Sol (Island of the Sun) in Lake Titicaca. This huge

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SETTING THE STAGE

On November 15, 1533, the Spanish adventurer Francisco Pizarro and a small force of soldiers entered Cuzco, the imperial capital of the Inca Empire. How can we begin to imagine their awe as they beheld this magnificent ancient city? Only through written accounts can we catch a glimmer of the original splendor of the temples and palaces of the Inca rulers, their elegant masonry, their finely wrought gold and textiles. Only through the chronicles of the Spanish conquerors themselves can we

fully understand the city's surviving archaeological treasures, for Pizarro and his band of invaders left few behind. In no time, the city—arguably the grandest center in pre-Columbian America—was stripped of its treasures.

It had taken Pizarro almost two years to reach Cuzco. During this time, Spanish expeditions had visited many of the Inca and pre-Inca cities and temple centers that archaeologists would begin to investigate only three-and-a-half centuries later. In their continued quest for the riches of the Inca Empire, the Spanish explored much of the Central Andes, learning rather quickly that gold and silver were not the only treasures that the newly conquered Inca civilization held in store. Mother Spain, in conquering what would become Colombia, Ecuador, Peru, Bolivia, and Chile, had won herself a luxurious cornucopia of new resources, ranging from llama wool to fertilizer to a variety of new foods—including the potato.

This book is about the long, slow process of fashioning that cornucopia: the migration from the Old World to the New (that is, the earliest migration to the Americas, across the Bering Strait) and the early settlement of the Andes; the building of cultures, religions, states, and empires, with their distinct traditions, ingenious solutions to problems, and art. It is also, alas, about the conflicts between the various peoples of the Andes, eventually giving rise to the Inca Empire; and, finally, about the ultimate conflict, one which was, for all intents and purposes, decided on the day Pizarro entered Cuzco.

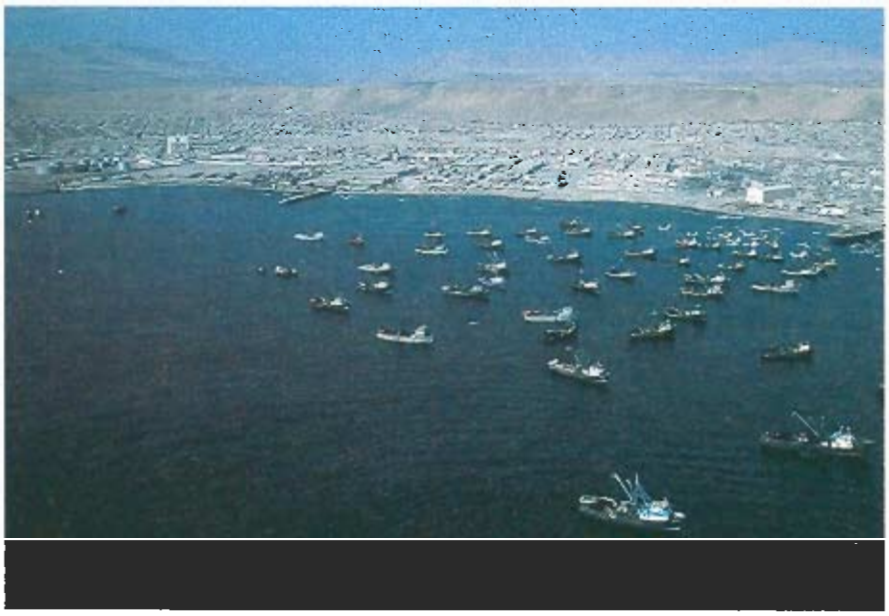
But first, we must prepare for our journey. Like Pizarro and his occupation forces, we will encounter a myriad of environments and resources, from the Pacific Ocean, across the narrow desert coast, to the Andean peaks, and into the tropical realm of the Amazon Basin. Unlike Pizarro, we have at our disposition more than 400 years of geographical study, which others before us have taken the time to sift through and synthesize. Let us begin with a short study of the region's major environmental zones.

Peru's desert coast, mountain highlands, and tropical forests provided the setting for an extraordinary cultural florescence that began some 12,000 years ago. Beginning on the coast, and then spreading into the highlands, Peru's first inhabitants slowly adapted to the challenging environments of the Central Andes, and created a way of life that survives to this day. The map on the opposite page shows the location of some of the major archaeological sites discussed in this book.

OCEAN RICHES AND ARID COASTS

The prime mover in the Central Andean climate is the Peru Current (also known as the Humboldt Current). This cold, northward-flowing current washes the west coast of South America from Valparaíso, Chile, to Punta Pariña, Peru. The winds blowing across the Peru Current pick up not only its cold water, but also nutrients as rich as the ocean itself. Beginning more than 900 feet (275 meters) below sea level and rising to the surface of the ocean, the aqueous environment served by the Peru Current sustains the greatest concentration of fish, bird, and sea mammal life in the world. The most resource-rich of the Andean environmental zones, the Pacific Ocean (which fronts the Andes) until recently supplied one-fifth of the world's fish catch, used both for food and for fertilizer. These ocean riches are concentrated between 5° and 15° South latitude, an immense fishery where, as we shall see, the first Andean civilizations arose. The bounty of the current is evident—sometimes to the naked


Quito
ECUADOR
VALDIVIA
LAS VEGAS
Amazon R.
Iquitos
SICHES
Talara
Marañón R.
P E R U
SECHURA DESERT
BATAN GRANDE
PACOPAMPA
Cajamarca
HUACALOMA
TUCUME
SIPAN
KUNTUR WASI
CUPINISQUE
HUACA PRIETA
CHAN CHAN
CERRO ARENA
Trujillo
CERRO BLANCO
SALINAS DE CHAO
PAÑAMARCA
PUNKURI
SECHIN ALTO
CERRO SECHIN
MOXEKE
LAS HALDAS
ASPERO
GALINDO
KOTOSH
LA GALGADA
HUAMACOTO
CHAVIN DE HUANTAR
HUÁNUCO PAMPA
TELARMACHAY
PACHAMACHAY
EL PARAISO
ANCON
LA FLORIDA
Lima
GARAGAY
PACHACAMAC
MINA PERDIDA
CARDAL
CORDILLERA BLANCA
CORDILLERA NEGRA
BRAZIL
Ayacucho
HUARI
MACHU PICCHU
Cuzco
PIKILLACTA
PARACAS
KARWA
Nazca
CAHUACHI
PUKARÁ
BOLIVIA
L.Titicaca
TIWANAKU
CHIRIPA
Arequipa
CERRO BAUL
KING STYE
CHINCHORRO
PACIFIC OCEAN
CHILE
★ Archeological Site
● Modern City

