

By D. H. Thomas and E. Delson

REPRINTED FROM:

Encyclopedia of Human Evolution and Prehistory, 2nd ed; E. Delson, I. Tattersall, J. A. Van Couvering and A. S. Brooks, eds. Garland: New York, 2000

WITH THE COMPLIMENTS OF:

Eric Delson
Department of Vertebrate Paleontology
American Museum of Natural History
New York, NY 10024

The most impressive physiographic feature in North America is the western cordillera, running the length of the continent like a gigantic backbone. A more ancient mountain chain flanks eastern North America, reaching only half the height of its western counterpart. The vast area between the Appalachians and the Rockies includes the glaciated Canadian Shield to the north, the Great Plains in midcontinent, and the Mississippi Basin to the south. East of the Appalachians is a coastal plain, relatively narrow in the north but widening significantly as it approaches the Gulf of Mexico.

An equally impressive range of mountains, the Andes, runs the full length of the South American continent. Although narrower than the North American cordillera, the Andes are much higher, reaching over 7,000 m in places. Coastal lowlands, varying in width, border the Andes. The uplands of eastern South America are much older than the Andes, much more weathered, and considerably lower in elevation. The lowland plains of interior South America contain the Orinoco and Amazon drainage basins.

Primate History

NORTH AMERICAN EARLY PRIMATES

The first well-documented faunal assemblages containing primates occur in the Paleogene of western North America. Although the order may have originated in eastern Asia, fossils are rare there throughout the Cenozoic. Numerous localities yielding diverse mammalian faunas are known throughout the Paleocene and the Eocene of the Rocky Mountain region (then mainly lowland tropical forests), and primates are a common component of these faunas (*see map*). Plesiadapiform primates are the oldest widespread group, including a variety of archaic forms grouped into two superfamilies with five families.

Purgatorius, the oldest recognized primate, appears at the very end of the Mesozoic and continues into the earliest Cenozoic, ca. 66–64 Ma. It is usually included in the family Paromomyidae, which also includes a number of extremely small to small, mainly Paleocene taxa that are among the least-derived primates. Most of these are restricted to western North America, although two genera also occur in western Europe and the Arctic (Ellesmere Island). Most paromomyids were insectivorous, but larger forms, such as the speciose and widespread *Phenacolemur* (which persisted into the Middle Eocene), were partly frugivorous. The dentally batlike picrodontids were rare nectar feeders restricted to western North America and perhaps derived from paromomyids. These two families are loosely grouped into the superfamily Paromomyoidea.

A larger range of sizes characterized the Plesiadapoidea, a group of three families linked by the development of mitten-like prongs on the enlarged central upper incisor. The Plesiadapidae and the Carpolestidae range from Early Paleocene into Early Eocene in the American West, with some plesiadapids known also in Europe. Skulls and postcrania of plesiadapids are the best known among all the archaic primates, documenting a snouty face, the lack of a postorbital bar known in all other primates, and a semigrasping foot (presumably related to primate arboreality). Plesiadapids are known that were as large as living marmots or woodchucks, and they ate a variety

Americas

The New World landmass measures 15,000 km from the Arctic to Cape Horn, both continents stretching 5,000 km across at their widest points. This immense territory (more than 42 million km²) covers more than one-quarter of the world's habitable surface.

of vegetable materials. The generally smaller carpolestids are known from less-complete remains, but they are characterized by an enlarged, blade-like P_4 and enlarged flattened and multi-cusped P^{3-4} , which probably helped shearing of a fibrous diet.

