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*Hunter-gatherers on the coast  
and hinterland of the Atacama Desert*

The earliest evidence of the people who inhabited the Atacama Desert, both along the coast and the high Andes (for example at Quebrada Jaguay and Tuina sites, respectively), dates back to about 11,000 <sup>14</sup>C years BP (uncalibrated). Along the coast, they lived in one of the most arid regions of the world, and their subsistence was based primarily on marine resources. The coastal valley oases which cross the desert from the Andes to the ocean occasionally provided fresh water, plants and animals. The introduction of small scale agriculture about 3000 to 4000 BP allowed the desert people to establish small hamlets (of no more than 10 hectares at most), with simple architecture (wooden posts, reed mats, and canes). High Andean habitats (greater than 3000 metres) supported a terrestrial hunting and gathering cultural tradition that was initiated in the late Pleistocene. This tradition later evolved into farming and pastoralism 3000 to 4000 years BP, after a period of local experimentation.

### **The landscape**

The Atacama Desert, located on the west coast of South America, is part of a long, narrow, arid coastal strip that extends for more than 3000 kilometres from northern Peru (5°S) into northern Chile (27°S). The Atacama ranges from latitude 17°S to 27°S, and is characterised by a steep landscape, ascending from sea level to more than 6000 metres in altitude in a distance of less than 200 kilometres, which creates a diversity of ecological settings. Within this region, there are two broad habitable altitudinal ecological zones: the modern hyperarid coastal desert; and the arid *puna* and *altiplano* in the high Andes above 3000 metres altitude.

The hyperarid coast is essentially barren of vegetation, except for small *lomas* formations, a highly endemic and seasonal formation characterised by shrubs, cacti and many annuals that depends on a dense fog. This fog typically blankets the coastline, which receives little actual rainfall. The lack of vegetation limited the existence of animals, particularly mammals, suitable for hunter-gatherers, which contrasts with the Australian deserts and the Kalahari and Namib. Freshwater supplies depend exclusively on precipitation in the western Andes, which is usually less than 300 millimetres per year. Nevertheless, as the water accumulates it runs down the steep slopes of the Andes, carving deep, narrow valleys and creating small point springs and oases along its course. This is especially true of the northern sector of the Atacama, the zone of Arica called the 'fertile coast', where the deep valleys open into coastal river mouths (Fig. 13.1) creating localised habitats for prehistoric and modern populations. In contrast, the central and southern sector (see Latorre et al., this volume) of the Atacama coast is sterile, without valleys. Here, agriculture was not feasible at the few small brackish springs. However, these did support open, short term camps of hunters and gatherers, contrasting with the more stable and permanent settlements in the fertile coast.

The initial colonisation of the Atacama during the terminal Pleistocene and early Holocene ( $^{14}\text{C}$  11,000–8000 years BP) occurred during more humid conditions than at present, at a time when people found habitats that facilitated settlement (see Grosjean et al. and Latorre et al., this volume).

### **The coastal habitat**

Despite its aridity, the coastal habitat has a rich and variable marine biomass that includes fish, molluscs, marine mammals and seaweed, all of which were crucial for the survival of the people that inhabited this desert. Without persistence of these resources over the last 11,000 years, the cultural history of the Atacama Desert and its people would have been completely different.

### **Coastal valleys, inland river basins and oases**

In contrast to coastal environments, the valleys and gorges in the Arica region have very unstable resources, both for hunter-gatherers and farmers. This is mainly due to fluctuations in the availability of water, subject to periods of drought. In these valleys food resources are limited to reed bulbs, *tomatillo*



**Figure 13.1**

*The Atacama coast at the mouth of the Camarones valley, near Arica*

This is typical coastal desert, without vegetation, and bounded by the Pacific Ocean and the Coastal Cordillera.

*photograph by Mike Smith*

(Solanaceae), *Prosopis* (a mesquite-like tree, good for firewood, with abundant pod-shaped fruits easy to store as whole fruit or flour), bird eggs, crayfish and camelids such as the guanaco (*Lama guanicoe*, one of the two wild species of South American camelid), and possibly viscacha (*Lagidium viscacia*, a rabbit-like rodent with a long tail), and *cholulos* (*Ctenomys* sp., a burrowing rodent similar to a gopher).