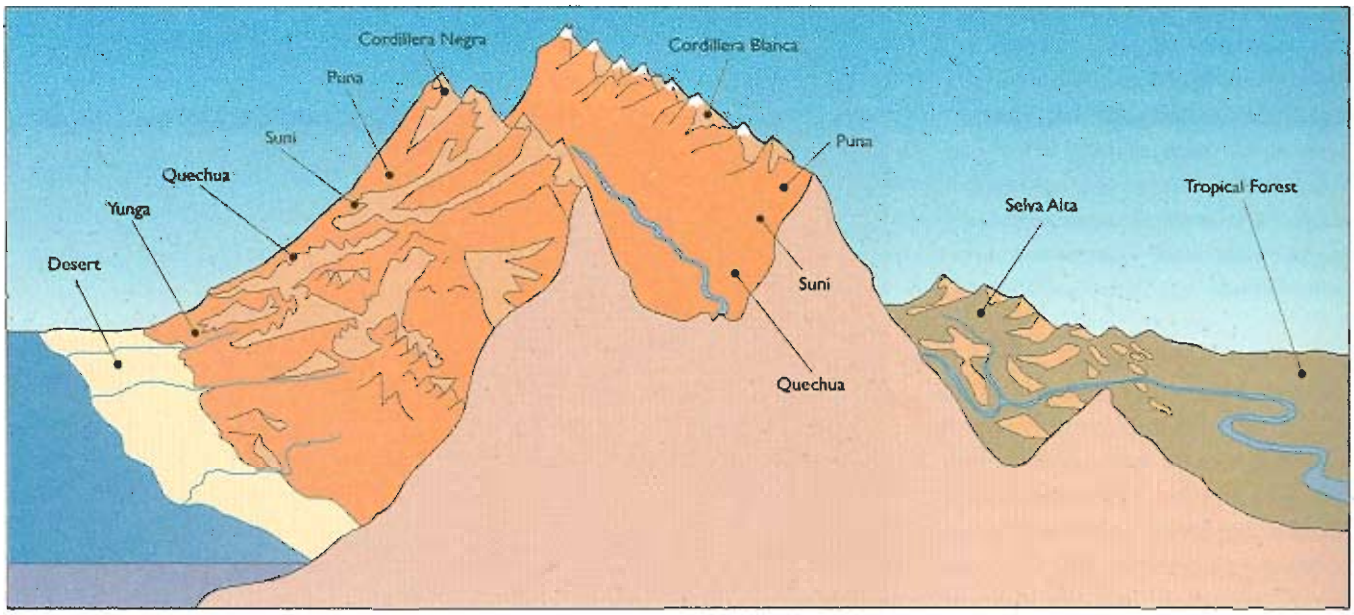


Enriched by the northward-flowing waters of the Peru Current, the waters off the coast of Peru contain some of the most prolific marine resources in the world. As they have for centuries, fishermen ply the coastal waters to harvest its bounty. This photograph shows the fishing fleet at Ilo, a port in southern Peru.

eye—as one approaches the shoreline: multitudes of inshore fish and shellfish species, and, clinging to the rocky shoreline, shellfish and sea lions.

Not only does the Peru Current provide marine resources—of prime importance to Central Andean peoples past and present—but it is also the controlling factor in the creation of one of the world's driest deserts. As the warm, moisture-laden sea winds move across the cold seas of the current, they are forced to release their life-giving water before reaching land. It is not until they move upward into the Andes that they once again gather water, which falls seasonally in the mountain valleys. As a consequence, the narrow coastal strip between the Pacific Ocean and the Andes Mountains receives virtually no rainfall, thus creating the famous hyperarid coastal desert of South America. Yet while this parched landscape holds only limited and scattered resources on its own, the inhabitants have long succeeded in exploiting their environment, for crosscutting the stark deserts of Peru are 57 rivers, most of which originate in the western Andes. These ribbons of life have sustained the people of the Central Andes for more than 12,000 years. Though it must be said that before the establishment of irrigation agriculture some 3000 to 4000 years ago—which enabled the populace to spread river water onto the floodplains and onto the desert—the rivers offered little except seasonal floodwaters for limited farming along the river banks and floodplains at the coast. Without irrigation, this desert coastal zone could not support the dense populations it has known over the centuries.

It is deceptive to think of the desert as a monotonous and barren sea of sand, for the desert coast contains within it a number of individual desert environments that necessitated different adaptive responses from early Andean



Peru's varying topography and diverse climates make it a "vertical mosaic" of environmental zones. The illustration shows the landscape rising from the arid coastal desert through the *yunga* and *quechua* zones to the high grazing lands of the *suni* and *puna*. Between the parallel ranges of the Andes Mountains—the Cordillera Negra and the Cordillera Blanca—lies an area of dry plains. East of the Cordillera Blanca, the land falls away to the tropical forest of the Amazon Basin. The diversity of Peru's natural environments plays a vital role in the lifestyle of Andean peoples.

peoples. In northern and southern Peru, for example, high plateaus that were formerly marine floors during the last Ice Age now rise precipitously at the coast to more than 900 feet (274 meters), their heights carved by deep canyons and river valleys. South of the northern plateaus, meanwhile, the 56-mile-wide (90-kilometer-wide) Sechura Desert, with its massive fields of barchan (crescent-shaped) dunes, presents a formidable barrier to population movements. Even farther south, past the Sechura, the desert narrows into a thin strip, fronting the majestic Andean mountain chain into northern Chile, where it again widens to form the Atacama Desert—one of the driest places on Earth. Still another environment, now largely destroyed by overgrazing, hardly resembles a desert at all: the elevated areas of the Peruvian coast, which support the *lomas* vegetation. There, a moist winter fog called *garúa* nurtures more than 1000 plant species that once attracted deer and the wild camelid, or camel-like animal, known as the guanaco.

ANDEAN VALLEYS, HIGH GRASSLANDS, AND MOUNTAIN PEAKS

As one climbs the western Andean slopes, wetter conditions prevail. Between 1600 and 7500 feet (500 and 2300 meters), the *yunga* ("warm valley", in Quechua, the language of the Incas) is a warm, dry region with deep canyons and plateaus carpeted with thorn forests and such distinctive vegetation as columnar cactus and algarroba trees. From the Zaña Valley northward to Tumbez, the yunga has relict stands of a tropical forest belt. Once widespread, it was destroyed by forest clearing and the introduction of European animals. This tropical forest band was the home of animals that are common

The people of the Andes have adapted their farming techniques to the often difficult conditions of the highlands, or *quechua*. In some areas, wide valley floodplains provide extensive fertile land. Elsewhere, highland farmers have resorted to terracing in order to make efficient use of seasonal water and available land.

in the Amazon Basin: monkeys, parrots, jaguars, and, in the Tumbez River, cayman (a relative of the crocodile). Because the tributaries of the coastal rivers are numerous and are comparatively narrow, the yunga has only limited potential for irrigation. Still, it remains an important agricultural zone, for almost all indigenous Andean crops can be cultivated here as well as in the river valleys of the coast.