By the end of the Paleocene, the first members of the modern primates (the euprimates) may have evolved in Asia or perhaps in southern North America. Two groups of euprimates appear suddenly, through migration, in North America and Europe at the beginning of the Eocene (ca. 55 Ma): the strepsirhine Adapiformes and the haplorhine Omomyidae. The archaic primates soon disappeared, competed into extinction not only by later primates but also by the rapidly diversifying rodents. In the American West, the adapiforms are represented by the small-to-medium-sized Notharctidae, a mainly folivorous group similar in many ways to the living lemurs of Madagascar. Four genera of notharctids are known by a dozen species ranging into the Middle Eocene, while one adapiform of European affinity occurred in the Late Eocene of Texas. The generally small omomyids were much more diverse and long-lived, with perhaps two dozen mainly monospecific genera, placed in the subfamilies Anaptomorphinae, Ekgmowechashalinae, and Omomyinae, spanning the earliest Eocene to the latest Oligocene. Species range from the size of the smallest marmosets up to that of medium-bodied monkeys, at least in tooth-row length. Diets were similarly varied, with frugivores, folivores, and insectivores among the known species. Most taxa have enlarged lower incisors like those of less-derived archaic primates, but at least some species had incisors and certain foot bones more like those of the ancestral anthropoids. It seems likely that the protoanthropoid stock was derived from an omomyid-like ancestry. With climatic cooling through the Eocene, forested areas decreased in size, and most arboreal mammals were forced into competition for limited resources in the north or into the smaller geographic space of southern North America. Only one omomyid is known in the Late Eocene (ca. 36–34 Ma) of Montana, and another from the Late Oligocene (ca. 28 Ma) of Oregon and South Dakota (possible forest refuges?).

SOUTH AMERICAN PLATYRRHINES

Although the probable ancestry of the higher primates, or anthropoids, can be traced to near the tarsiiform omomyids, the nature of their dispersal into the southern continents is less clear. Early anthropoids arrived in South America by the Late Oligocene (27 Ma), when *Branisella* is known from Bolivia. The living New World primates, the platyrrhine monkeys, are divided here into two families, Cebidae and Atelidae, each with a long fossil history. In fact, *Branisella* can be included in the Cebidae, as can the Early Miocene (ca. 20 Ma) Patagonian *Dolichocebus* and Chilean *Chilecebus*, close relatives of the living squirrel monkey, *Saimiri*. Another Early Miocene genus, *Tremacebus*, is apparently a relative of the living nocturnal owl monkey, *Aotus*; both forms show enlargement of the eye sockets typical of nocturnal mammals, especially anthropoids. *Soriacebus* is probably the oldest known pitheciin. In the Middle Miocene (14–12 Ma) La Venta fauna of northern Colombia, at least nine genera con-