Along the sterile coast, the inland river basins upland of Iquique, such as the Pampa del Tamarugal and adjoining canyons and oases, offered limited resources for food and shelter. In the unique woodland of *Prosopis tamarugo*, people found wood, reed bulbs and fibre, and raw materials for lithic tools. These inland supplies, non-existent along the sterile coast of Iquique, were fundamental for the coastal groups who organised migratory circuits in order to obtain access to these complementary goods.

#### **Andean valley habitats**

The food resources found in the Andean valleys are not very abundant. Today, the vegetation is patchy and supports small populations of guanaco, viscacha, chinchilla (*Chinchilla* sp.), *cholulos*, and birds such as the *puna* partridge (Tinamidae) and *guallata* (Andean goose). Much greater agricultural productivity was achieved in these valleys through a complex system of terraces and irrigation undertaken by later prehistoric farmers, who harvested a limited number of Andean plants including cereals like maize (*Zea mays*), quinoa (*Chenopodium quinoa*), and tubers such as potatoes (*Solanum tuberosum*), *ocas* (*Oxalis tuberosa*), and *ollucos* (*Ullucus tuberosus*). Habitats at intermediate elevations (3000–3600 metres) in the Puna de Atacama were critical for the first inhabitants. Their camps found in caves and shelters (such as San Lorenzo and Tuina-5) have been dated at about 12,000 BP, 2000 years earlier than the occupation of high elevation Pleistocene lakes (about 4000 metres) (Grosjean et al. in press; Núñez et al. 2002).

#### **High plateau habitats**

Given their extreme climatic conditions (low temperatures and scarce precipitation) the high plateau steppes have a limited capacity for supporting intensive human occupation. The low temperatures and the altitudes above 3500 metres reduce the possibilities of developing agriculture. As a result,

activities were limited to the hunting of vicuña (the other wild camelid, *Vicugna vicugna*) and small animals (rodents and birds) and later in prehistory to herding a few llamas (*Lama glama*) and alpacas (*Lama paco*). In contrast to the Andean valleys and coastal habitats, settlement patterns in the high plateau tended to be dispersed (until recently). The human occupation of these habitats started around 10,000 BP in sites such as Las Cuevas, Quebrada Blanca, San Martín and Tuyajto 1 and 2 (see Grosjean et al., in press; Núñez et al. 2002; Santoro and Núñez 1987).

### People of the hyperarid coastal desert

The prehistory of the Atacama, Australian and southern African deserts shows that, despite extreme conditions, distinctive peoples and cultures were able to develop ingenious systems of subsistence, along with complex social structures and ideologies. The archaeology of the Atacama coast shows a progressive improvement of life conditions, as measured by the quantity and variety of objects created for distinct uses; manufactured with diverse materials such as stone, shell, bone, ceramics, leather, vegetable fibre, wool and feathers, all wonderfully preserved in the hyperarid desert sands. Perhaps the most fascinating creation of these early coastal Atacama Desert people was the development of a sophisticated system of mummification (see below). The ideological principles that underlay this helped to maintain the social ties within these communities that lived dispersed over large territories (Arriaza and Standen 2002).

The first humans to settle in the coastal desert, in the late Pleistocene (about 11,000 to 10,000 BP), were either groups that migrated along the coast from the north or Andean hunters coming from the highlands. Although only a few sites are known (Quebrada Jaguay, Quebrada Tacahuay, the Ring Site), these first populations exploited marine resources (fish, seabirds and shellfish), but did not have a specialised technology, as seen later. Instead, they functioned with a simple expedient toolkit of flakes. They carried out a nomadic way of life with semipermanent base camps along the coast, as seen at Quebrada Jaguay, site QJ-280, by the unique evidence of foundations of small huts (Daniel Sandweiss, personal communication), and a maritime economy

complemented with camelid hunting, and gathering of edible plants obtained from the coastal *lomas*, oases, valleys, and the *quebradas* (Sandweiss et al. 1998). Long distance journeys may have taken these people to the highlands, where they obtained obsidian, in return for exotic coastal items such as shells.

On the Atacama coast, from 8000 to 9000 BP, fishermen started to establish more permanent campsites with rounded living structures built from a wooden post framework, covered with matting, hides and branches (Núñez 1983; Muñoz 1993). Among the most important raw materials were the reeds that grow along the springs. Noteworthy were mats woven from fine, shredded reed fibre and used in domestic functions (roof thatching, mats, clothing) and funerary functions (wraps for funerary bundles). Nets or *chinguillo* (ring-necked nets) and other hunting, fishing and gathering implements were fabricated from reed fibre, or were integrated with other materials such as wood, leather, lithic artefacts and so on. Clothing consisted of breechcloths and fringe skirts or *faldelines* made of reed fibres or twisted camelid wool.