The land between 9200 and 11,500 feet (2800 and 3500 meters) is known as the *quechua,* named for the descendants of the Inca. The high-altitude environment encountered by early hunters and gatherers has been radically changed by thousands of years of exploitation, notably by agriculture and tree-clearing. Although there is seasonal rainfall, the region is dependent, as is the coast, on perennial river-water for irrigation and terrace farming. Here, the north-flowing rivers form long valleys that drain two-thirds of Peru eastward to the Amazon. On the slopes of these longitudinal valleys, farmers have constructed flights of terraces, expanding the agricultural potential of even the most precipitous terrain. These staircase farms and the valley floodplains produce a wide range of traditional Andean crops, including many species of potato, one of which is resistant to frost. The potato is only one of a series of tuber crops, such as *oca*, *ullucu,* and *mashua*, which have formed the subsistence base of Andean peoples for millennia.

Between the quechua valley system and the vast grasslands of the *puna* (in Quechua, "high plateau"), lies the narrow transitional zone called the *suni*, an environmental band ranging from 11,500 to 13,000 feet (3500 to 4000 meters)

that reaches the upper limits of agriculture. Cut by deep canyons, the suni is home to the domesticated llama, alpaca, and guinea pig, all of which are important for wool and meat products. In southern Peru and Bolivia, the suni spreads into a wide, undulating plateau surrounding the famed Lake Titicaca. Lying at an altitiude of 12,500 feet (3812 meters), Lake Titicaca is 103 miles (165 kilometers) long, 40 miles (65 kilometers) wide, and 935 feet (285 meters) deep, making it the highest navigable body of water in the world. The Lake Titicaca Basin sustains the densest rural population in both Peru and Bolivia, a vibrant agropastoral society that grows many of the quechua crops and tends vast herds of llama and alpaca.

The agropastoralists of the suni utilize the puna, the highest of the Central Andean environmental zones to be occupied by humans. The puna is an open grassland above the altitude limits of agriculture. Dominated by tall bunch grasses called *ichu*, this grassland holds a mosaic of resources clustered around perennial streams and shallow glacial lakes. Among these resources are the vicuña, a wild camelid prized for its wool, as well as white-tailed and huemal deer. At between 13,000 and 16,000 feet (4000 and 4800 meters), vast herds of domesticated camelids are managed by Quechua and Aymara people. At its widest, in southern Peru and Bolivia, the puna combines with the suni zone to reach a width of about 120 miles (200 kilometers) before grading into the hyperarid Atacama Desert of Chile. At its northern extreme, this rich pasture-land constricts and disappears altogether in north-central Peru.

Towering above the puna are two parallel cordilleras, or mountain ranges, called the Cordillera Negra (black) and Cordillera Blanca (white), the latter named for its cap of snow and ice. Huascarán, the tallest mountain in Peru at 22,205 feet (6768 meters), is the centerpiece of the 75-mile (120-kilometer) Cordillera Blanca; indeed, the range boasts more than 30 mountains exceeding 20,000 feet (6000 meters). The Cordillera Negra, the westernmost of the two ranges, forms the Continental Divide and overlooks the desert coast; the Cordillera Blanca, interrupted repeatedly by major rivers heading to the Amazon and Madre de Dios river systems, is broken into a chain of short cordilleras.

East of the Cordillera Blanca, the land falls away rapidly into a series of deep river valleys that plunge toward the lowland tropical forests. Along the upper portions, at 7200 to 11,000 feet (2300 to 3300 meters), cloud forests are nourished by the persistent, damp winds from the Amazon Basin. Below these forests, the yunga environmental zone extends from 7500 to 3200 feet (2300 to 1000 meters).

Between 1300 and 3200 feet (400 and 1000 meters), the *selva alta* (high tropical forest) grades into the varied tropical forest environment, stretching thousands of miles eastward to the Atlantic Coast of Brazil. Within the tropical forest is found the greatest diversity of plant and animal life in the Western Hemisphere.

The snow- and ice-covered peaks of the majestic Andes run down almost the entire length of the South American continent, and form the world's longest mountain chain.

The people who inhabit these diverse environmental zones certainly do not depend solely upon the resources that they can produce or extract from their own land. It was the ethnohistorian John V. Murra who, during the 1970s, was the first to stress that traditional Andean peoples enjoyed direct access to land and resources in both higher and lower ecological zones. Control of resources in widely dispersed ecological zones produced a chain, or archipelago, of economic islands. This permitted the incorporation of sparse resources, first by households, then communities, then pre-Hispanic states, and, finally—under the Inca Empire—a single, unified, economic system. In the highlands, this economic integration permitted the quechua and suni agriculturalists access to the great pastures of the puna. In the Titicaca Basin, this led to the development of an elaborate agropastoral economy. In other regions, such as the coast, access to goods took place through exchange and trade, with specialized fisherfolk and agriculturalists exchanging marine products for farming staples.

IT WASN'T ALWAYS LIKE THIS

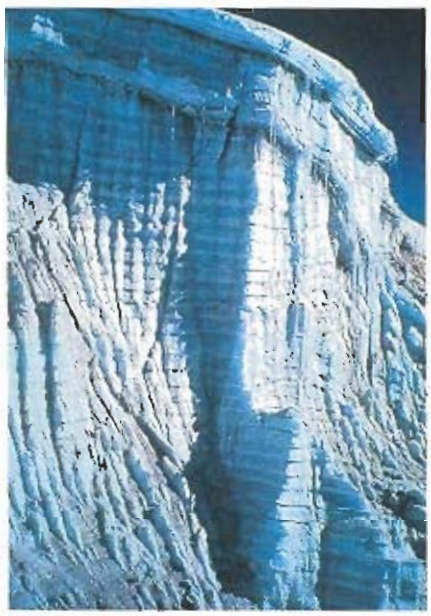
Although there is a paucity of geological studies on the Late Pleistocene (Late Ice Age) in the Central Andes, the little research that has been done allows us to reconstruct the changing environments of the late Ice Age and the Holocene Epoch. Even if the indigenous peoples of the Central Andes had not radically altered the landscape over millennia (a process which accelerated with the arrival of the Spanish), the modern environment would still be markedly different from that encountered by the first migrants some 12,000 years ago. In many now-arid or semiarid areas, for example, colder temperatures and greater precipitation resulted in lusher conditions.

The Talara Tar Pits, in northwestern Peru, offer archaeologists a glimpse of prehistoric climatic conditions along the Peruvian coast. The remains of several species of extinct animals have been found at the site, indicating that this arid area once received sufficient rainfall to support vegetation on which the animals could feed.

Today, 722 glaciers cover some 298 square miles (723 square kilometers) in the Cordillera Blanca in central Peru—the largest glacier-capped region in the tropics. At the height of the last glaciation, between 20,000 and 18,000 years ago, glaciers and snowfields extended downward in altitude more than 3280 feet (1000 meters) below their modern limits. Needless to say, this cold, windswept region would have been very forbidding to early migrants into the high Andes.