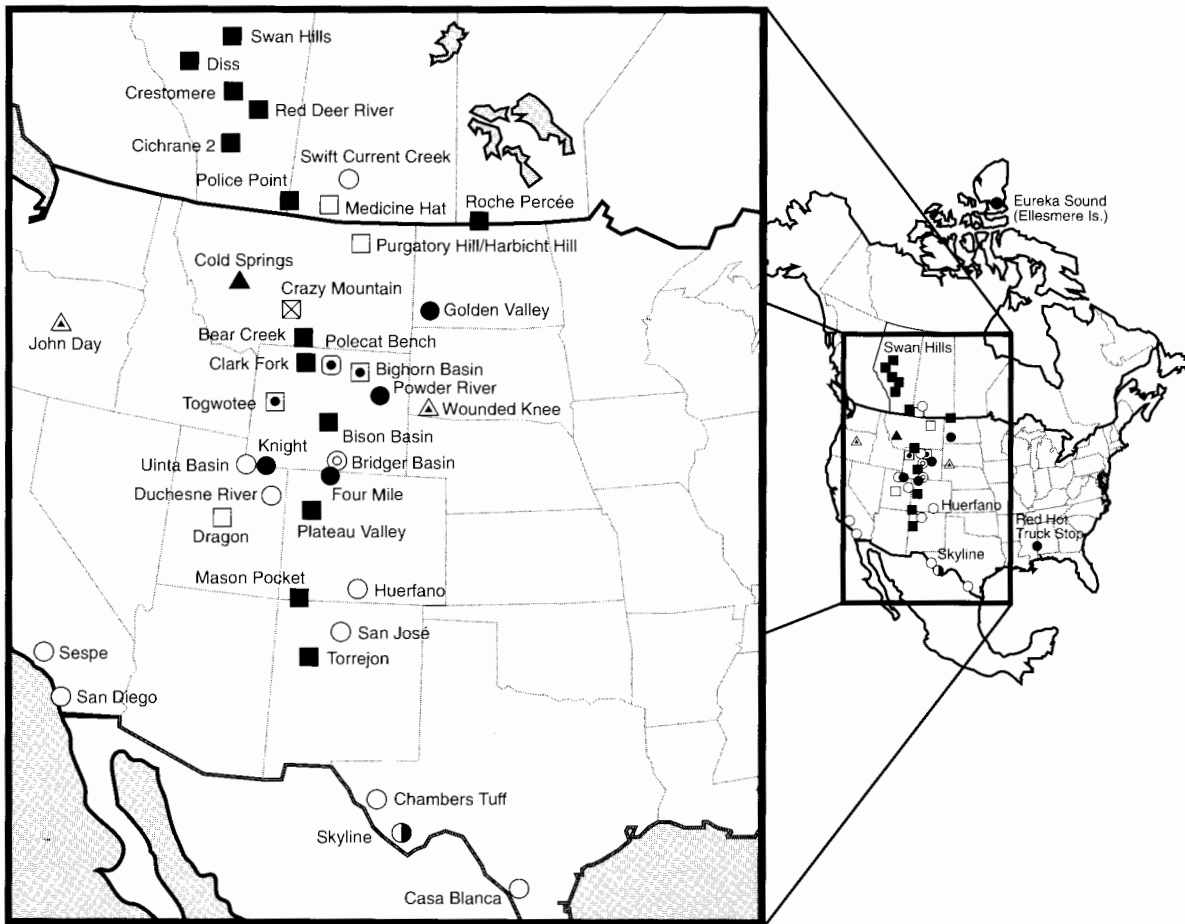
tinue to demonstrate the early diversification of the platyrrhines. *Micodon* and perhaps two other taxa are early calitrichines, *Neosaimiri* is little different from *Saimiri*, while *Aotus* is represented by an extinct species. *Stirtonia* is a large form close to the modern howler monkey, and three other genera represent early members of the atelid subfamily Pitheciinae. At least three further distinctive genera are known from Holocene deposits on Caribbean islands, suggesting a dispersal through that region from a probable Central American source. Two other very large ateline genera are known from the Late Pleistocene of eastern Brazil.

The modern platyrrhines have a wide range of diets, social behavior, and locomotor adaptations. As in the early primates, most genera can be distinguished by their dentitions. Yet, despite the presence of a widespread plains fauna in South America during the Miocene, no platyrrhine became terrestrial, in contrast to the multiple adaptations to ground life among Old World anthropoids. Instead, all New World monkeys are restricted to forested environments, and the rapid encroachment of humans on their habitats is driving several species toward extinction.

Humans in the New World

The New World was discovered at least three times. The most celebrated “discovery” is accorded Christopher Columbus, who landed on San Salvador in October 1492. But half a millennium earlier, Norsemen from Greenland and Iceland had already fished the waters of North America, shipping its timber back to their families on tree-barren Greenland. Although the New World adventures of Leif Eriksson were duly recorded in Norse epics, scholars debated the existence of a Norse New World settlement for nearly a millennium. The best archaeological evidence for their presence is at L’Anse aux Meadows (Newfoundland). Landing ca. AD 1020, the Vikings held onto their New World foothold for three decades before retreating. When the Vikings arrived at L’Anse aux Meadows, they encountered, and thoroughly alienated, the true first Americans, whom the Norse called *scraelings*. In fact, the first human footprints on New World soil belonged to the Asian people who were to become American Indians and the closely related Eskimo. The Americas were “discovered” and then populated from northeastern Asia by 20 Ka, perhaps as early as 30 Ka. People migrated into this New World as fully evolved *Homo sapiens sapiens*. Human beings did not evolve in the Americas.