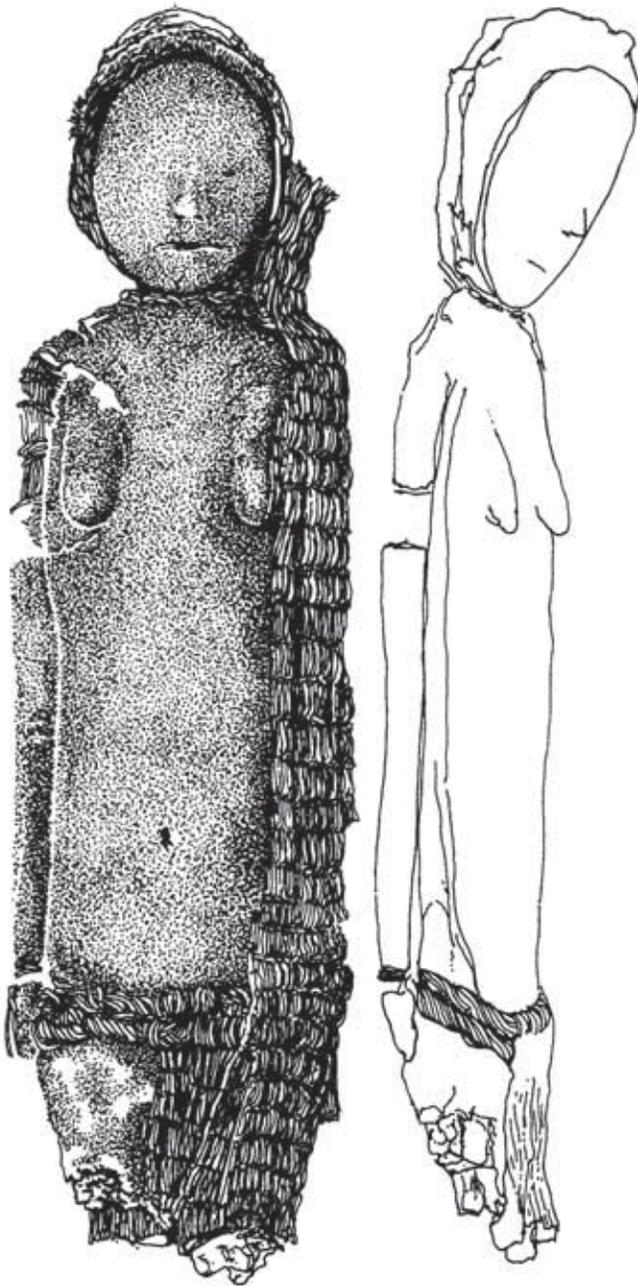
Holocene groups also became more specialised in the exploitation of marine resources, marking the beginning of sedentary life in small settlements along the coast of central Peru about 7000 BP (Benfer 1990), as well as in the Atacama. For example, for fishing they used fishhooks, harpoons, nets woven from reed or cotton fibres, and weights of composite sinker hooks made of stone, bone, shell and cactus spines, and later in prehistory with copper. In hunting marine mammals, particularly sea lions, they used harpoons with carved stone spearheads, whereas shellfish gathering was carried out with the aid of a modified animal rib, to facilitate the removal of gastropods from rocks. Settlements on the arid southern Atacama coast were less permanent than those in the north, with smaller site areas and only shallow shell middens. These sites are not only smaller but also dispersed along the coast, and so do not reflect the semi-sedentary life seen on the fertile coast. Another important difference between the northern and southern sectors of the coast is the integration of inland basin habitats, 30–40 kilometres from the coast (as at Tiliviche, Tarapacá Canyon and Pampa del Tamarugal) linked to sources of fresh water, lithic raw material, and the collection of reeds and *Prosopis* fruits. Núñez et al. (1975) have suggested that the integration of coastal and inland habitats occurred under a seasonal transhumant pattern. By about 4000 BP,

there was a significant change in these settlement patterns, as people from the coast looked for new habitats along the valleys (up to 20 kilometres from the ocean) in places favourable for experimental agriculture. At Tiliviche, there is also evidence of the domestication of guinea pigs (Hesse 1982).