Much of the central Peruvian puna was covered by glaciers, and the yunga, quechua, suni, puna, and selva alta vegetation zones were forced to lower elevations or restricted to narrower zones. Even the tropical forests to the east of the Cordillera Blanca, once thought to have been unchanged for millions of years, were more restricted, and deserts prevailed in certain areas fringing the Amazon Basin. During the height of the last glacial period, the average temperature is estimated to have been 9 to 11 degrees Fahrenheit (5 to 6 degrees Celsius) colder than that of today. But by 12,000 to 10,000 years ago, the glaciers were in full retreat, ushering in the Holocene and initiating the transition to modern environments, which were in place by about 5000 years ago.

It has been said that the Peruvian coast has been a desert throughout the entire time period, but recent evidence proves otherwise. Fauna at the Talara Tar Pits provides the best evidence for the glacial Late Pleistocene climate on the northwest Peruvian coast. The now-extinct animals trapped in the tar pits include mastodons, horses, wolves, giant ground sloths, saber-toothed cats, and an extensive bird and insect fauna—all dated to 14,000 years ago. These water- and grass-dependent animals enjoyed annual monsoon rains, which supported widespread savannas, forests, lakes, and marshlands in what has since become—but was not always—a desert.



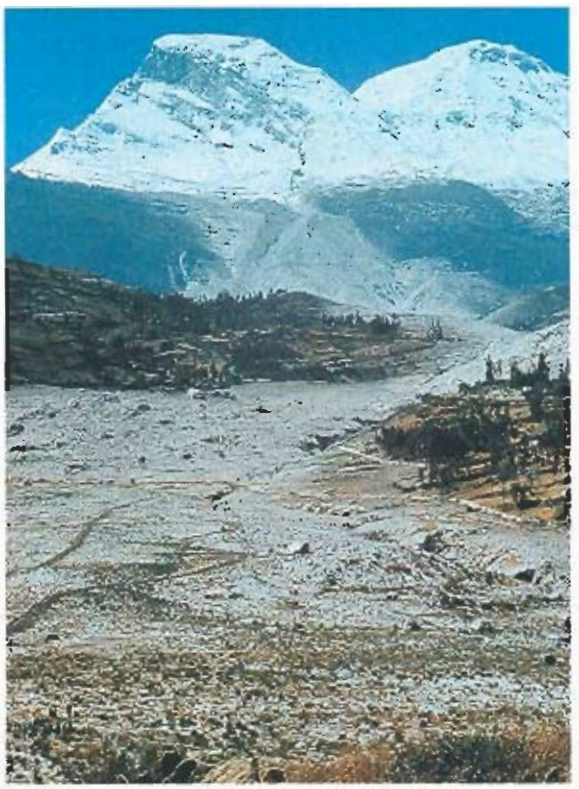
Glaciologists have learned much about the Andean region from the Quelccaya Ice Cap, located southeast of Cuzco in southern Peru. Each layer in this 164-foot-high (50-meter-high) ice cliff, near the margin of the ice cap, represents one year's worth of precipitation. Ice cores taken from the cliff have revealed information about climate changes extending as far back as 1500 years.

Further evidence of wetter conditions into the Holocene Epoch (11,000 to 5000 years ago) comes from the shell middens (mounds of discarded shells) that stretch from El Alto to the Llescus Peninsula. These shell middens are composed of mangrove shellfish species that were collected by early fisherfolk along the coast. Although mangrove swamps are now found only to the north of the Peruvian-Ecuadorian border, they had fringed the northern 233 miles (375 kilometers) of the Peruvian coast prior to 3000 B.C. Just north of the Santa River, and about 250 miles (400 kilometers) south of the mangrove shell middens, a number of 5000-year-old archaeological sites situated on a former Holocene-Epoch shoreline have yielded extensive warm-water shellfish fauna. Since at that latitude today the coast has the cold-water shellfish of the Peru Current, the presence of warm-water shellfish strongly suggests that the ocean current system was different in the past, and that a warm-water current formerly washed these shores, bringing yearly rainfall to this now-arid coast. If this was so, the central and north coasts of Peru were not the arid deserts of today, but were better watered, and probably featured grasslands and forested valleys as many as 5000 to 6000 years ago. As has been pointed out by paleontologist Harold B. Rollins, archaeologist Daniel H. Sandweiss, and myself, this would mean that El Niño, the sporadic warm-water current that brings catastrophic rainfall to the Peruvian coast, originated only in the last 5000 years.

In addition to the significant climate and environmental changes that have occurred since the end of the Pleistocene glacial period, ocean levels fell by 410 feet (125 meters) during the maximum glacial, with the water being "locked up" in the massive ice sheets of the world. Such an enormous drop in sea level exposed vast expanses of the world's continental shelves. Although not as extensive as the exposed continental landmasses along the eastern edges of the Western Hemisphere, a drop of 325 feet (100 meters) some 12,500 years ago would have exposed dry land along the central Peruvian coastline to a distance of more than 37 miles (60 kilometers) from the present coast. As the world's ice sheets retreated, they poured their meltwaters into the ocean basins. Over the next 7000 years, this land surface was submerged by the rising sea levels. Finally, by 5000 years ago, ocean levels stabilized and beach ridges formed at the mouths of the northern Peruvian river valleys. Thus the narrow desert coast of today was much wider in the past, providing early migrants with a broad landscape and coastline to exploit.

THE FOUR "NATURAL" HORSEMEN OF THE APOCALYPSE

Cultural development in the Central Andes cannot be interpreted without correlating the cultural record with geological and climatic change. This region is subject to many of the natural catastrophes that assail other areas of the world, but nowhere else do they occur in such profusion. The disasters range from



The devastating earthquake and subsequent landslide that entombed the Central Andean town of Yungay and 4000 of its inhabitants in 1970 is considered the most destructive natural catastrophe to have occurred in the New World in the last 500 years. The valley appears tranquil today, but the great expanse of boulders and debris left by the avalanche is a reminder that nature always has the upper hand.

localized avalanches, or *huaycos* (floods of liquid mud, usually transporting large boulders), to volcanic eruptions, earthquakes, and El Niño rainfall and drought events that bring severe devastation to vast areas of the Central Andes.

The huaycos can be caused by the rupture of dammed glacial lakes, or by huge rock and ice avalanches from the peaks of the towering cordilleras, some of which are the result of earthquakes. One still-remembered huayco resulted from what is known as the Huascarán avalanche. On May 31, 1970, a devastating earthquake dislodged a block of ice and rock 0.75 mile (1.2 kilometers) long and 2600 feet (800 meters) wide, which then broke away and entombed the town of Yungay and 4000 of its inhabitants. In total, the earthquake claimed more than 70,000 lives and left 500,000 people homeless; it affected 32,000 square miles (83,000 square kilometers) of territory, and destroyed 152 highland and coastal towns and cities, as well as 1500 peasant villages. It is considered the most destructive natural catastrophe to have occurred in the New World in the last 500 years.