The first Americans brought certain basic cultural skills: fire making, flint chipping, and serviceable means of procuring food, shelter, and clothing. These early immigrants must also have brought with them the rudiments of kin-group social organization and beliefs about magic and the supernatural. They certainly possessed forms of human language. When Columbus arrived, Native Americans of Alaska, Canada, and the U.S. mainland spoke about 2,000 mutually unintelligible languages; the linguistic complexity in South America was comparable. Although some degree of linguistic diversity may have been imported with the earliest New World settlers, much of the linguistic evolution took place as Native Americans adapted to their new environment.



Selected North American fossil primate localities from Early Paleocene to Late Oligocene; inset shows sites east of the Mississippi. Age and included taxa are indicated according to the key at right.

The published legend is erroneous; the following is correct:

- | | | |
|-------------------------------------|--|--|
| □ Latest Cretaceous-Early Paleocene | ○ Middle Eocene | ★ Middle-Late Paleocene – Plesiadapiformes |
| ■ Middle-Late Paleocene | ⊙ Middle or Late Paleocene-Middle Eocene | ● Early Eocene – Plesiadapiformes, Adapidae |
| ● Early Eocene | ◐ Late Middle Eocene (adapids only) | ⊙ Early Eocene – Plesiadapiformes, Adapidae, Anaptomorphinae |
| ◐ Late Paleocene-Early Eocene | ▲ Late Eocene Omomyidae | ◑ Middle Eocene – Adapidae, Microchoerinae |
| ⊙ Early Paleocene-Early Eocene | △ Late Oligocene Omomyidae | ■ Late Eocene – Adapidae, Microchoerinae |
| | | ⊗ Early-Late Eocene – Adapidae, Microchoerinae |
| | | ▲ ?Late Eocene – Adapidae |

PALEOINDIAN OCCUPATIONS

The earliest well-defined archaeological assemblages in the Americas are termed *Paleoindian*, the earliest of which is the Clovis complex, dating sometime between 12 and 11 Ka. Despite decades of concerted research, no undisputed evidence of a pre-Clovis presence has been uncovered anywhere in the Western Hemisphere. But whether the Paleoindians were actually the First Americans is not known. Most archeologists still agree that the first Americans traveled from Asia sometime during the Late Pleistocene. Biology and language point to an Asian homeland; it is the timing and conditions surrounding their arrival that remain unknown. A few archeologists have suggested that the morphology and artifacts of the first Americans suggest very generalized, even Paleo-Eurasian or European ancestry rather than close relationships to East Asian ancestors.

Considerable nonarchaeological evidence also supports this position. In the 1980s, J. Greenberg's reanalysis of Amer-

ican Indian languages postulates three waves of migrants into the New World. This linguistic interpretation indicates that the earliest wave of migration took place ca. 12 Ka; they were the people of the Clovis complex. Independent correlations of dental traits and evidence from molecular biology can also be cited in support of the Clovis-first hypothesis.