### **The Chinchorro**

One of the most remarkable cultural aspects of the people of the Atacama Desert was the development of artificial mummification by the Chinchorro culture (Fig. 13.2) (Arriaza and Standen 2002). These are the earliest mummies in the world, predating even those in Egypt. Independent of the natural process of mummification, which often occurs in desert environments, the Chinchorro created their own mummification methods, which drastically transformed the bodies, halting decomposition, and allowing the dead to participate in a new social and ideological context, of which we still know very little (Arriaza and Standen 2002).

We have found bodies with natural mummification dating back to 8000 years BP (Standen and Santoro 2004), but the first evidence of artificial mummification appeared about 7000 years BP (Schiappacasse and Niemeyer 1984). Artificial mummification flourished in subsequent centuries and the bodies received much time and great care. Adult men and women of varied ages — children, newborn infants and fetuses — were drastically transformed after their death. Their physical constitution was altered and reconstructed with their own body parts, principally the bones and skin, but the morticians added foreign materials such as vegetable matter (including reed branches and fibre), sticks, clay and coloured pigments. In some cases, the procedures began with the complete removal of all muscle tissue from the bones, evisceration, elimination of the brains, removal of the skin, partial elimination of the soft parts, and drying by fire. In the most elaborate cases, the body was completely reconstituted and covered with a thick layer of clay in which was sculpted the features of the face, genitals and breasts. A wig of human hair was then added. Finally, the bodies were plastered with a fine layer of manganese, a black pigment, or with oxidised iron, red in colour. In this way, the bodies were transformed into gleaming black or red statues, a sharp contrast to the opaque shades of the desert. Arriaza (1995) classified



**Figure 13.2**  
**A Chinchorro 'Black' mummy**

These mummies are the earliest and most elaborate, and are radiocarbon-dated from 7000 to 4800 BP.

*reproduced from Arriaza and Standen 2002:7, with permission*

Chinchorro mummies into several types: black, red, bandaged and mud-coated mummies. There is also a chronological dimension to this typology: the variety of mummification changed over time from black to red and from red to mud-coated techniques.

These transformations created inanimate beings, with a striking vivid appearance (see Llagostera 2003, Figs 1 to 5), prepared to face a 'new life'. We do not know the reasons why different mummification procedures were applied to members of the same group and if the members who received greater attention enjoyed greater social prestige during their lifetime, or constituted some form of ancestral lineage. Mummification may also have served as a mechanism for group acculturation, to preserve internal cohesion, social integrity and a collective historic memory. It is interesting to note that the Chinchorro maintained their identity as a cultural group for more than 3000 years, from 7000 to 4000 years BP. This required an effective means of preserving historical memory over several millennia, and a mechanism of transmission, which would assure the conveyance of an ideological legacy from one generation to the next, without great variation.

Another interesting aspect of the Chinchorro is the emphasis placed on collective interments. Groups of individuals of different sex and age were placed, one next to the other, and covered with reed matting, a feature not observed in subsequent cultures. This seems to signify that the basic unit of the society was rooted in a group of individuals, of different sex and age, who formed a social unit and related to other social units of similar structure dispersed along the coastal desert.

The Chinchorro people lived along the Atacama coast from Ilo in southern Peru to Antofagasta in northern Chile. Within this region, the rise of their mummification techniques occurred in the Arica–Camarones area, and peaked in complexity around 5000 BP (Arriaza 1995; Arriaza and Standen 2002). No Chinchorro bodies have been found inland, except for the Acha site in Arica, which is located six kilometres from the current coastal line. The few burials from Acha do not show complex artificial mummification, but the treatment of the bundle represents the first steps of locally developed artificial mummification (Standen and Santoro, *in press*). This absence of mummified bodies from inland sites does not mean the Chinchorro entirely avoided the

desert hinterland or mountains: by 4000 BP they were receiving prestige goods from the Amazon basin, such as tropical feathers and wood (Rivera 1975). However, early in their history, the Chinchorro represented a rather geographically limited cultural system.