An active volcanic chain runs from Colombia to Chile, but the chain is interrupted from southern Ecuador to southern Peru. This gap in the "ring of fire" is due to the low angle (10°) of the Nazca Oceanic Plate as it descends under the South American continent. In the active volcanic regions, the Nazca Plate slides under the Andes at steeper angles of 25° to 30°, allowing magma to rise and exit the earth's crust in the form of volcanic explosions. The largest historically known volcanic eruption in Peru was Huaynuputina, which occurred from February 9 to March 6, 1600. For seven days, the city of Arequipa was in complete darkness, and heavy ash was transported northward for 50 miles (80 kilometers); there is evidence that ash from Huaynuputina reached as far north as Nicaragua. Ash from this eruption also drifted southward, and in the Moquegua Valley, archaeologists have identified its 0.5-to-1.0-inch (1-to-3-centimeter) ash layer, which is used as a chronological marker of the early colonial period.

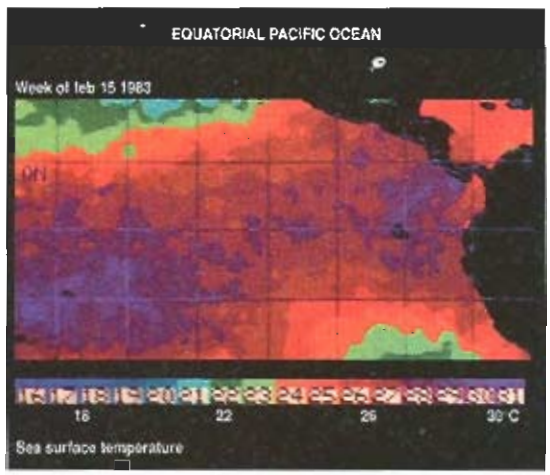
The passing of the Nazca Oceanic Plate under the South American continent makes the Central Andes one of the most earthquake-prone areas in the world. The subduction, or sliding, of one tectonic plate under another takes place at the junction of oceanic and continental plates. This occurs at an immense tear in the earth's crust called the Peru-Chile Trench, a chasm between 16,000 and 26,000 feet (5000 and 8000 meters) in depth. Of the thousands of earthquakes recorded between 1582 and 1974, 42 registered over 7.0 on the Richter Scale. The most active earthquake zone in Peru follows the coastline and the Andes, which is, ironically, the region where many of Peru's great pre-Hispanic civilizations developed. For centuries, inhabitants of this

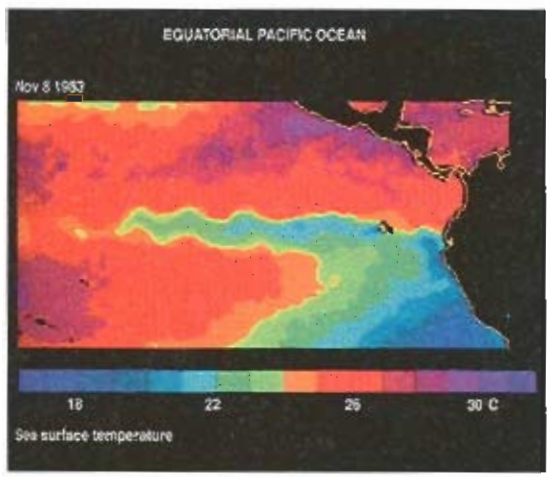
area have watched earthquakes disrupt water sources needed for irrigation, and render unusable the irrigation canal systems so crucial to these agriculturally based coastal societies.

Sometimes accompanying earthquakes are *tsunamis,* or tidal waves, which wreak havoc on coastal cities. In 1746, when an earthquake leveled Lima, a wall of water inundated the city's port, Callao, drowning more than 4000 inhabitants.

It is rare that rain falls upon the hyperarid desert coasts of the Central Andes, but when it does, in so-called El Niño years, it does so to destructive excess. El Niño, or ENSO (El Niño/Southern Oscillation), was named by fishermen for the Christ Child because of its arrival around Christmas. A warm-water current flowing southward along the northern Peruvian coast, El Niño overrides the cold Peru Current, pushing it offshore. This allows the moisture-laden clouds to unload their rain on the desert coast, producing a natural weather catastrophe for the peoples of the Central Andes.

The dramatic effects of the 1982-1983 El Niño show up clearly in these false-color satellite images of sea-surface temperature. In the upper image, warm water (shown as red-magenta) from the western Pacific pushes all the way to the coast of South America, preventing cool water from reaching the surface and replenishing vital nutrients. The lower image shows a return to normal circulation, with a tongue of cool water (shown as blue) stretching up the coast and out into the Pacific.



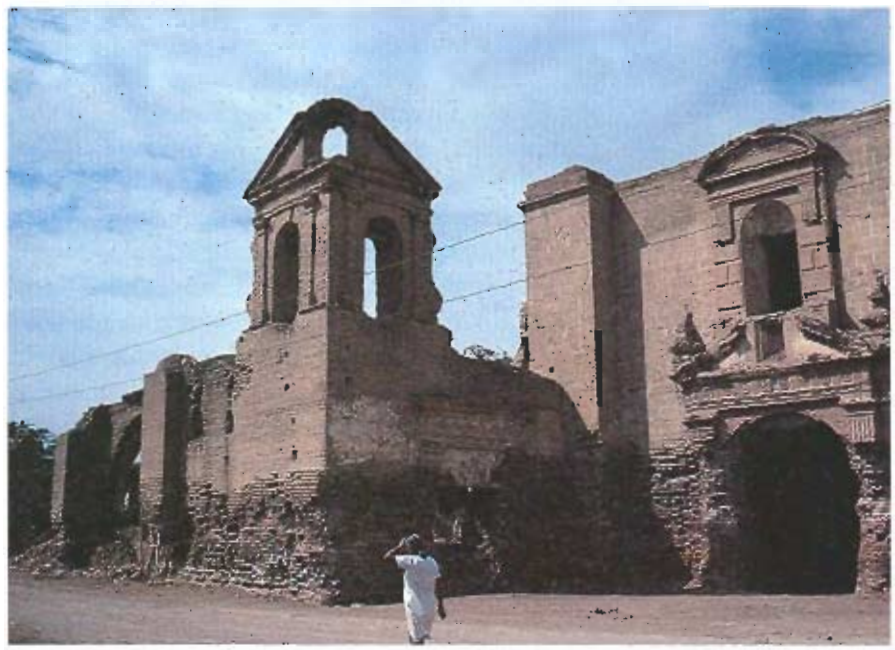


Not only does El Niño produce torrential rainfall on the desert coasts of southern Ecuador and northern Peru, it also provokes droughts in the southern Peruvian and Bolivian Andes. In the last 450 years there have been about 70 ENSO events of varying degrees of intensity. Seven of these, including the El Niños of 1891, 1925, and 1982-1983, were among the strongest on record. (The ENSO record has been pushed back to A.D. 500 by the ice core taken from the Quelccaya Ice Cap southeast of Cuzco, which records both wet and dry periods; this work was done by Lonnie G. Thompson and Ellen Mosley-Thompson of the Byrd Institute of Polar Studies, Ohio State University.) In 1982-1983, the strongest El Niño in 100 years produced months of rainfall, shattering all established records. In southern Ecuador and northern Peru, roads and bridges were washed out, cities inundated, and irrigation systems and agricultural fields destroyed. In the southern Andes, meanwhile, the ENSO drought had a devastating impact on the llama herders, forcing them to choose between seeking pasturage at lower elevations or abandoning their herds, either by slaughtering or selling them, and forsaking the suni and puna by migrating to coastal cities and lomas pastures.

