opportunities are

also considerations, since there is usually some latitude in selecting where the layover stops will occur.

Prolonged rest stops are particularly important phenomena for archaeological studies of ancient caravans. These were desirable camp locations, and a wider range of activities were performed at these locations, which are thus likely to retain distinctive artifacts and perhaps stratified deposits. When trade opportunities and social visits present themselves the caravaneros may take turns making nearby visits while the others guard the camp and animals. From an archaeological perspective it is likely that some settlements in the highlands began as caravan layover locations that had water, good grazing, and that were situated adjacent to important travel routes.

Navigation and Travel

On the return journey the caravaneros followed a new route in part because we requested a loop in order to observe caravans in more varied terrain. It appears that caravaneros are relatively averse to taking risks with their animals, hence the very early departure times for stable weather and maximum daylight. Setting out on an unknown route, however, was feasible with sufficient information acquired from locals about the travel route and the prospect for grazing at the end of each day.

The unfamiliar route we took on July 27 was largely described through reference to large mountains that could be sighted from afar. These peaks had names and, it was implied, power that deserved respect. The references the *llameros* made while arriving back into the lands of their community included crossing Chankahuaña pass (Figures 13.3 and 13.5), their proximity to the larger peaks, and the views of Nevados Coropuna and Solimana toward the south. While much of the route followed river valleys and the gullies, and the names of quebradas were frequently referenced, the names of the streams on the puna were mentioned far less frequently than the mountains, perhaps because streams sometimes change names at a major confluences.

Rituals on passes and other prominent locations are mentioned in other caravan journeys, particularly in Bolivia (Lecoq 1988; Nielsen 2000:24). Cruz mentioned that his father performed many of these rituals (*tinka*) on passes, but that he didn't do them, or at least he didn't do them on this journey in our company. The departure ceremony and, to a lesser extent, the return ceremony in the presence of elders such as Virginia Gutierrez's mother and Tadeo's father, framed the journey.

Describing the journey during the departure ceremony, Cruz noted that the caravan would not stop at communities along the way and that it would keep moving until it reached the destination. One implication is that while residents in small communities along the route might hope to trade with them, their goods are worth more further from Chancara, and if one is prepared to journey five days to the north it makes little sense to trade away goods only one or two days from home. Furthermore, there are risks associated with delays and socializing. These practices may adapt rapidly, however, with the presence of large roads and market access in the Antabamba valley and the far end of the journey. Conceivably, caravan goods may now have more value in the more isolated communities along the way that remain unserved by modern transportation.

CONCLUSIONS

A moving Andean caravan maintains a daily rhythm that depends on the inherent sociality of the animals and a relationship with the caravaneros that makes it possible for animals to walk untethered and make steady progress. The experience of the caravanero and his attentiveness to obstacles along the route are fundamental for the success of the journey. Conservative choices are often made with respect to route selection, trade goods, campsites, and scheduling. The enterprise is a valued community tradition; however, it is perceived as uncomfortable, especially by the young, with relatively small financial returns and some risk.

Llama-based transport that was once central is today an activity peripheral to much of the regional economy. However, despite broad changes to the highland economy, a small number of families, such as the Cruz family, continue to bring Huarhua salt to adjacent valleys many days from their community using cargo llamas. In part they continue due to the economic opportunity this exchange brings, but they continue also because they thereby maintain ties to family and to memory. Kinship ties lie at the root of the long-distance relationships maintained by this particular caravaning tradition, and in fact Fidel Cruz had not repeated the journey since 1994 when his sister ceased to live in a village along the route.

Studies of fast-moving, mobile groups that discard few material items challenge the spatial basis of archaeological research that relies predominantly on stratified sites and regular events of deposition. This project and other studies have highlighted the importance of examining the locations of layover-day rest stops. The open puna in the

Central Andes is where caravans excel, because grazing is often plentiful, and we observed that travel speeds on a multi-week journey were primarily limited by the width of the caravan route and the extent of constricted areas. Considered on a regional scale and over millennia, it is apparent that despite the strenuous climbing and the cold nights, many of the important caravan routes climbed to the puna on stairs following a ridgeline, and the route stayed on the puna as long as possible. In the modern Andean world much travel and economic activity has concentrated at lower elevations. However, we see that long ago the emergence of the practice of walking untethered camelids in caravans across the puna made the highlands a setting for rapid movement and communication, and it likely contributed to the early establishment of large prehispanic settlements by lowering the costs of interacting across the broad highland expanses and forging common cultural ties throughout the region.

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