### **Andean culture on the desert coast**

Beginning about 3000 years BP, a new system of subsistence, based on horticulture with large contributions from marine resources, was established in the Atacama. This was a period of experimentation and territorial expansion of the coastal peoples towards inland valleys and oases, as part-time farmers. A series of agricultural products suited to the semitropical valleys of Arica were introduced, including maize, beans, pepper, sweet potato, and manioc. Sedentary villages appeared, notably those situated in the Pampa del Tamarugal basin, like Caserones, Guatacondo and Ramaditas (Núñez 1982; Rivera et al. 1995–1996). The origin of these cultivars is still uncertain, and we do not know if there were independent processes of plant domestication on the coast and in the highlands.

This sedentary life was connected to a new system of beliefs and ritual expressions that completely transformed the previous system linked to artificial mummification. The new ideology was derived from advanced ceremonial centres on the Bolivian *altiplano* in the Lake Titicaca region, such as Pukara and Wankarani, and distinguished by a rich iconography. Expressions of *altiplano* iconography are found along the coast in the form of weavings with step designs and figures of human faces with lined appendages. These iconographic elements were appropriated by the coastal peoples to serve their own social interests and dynamics. The quality of life improved as new technologies were incorporated such as ceramics, woollen weavings, basket making and woodwork. Objects fabricated from exotic raw materials, or objects of fine handiwork such as weavings, copper spoons, quartz or shell bead necklaces, were used as symbols of social prestige. One aspect that distinguishes post-Chinchorro societies was not only the end of artificial mummification, but also the clear appearance of individual burials, situated in independent graves and surrounded by a group of personal artefacts. This feature indicates profound changes in the concept of the basic unit of society. The social system was

now rooted in the individual, recognised as an independent entity and not in conjunction with other individuals, as with the Chinchorro. These cultural changes, first observed on the northern coast of the Atacama, gradually spread to the sterile coast to the south, and were incorporated into the hunting-gathering economy there.

### **People of the arid *puna***

People arrived in the arid highland habitats on the eastern margin of the Atacama about 11,000 to 10,000 BP (for example San Lorenzo, Tuina-5; Núñez et al. 2002). In contrast to the first fishermen, Andean hunters carried a specialised lithic toolkit that included bifacial triangular projectile points made out of basalt, obsidian, quartz and jasper (Núñez et al. 2002, Fig. S2; Santoro and Núñez 1987, Fig. 4). These artefacts were used in hunting, butchering, hide working and woodwork. Initially, their preferred game animals were the camelids, but later they hunted Equidae, as reported for Tulan-5 (Núñez et al. 2002). They also hunted smaller animals such as the viscacha, *cholulos* and Andean birds.

Around 11,000 BP, they established temporary camps in caves and rock-shelters, and open camps at intermediate elevation canyons and near low elevation wetlands (Núñez et al. 2002). Occupation of high Andean habitats is not archaeologically visible until later, around 10,000 BP, when people occupied areas near lakes and the wetlands known as *bofedales* (localised marshy ecosystems which support a diverse array of plants adapted to extreme conditions and which also provide pasture for camelids). From the beginning, these hunter-gatherers exploited a range of highland environments, moving between them on a seasonally transhumant pattern. While the coastal people mummified their dead, people occupying the *puna* developed a rich pictorial art. There is much evidence of coloured pigment from archaeological excavations in caves and rock-shelters (Aldenderfer 1999; Santoro and Núñez 1987) and of rock paintings of camelids, humans and geometric figures (see Berenguer, this volume; Aschero 1996; Núñez and Santoro 1988).

During the mid-Holocene, hunter-gatherers in the northern Atacama (17°S–20°S) adopted more diverse subsistence strategies and greater mobility. This is expressed in a decline in the quality and quantity of cultural remains in camps that were more intensively occupied earlier in the Holocene (Aldenderfer 1999; Santoro and Núñez 1987). For the central Atacama (20°S–26°S), archaeological data tend to show a marked period of abandonment, known as the *silencio arqueológico* (see Grosjean et al., this volume), reflecting the retreat of desert groups to regions with more abundant resources, or ecological refuges located within the Atacama, as in the case of Puripica (Núñez et al. 1999). The discordance of different ecological studies for the mid-Holocene, particularly for the central Atacama, and their implications for the interpretation of archaeological records, suggests that more attention should be given to the kind of palaeoecological archives used for climate and ecological reconstructions (see Grosjean et al. and Latorre et al., this volume) and their significance for human settlement. However, this period of instability in settlement in the central Atacama does not correspond with any efflorescence of sedentary life on the northern coast of the Atacama. On the coast, the mid-Holocene saw development of the Chinchorro culture, with semi-sedentary settlements concentrated at the mouth of the Pacific valleys, between Ilo and Camarones. On the coast, the time of the *silencio arqueológico* corresponds to a period when there is abundant evidence for human activity, plentiful marine resources and secure access to fresh water.