THE SPANISH CHRONICLERS: EYEWITNESSES TO THE PAST

Not only did the Spanish take a keen interest in the mineral riches and the economic wealth of the land and sea, but they also were astonished by the sophistication and magnificence of Inca culture, and by the impressive ruins of even earlier civilizations that abounded throughout the Central Andean landscape.

Because the Inca had no written language, it became the task of the chroniclers—the Spanish soldiers, religious practitioners, and



In the early morning of March 15, 1720, heavy rains caused by El Niño unleashed floods that annihilated Zaña, once a thriving city of 80,000 people in northern Peru. The only building to remain standing was the Convent Church of San Agustin, whose eroded lower walls hint at the massive destruction caused by the floodwaters. Today, the ruined structure is undergoing repairs to ensure that its walls remain stable.

government officials—to tell the story of the history and culture of the Inca Empire and its predecessors. The writings of Captain Pedro de Cieza de León, published in 1553, provide one of the best eyewitness accounts of the early years, and are among the few to mention the brilliant civilizations that preceded the Inca. Arriving in 1547, Cieza de León traveled throughout Peru and Bolivia, and described Inca and pre-Inca cities and temples, including the ruins of the capital of the pre-Incan empire of Tiwanaku, in present-day Bolivia. Other major pre-Inca sites, such as the capitals of the Huari and Chimú empires and the ancient ceremonial center of Pachacamac, caught the attention of other Spanish chroniclers.

In 1908, the momentous discovery in the Royal Library of Copenhagen of *El Primer Nueva Corónica y Buen Gobierno*, written before 1615 by Felipe Guamán Poma de Ayala, made public 400 drawings depicting aspects of the economic, social, political, and religious systems of the Inca. This unparalleled document is the only visual history of the fateful encounter between the Spanish and Inca empires, and it is a major source for the interpretation of Inca culture by ethnohistorians and archaeologists.

Often for motives of greed rather than those involving scientific inquiry, Inca and pre-Inca ruins were mined for their golden and silver treasures, activities which continue to the present day. Yet whatever the motive, it is by this means that we have amassed much of our knowledge of Andean cultures. In addition to precious metals, the Spanish discovered elaborate ceramics, textiles, jewelry, and wood and stone carvings—treasured by-

Among the earliest artifacts unearthed from Inca tombs were the pots shown above, which were studied and recorded by Thomas Ewbanks during an 1849-1852 expedition to South America. Ewbanks was one of the first to establish the importance of such artifacts, in the absence of any written records. These and other materials were subsequently shipped to the United States by a U.S. naval astronomical expedition.

products of looting that represented the majority of the pre-Incan civilizations that professional archaeologists would study in great depth in the 19th and 20th centuries.

THE EARLY ARCHAEOLOGICAL DISCOVERIES

The 19th century saw the rise of the scientific approach to the explanation of both the natural and the cultural world, replacing theological interpretations of the archaeological and geological record. The earliest scientific attention to the archaeological record of the Andes came in the form of expeditions that investigated the geography, geology, flora, and fauna of South America. The pace of discovery quickened as naturalists explored throughout the Andes. Although most early investigators described the ruins that they encountered, they did not conduct organized archaeological investigations of the sites, and rarely did they speculate on the age of the archaeological record they were documenting.

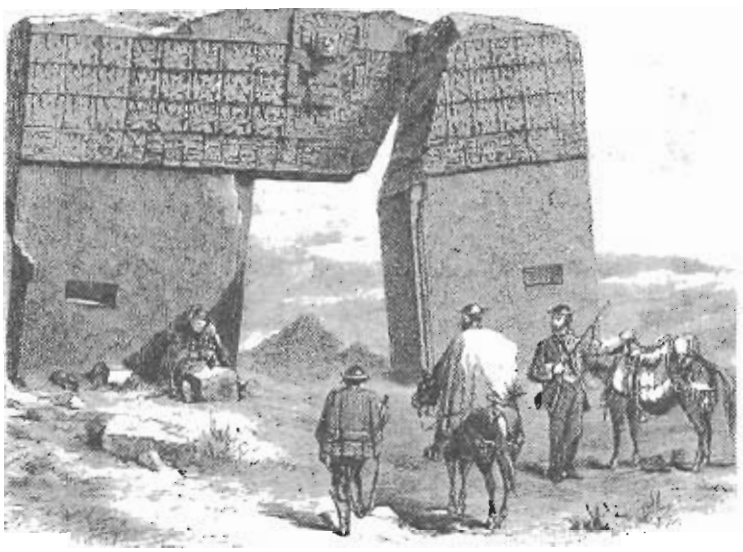
One of the first archaeological reports was by Thomas Ewbanks, who in 1855 published a series of provincial Inca tomb lots from Arica (a small city which at that time belonged to Peru, and is now part of Chile), collected and shipped to the United States by a U.S. Navy astronomical expedition. In his well-illustrated report, Ewbanks remarked that:

> Whatever is to be known has to be drawn out of the ground; out of what the plough turns up; what mounds, graves, and earth-works may disclose; and what architectural ruins may afford. These are the only archives remaining of the deeds and destinies of the old inhabitants of the hemisphere; and hence everything registered in them, however trifling under other circumstances it might be considered, has a value proportioned to the insight it may give into national or social habits and conditions.

A key point in Ewbanks's profound statement is the fact that much of the cultural record of the Central Andes can be revealed only through archaeological research, for, as was previously stressed, there exists no written record of the accomplishments of Central Andean peoples before the arrival of the Spanish chroniclers.

In 1863, Ephraim George Squier arrived in Peru as the U.S. Commissioner to arbitrate between Peruvian and North American merchants of guano (bird excrement used as fertilizer). Squier was well known fot the first scientific studies of the large earthworks in the Ohio and Mississippi valleys, and his friendship with the eminent historian William H. Prescott led him to spend two years of research on archaeological sites in Peru and Bolivia. His 1877 publication on his Peruvian travels included detailed descriptions of archaeological sites, and he speculated on the possibility that some of the ruins were pre-Inca in date. Rich with illustrations, his book made the public aware both of the vastness of the Central Andes and also of the magnitude of the region's numerous monuments, cities, and temples.

The 19th-century explorer Ephraim George Squier traveled extensively in Peru and Bolivia in 1863 and 1864. Squier was impressed with the massive structures and fine architecture that he encountered, and described his journey in *Peru: Travel and Exploration in the Land of the Incas*. In this engraving from the book, Squier and his party inspect the partly ruined Gateway of the Sun, at Tiwanaku.