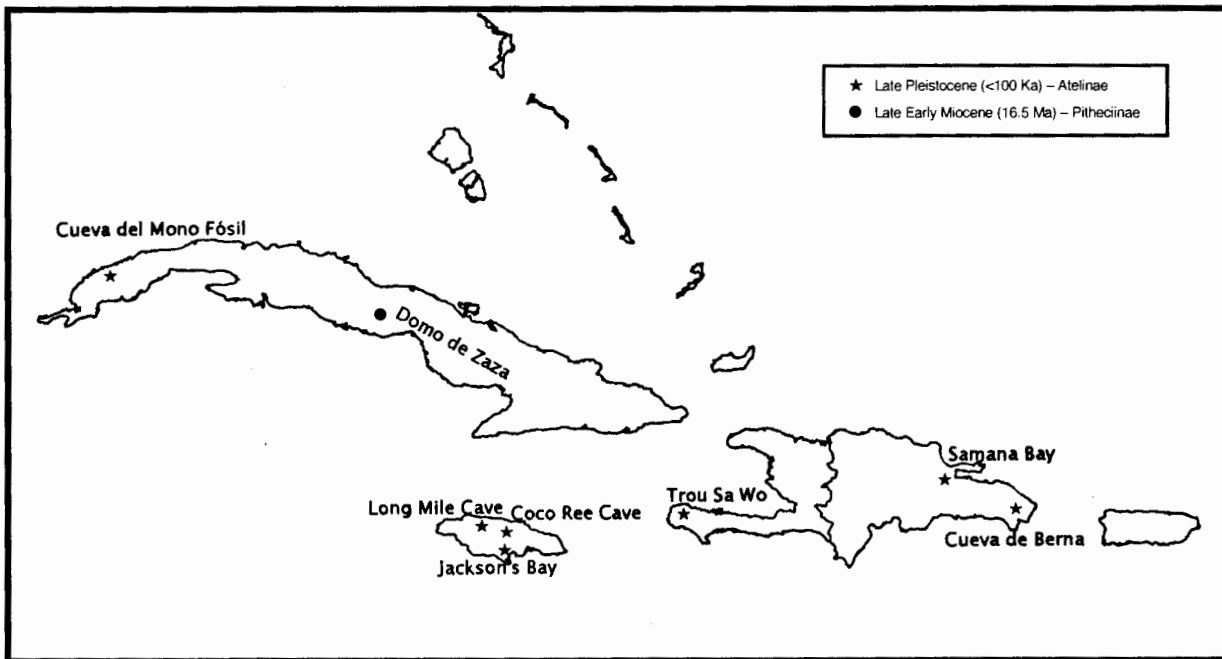
But considerable controversy surrounds Greenberg's broad-brush linguistic reconstructions, and numerous skeptics question the relevance of the dental and genetic testimony relating to the first Americans. And, although still controversial, archaeological evidence is emerging from a number of sites suggesting that people arrived considerably before the well-documented Clovis complex. Many modern archeologists have begun to acknowledge that people could readily have arrived in the New World as early as 40 Ka.

Numerous sites throughout North and South America offer tantalizing suggestions of pre-Clovis occupations, but none provides iron-clad proof acceptable to all archaeolo-



Selected South American fossil primate localities from Late Oligocene to Holocene. Age and included taxa are indicated according to the following key:

- ★ Late Pleistocene (<100 Ka) – Atelinae
- ✚ Late Miocene (ca. 10-6 Ma) – ?Atelinae, ?Cebinae
- Early Middle Miocene (15-13 Ma) – Atelinae, ?Callitrichinae, Cebinae, Pitheciinae
- ◻ Earliest Middle Miocene (16-15 Ma) – new genus
- Late Early Miocene (16.5 Ma) – Pitheciinae
- Mid Early Miocene (20-18 Ma) – Cebinae, Pitheciinae
- ▲ Late Oligocene (27 Ma) – Branisellinae



Caribbean fossil primate localities, all apparently of Holocene age, except Domo de Zaza (Miocene). Taxa located as follows: Cueva de Mono Fósil, Paraluouatta; Long Mile Cave (and neighboring Sheep Pen cave, not shown) and Jackson's Bay sites, Xenothrix; Cueva de Berna and perhaps Trou Sa Wo and Samana Bay, Antillothrix; Coco Ree and Domo de Zaza, postcrania of uncertain identification.