### **Andean agriculture and pastoralism**

In the highlands, a combination of small game hunting (birds and rodents) and camelid management, complemented with the collection of fruits of *chañar* and *Prosopis* from the Puna de Atacama, reflects another example of a transhumant circuit. By about 5000 to 4000 BP, hunter-gatherers had shifted from pure hunting to raising wild animals, which provided some of the prerequisites for later camelid domestication and pastoralism. In the Puna de Atacama there seems to have been an independent process of animal domestication, one registered at the open camp of Puripica-1, which includes stone-walled huts, rock slabs with carved camelids and the intensive use of mortars to transform plant products into flour (Núñez 1981; Núñez et al. 1999; Santoro

and Núñez 1987). At the same time, there is the introduction of domesticated plants adapted to high altitudes, such as maize, *quinoa*, *cañihua*, potatoes, *ocas* and *ollucos*. Camelids were fundamental to the Andean economy. Llamas produced meat and *charqui* (dehydrated and salted meat), and were a key mode of transport for trading goods between different Andean regions. Alpacas were selected for the production of woollen fibre used in the fabrication of elaborate textiles, a feature that distinguishes Andean civilisations from other ancient civilisations (Núñez and Santoro 1988; Santoro and Núñez 1987).

## Conclusion

The prehistoric populations of the Atacama, both in the arid highlands as well as along the northern and central sectors of the hyperarid coast, were able to establish complex ways of life based on hunting and gathering marine and terrestrial resources. By the end of the Pleistocene, the isolated Atacama coast (17°S–27°S) was colonised by hunter-gatherers. They carried sufficient experience, but no specialised technology to exploit the rich maritime resources or the resources of the high valleys and prairies of the Andes (3000–4500 metres above sea level). The earliest camps (about 11,000 BP) have been found in the Puna de Atacama (19°S), where a rather successful cultural dynamic started. This led to improvement in technologies (such as hunting and gathering practices, food storage systems, and camelid domestication), ideology and social systems (for example, new settlement patterns and long distance exchange networks). The coast appears to have been populated around 10,000 years BP; 1000 years later than the highlands, but this difference may reflect archaeological sampling rather than actual differences in the timing of colonisation. The archaeology of the northern, more fertile Atacama coast shows that people had mastered the exploitation of marine resources relatively early. This allowed them to maintain a sedentary life, with main camps located at the mouth of major valleys, where the enormous archaeological shell middens that accumulated provide strong evidence of the intensity of these occupations. This pattern is not matched further south, where there were only transitory camps on this sterile coast.

The coastal groups developed effective social and ideological devices (such as artificial mummification) that maintained the internal cohesion of their communities for several millennia. On the sterile southern coast of the Atacama, the lack of permanent fresh water limited the possibilities for intensive use of marine resources. People needed to establish more mobile settlements that included inland oases, such as Pampa del Tamarugal. These areas are within the most arid part of the Atacama Desert. Here, people had few resources away from the coast. They needed to cross more than 100 kilometres of absolute desert to reach highland basins, such as the marshy zone of Calama, the Río Loa basin or the Puna de Atacama, further east.

While the changing environment represented a challenge to the stability of these societies, the magnitude and characteristics of these changes, and their consequences for the way of life of the people, are subjects that require further interdisciplinary studies. Overall, people in the different landscapes of the Atacama Desert maintained their cultural traditions for long periods of time, and were able to cope both with environmental and internal and external social pressures. Today, people of this region face a range of challenges: the need to improve their living conditions, and the development of new technologies to exploit the vast infertile territories that blanket the Atacama, as in many other deserts in the world.

### **Acknowledgements**

Our research was sponsored by Fondecyt grants 1010131, 1970525, 1950035, 1900451, 1890012, 5960011, and the Universidad de Tarapacá. We are grateful to Vicki Cassman, Claudio Latorre, Daniel Sandweiss, Mike Smith and Paul Hesse for their comments and English editing. We also thank Daniela Valenzuela who helped us to set up the figures.