The modern foundations of scientific archaeology in Peru stem from the 1874–1875 excavations at Ancón, north of Lima, by the German investigators Wilhelm Reiss and Alphons Stübel. These studies stimulated Max Uhle, an assistant at the Königliches Museum für Völkerkunde in Berlin, to devote the rest of his life to Andean archaeology. Uhle published on the Stübel and Reiss collection and, with Stübel, on the ruins of Tiwanaku; thus, when he finally went to South America in 1892, he was already an eminent scholar of Andean archaeology. With financial support from his new employer, the University of Pennsylvania, he excavated briefly at Ancón before mounting a major campaign at Pachacamac, where he excavated for a full year; his 1903 report on the research at Pachacamac became a milestone in Peruvian archaeology. Uhle focused his attention on the contents of burials, and, through his analysis of cemetery data at various sites, he soon demonstrated that a whole series of art styles had a regional—specifically, pan-Andean—spread. Uhle proposed the first chronology of cultures for Peru: Early Pre-Tiahuanaco (now spelled Tiwanaku), Tiahuanaco, Pre-Inca, and Inca periods.

For more than 40 years, Uhle's ordering of major Peruvian cultures remained in vogue. Even after continued investigations to the present day, it remains the core of the modern chronological system of the Central Andes. Uhle speculated that the cultures he had discovered must be at least 2000 years old. Remarkably (considering his relatively small bank of data), he was not far wrong: the beginning of his Early Pre-Tiahuanaco Period has since been radiocarbon-dated to 2200 years ago. (All dates presented in this volume for pre-Hispanic cultures in the Central Andes are derived from the radiocarbon, or C_{14}, technique of dating. The technique was invented by Willard F. Libby in 1949, and earned him the Nobel Prize. This method can date organic materials—such as wood, charcoal, bone, and shell—up to 50,000 years of age). Uhle was also correct in his statement that the pre-Inca societies were at least comparable to, and in many cases surpassed, the Inca in their complexity and brilliance.

Uhle left Peru in 1912, after directing the newly opened National Museum of History of Peru. He remained in South America until 1933, establishing museums in Chile and Ecuador, and amassing large collections for exhibition and for foreign museums. The year before Uhle left Peru, Hiram Bingham of Yale University was to discover the untouched Inca site of Machu Picchu in the Urubamba Valley east of Cuzco, initiating a surge of interest in Inca culture and the first major research at an Inca site.

Max Uhle was one of the founders of modern scientific archaeology in Peru. Uhle's pioneering studies of cemeteries and burials helped to establish an important chronology of Peruvian cultures.

Gordon R. Willey, shown here in 1946, implemented the settlement-pattern study of the Virú Valley Project, a chronological examination of a single valley that focused on all aspects of its cultural development.

In 1913, the first Peruvian professional archaeologist was appointed to direct the new archaeology division of the National Museum of History, Lima. Born in 1880 and educated at the University of San Marcos and at Harvard University, Julio C. Tello was a highland Indian. He was a prodigious investigator, excavating or surveying in almost every coastal valley and throughout the highlands. One of Tello's major scientific contributions was the recognition of even earlier cultures than those described by Uhle. In 1919, Tello headed an expedition to the Callejón de Huaylas in northern Peru, where he investigated the massive temple center of Chavín de Huántar. With its elaborate carved stone monuments, representing fanged jaguars, caymans, birds, and serpents, the site led Tello to conclude that Chavín de Huántar was the center of the first civilization in the Central Andes. He also proposed that Chavín culture was in part derived from cultures in the tropical forest. Tello and others subsequently encountered the Chavín art style in architecture, ceramics, and textiles along much of the coast. Thus, by the 1940s, they were able to establish that yet another period of widespread cultural interaction had preceded the Early Pre-Tiahuanaco Period.

THE QUICKENING PACE OF RESEARCH

After World War II, the members of the Institute of Andean Research, founded in 1941, played a key role in the planning and implementation of the Virú Valley Project, the largest archaeological project yet undertaken in the Central Andes. The goal of the Virú Valley interdisciplinary research program was to conduct a holistic study of a single coastal Peruvian valley; the project included research on the early occupation of the region, the development of a precise chronology of the styles of ceramic works, and a valley-wide study of settlement patterns. This latter approach to archaeological interpretation was developed by the archaeologist Gordon R. Willey after discussions with noted anthropologist Julian H. Steward. Willey examined how settlement systems—that is, the ensemble of all the components of a settlement, including temple and public centers, dwelling sites, fortifications, and cemeteries—reflected changing political, religious, social, and economic organization of successive cultures in the Virú Valley. The monographs and numerous papers resulting from the Virú Valley Project formed the next plateau upon which the succeeding generation of Peruvian and foreign archaeologists was to build.

In concert with the Virú Valley Project, excavations by the archaeologist Junius B. Bird at the coastal fishing village of Huaca Prieta in the neighboring Chicama Valley revealed for the first time the Late Preceramic cultures (cultures not yet using pottery) that formed the foundation for later Central Andean civilizations. In 1949, just after Bird excavated at Huaca Prieta, he took advantage of W.F. Libby's newly developed radiocarbon C14 dating system and submitted botanical samples from Huaca Prieta to Libby for dating.

In 1919, Julio C. Tello's excavation of the temple center of Chavín de Huántar led the archaeologist to the belief that Chavín represented the earliest civilization in the Central Andes.

Archaeologist Michael E. Moseley was the first to present the hypothesis that Peru's earliest coastal temple centers depended upon the resources of the sea, rather than on agriculture, for subsistence.

The dates not only supported Bird's estimate of 5000 years of age for Huaca Prieta, but produced dates for 3000-year-old pottery production in Peru.

By the 1950s, the tempo of archaeology increased markedly, with numerous expeditions and excavations being initiated throughout the Andes by both foreign and Peruvian scholars. Many of the research strategies of the Virú Valley Project were applied to various Andean regions. In the 1950s and 1960s, emphasis was placed on uncovering the evidence for initial human occupation, origins of farming economies, development of coastal fishing societies, and the nature of the newly discovered, 5000-year-old Andean temple centers. Ethnohistorical sources and archaeological techniques were employed in reconstructing Inca civilization. A geological approach was introduced into the interpretation of the archaeological record, correlating climate change with cultural development. Researchers also investigated the relationships between tropical forest cultures and Central Andean societies. These new research thrusts included the continued research at many well-known sites, leading to further refinement of the cultural chronology of the Central Andes, as well as a better general understanding of the evolution of Andean civilizations.

A major issue in the late 1960s and early 1970s was which kind of resources—agricultural or maritime—had formed the subsistence pattern of cultures preceding the later Andean coastal civilizations. Archaeologist Michael E. Moseley, following up on Edward P. Lanning's work on the Late Preceramic sites in the Ancón region, developed the hypothesis that the earliest complex societies in Peru had an economic base of ocean resources, and not agriculture. For its time, this was a radical hypothesis, for all archaeologists believed that the rise of the state throughout the world was universally due to subsistence strategies based upon agriculture. Moseley supported his claim with evidence from the Ancón region shell middens and from the discovery in the 1960s of a series of 4000- to 5000-year-old coastal temple centers that offered little agricultural evidence.

It was also during this period that further large-scale, interdisciplinary research projects were initiated—the first since the Virú Valley program. In the Ayacucho region of the southern Peruvian Andes, archaeologist Richard S. MacNeish initiated a program of investigations on the early evidence for human occupation and the origins of agriculture; and in the Junín puna, archaeologists Ramiro Matos Mendieta and John W. Rick concentrated on early cave and rockshelter sites. In the Moche Valley, Moseley and his colleagues investigated the Moche capital at Cerro Blanco, the Chimú capital at Chan Chan, and the irrigation canal systems that were so essential to the agricultural economy of these state-level societies. A major program of Inca research in the Huánuco region, focusing upon local ethnic groups under Inca domination, was developed by John V. Murra and a team of archaeologists and ethnologists.

These studies have established certain norms in the field of Andean archaeology: to the present day, research continues to focus on long-term investigations of temple and urban centers, and on the examination of changing settlement patterns of river valleys and geographic regions. Not only have the sites made famous by the earliest Spanish chroniclers received renewed attention, but other little-known regions of the Central Andes have been surveyed and investigated. However, many areas still remain unknown to the archaeologist.

This volume will present our current understanding of cultural development in the Central Andes, as reconstructed from the archaeological record. As emphasized above, with the exception of the Inca Empire, all of our interpretations of the cultural evolution of the Central Andes come from archaeological research. The reason for this is that, unlike societies such as the Maya, the ancient peoples of the Andes left no written record of their accomplishments. Four unifying themes will guide our interpretation and reconstruction of the 12,000 or more years of cultural development in the Central Andes. These are continuity and change, interaction and communication, economic diversity, and the impact of natural catastrophes on the rise and fall of Central Andean civilizations.

It has been well established that there is long-term continuity between successive cultures in certain areas of the Central Andes. However, the contrary is also true, as evidenced by dramatic cultural changes in other areas. Emphasis will be placed on these continuities and discontinuities through time, as well as on their underlying causes—such as political domination, assimilation, or sweeping population changes.

The rise of complex societies 5000 years ago brought increasing trade and interaction over great distances. Not only were foreign elements present in the artifact assemblages and art styles, but much of the Central Andes region, especially after 3000 B.C., was united in a sphere of interaction through which economic resources, ideologies, and art styles flowed northward and southward, and east to west, from the tropical forest, across the Andean chain, and into the coastal valleys.

Cultural complexity led to a myriad of subsistence technologies which were developed to maximize the capture or production of resources from the ocean to the high grasslands to the tropical forests. Ingenious systems of fishing, farming, and herding emerged through time, providing the economic foundation for these states and empires.

As societies grew more complex, the impact of natural disasters became more severe. Recently, the impact of natural catastrophes has been seen as playing a key role in the rise and fall of Central Andean civilizations. The record of the natural "Four Horsemen of the Apocalypse"—avalanches, volcanic eruptions, earthquakes, and El Niño flood and drought events—will be examined to determine their role in driving cultural change.

CENTRAL ANDEAN CHRONOLOGY

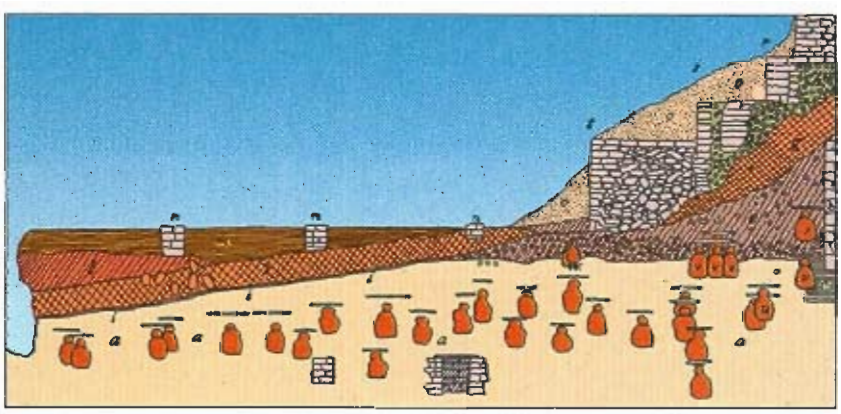
The chronological system used by archaeologists to organize the vast and complex archaeological record of the Central Andes was proposed by archaeologist John H. Rowe in 1960, and was based on the ideas of famed anthropologist Alfred L. Kroeber and archaeologist Gordon R. Willey. Later modified, it now stands as follows:

EARLY PRECERAMIC PERIOD (10,000? TO 6000 B.C.)
This period saw the initial peopling of the Central Andes during the Late Pleistocene, when glacial conditions prevailed. Over the next 4000 years of fluctuating climate, these first inhabitants developed a series of adaptations to coastal and intermontane valleys, and to the high grasslands.

MIDDLE PRECERAMIC PERIOD (6000 TO 3000 B.C.)
The transition to modern climates led to the first sedentary communities, the use of domesticated plants, and the growth of a llama-herding economy.

LATE PRECERAMIC PERIOD (3000 TO 1800 B.C.)
During this period, large temple centers were built on the coast and in the Andes, supported by the exploitation of maritime and agricultural products.

INITIAL PERIOD (1800 TO 800 B.C.)
This period saw the introduction of pottery technology, the construction of huge monuments, the spread of irrigation, and the development of new art forms and architectural styles.



Max Uhle's research at the Middle Horizon cemetery under the temple at Pachacamac was among the first stratigraphic excavations carried out in Peru. This illustration shows the relative positions of burials unearthed by Uhle.

EARLY HORIZON (800 B.C. TO 200 B.C.)
The first of three periods during which the Central Andes was integrated by the spread of the Chavín religious cult, also reflected in the adoption of the Chavín art style.

EARLY INTERMEDIATE PERIOD (200 B.C. TO A.D. 600)
The rise of the Moche, Nasca, Tiwanaku, and others produced the finest ceramics, textiles, and metalwork of any period, as well as massive irrigation and public works. This period also saw an increase in militarism.

MIDDLE HORIZON (A.D. 600 TO 1000)
The Middle Horizon marked the zenith of the southern Andean Tiwanaku and Huari empires.

LATE INTERMEDIATE PERIOD (A.D. 1000 TO 1470)
The renewed development of regional states—notably the Chimú Kingdom of the Peruvian north coast and the emerging Inca of the Cuzco region—led to collision and invasion.

LATE HORIZON (A.D. 1470 TO 1532)
Having subdued their neighboring rivals, the Inca soon established the largest empire known in the Americas: Tahuantinsuyu (or "Land of the Four Quarters"), stretching 3500 miles (5500 kilometers) from Chile and Argentina to southern Colombia.