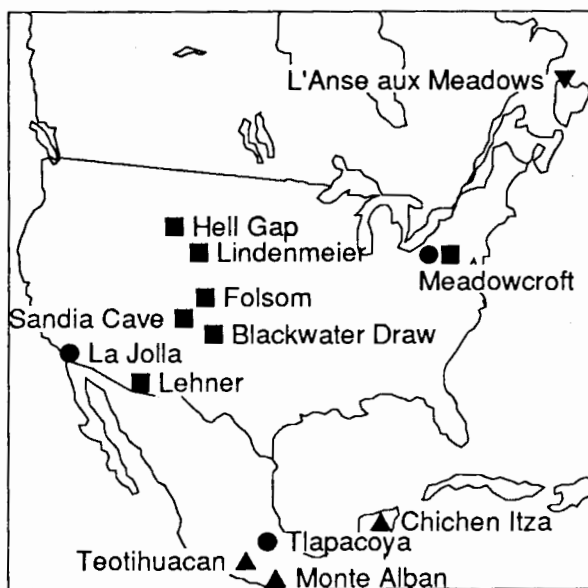
gists. Some of the best evidence derives from excavations at Meadowcroft Shelter, a remarkably well-stratified site in southwestern Pennsylvania. J. Adovasio and his colleagues have documented a sequence of more than 40 radiocarbon dates, in near perfect stratigraphic order. The oldest cultural date is now thought to be slightly older than 15.9 Ka, and the oldest stone artifacts appear to date between 12.8 and

11.3 Ka. Evidence for early human occupation consists of occupation floors containing firepits, prismatic blades, bi-face-thinning flakes, flake knives, a wooden foreshaft, a piece of plaited basketry, and two human bone fragments.

Although many archaeologists consider the evidence from Meadowcroft to be conclusive, others remain unconvinced. The stone implements are rare, small, and relatively uninformative; they are disturbingly similar to much later artifacts. Extinct Pleistocene megafauna is surprisingly absent from the deposits, and the temperate character of the vegetation throughout the Meadowcroft sequence also seems anomalous, since, during a part of this time, the ice front should have been less than 75 km to the north. In 1998, however, new evidence from Cactus Hill near Petersburg, VA, indicated a pre-Clovis horizon comparable to that at Meadowcroft with radiocarbon dates on charcoal of 15–16 Ka.

Another leading pre-Clovis candidate is Monte Verde, an open-air residential site in southern Chile. Excavator T. Dillehay and his colleagues have encountered four distinct zones of buried cultural remains. Nearly one dozen house foundations and fallen pole-frames of residential huts have been excavated, and fragments of skin (perhaps mastodon) still cling to the poles. Abundant botanical remains are associated with the archaeological deposits, as well as numerous shaped stone tools, including several grooved *bola* stones.

Dillehay argues that the upper layers contain "well-preserved and clear, conclusive evidence" of a human presence ca. 13 Ka. Even more controversial are the deep layers at Monte Verde that have produced two radiocarbon dates of 33 Ka, associated with possible cultural features and several fractured stones.



Selected North American archaeological sites. Age indicated by symbols as follows: Pre-Clovis ● (35–13 Ka); Paleoindian ■ (13–9 Ka); Viking ▼ landing (ca. AD 1000); Postclassic ▲. Note: Cactus Hill site, not shown here, is located just below 'a' in 'Meadowcroft'.

Not only do these controversial data suggest an earlier human presence in the New World, but their interpretation likewise theorizes that the earliest Americans did not employ the sophisticated big-game-hunting Clovis complex with its elegantly fashioned stone tools. The plant and animal remains from Monte Verde suggest a forest-adapted economy based primarily on the collection of wild plant foods and shellfish; only secondarily did the people rely on the scavenging and/or hunting of slow-moving game, paleollama, or mastodon.

Another candidate for pre-Clovis occupation in South America is the cave of Pedra Furada in Brazil. While ca. 12-11 Ka occupations are well documented both at this site and at the cave of Pedra Pintada (Brazil), the evidence for earlier occupation has been disputed. For Pedra Furada, the dispute concerns whether the charcoal and/or the "artifacts" result from human activities or natural processes.

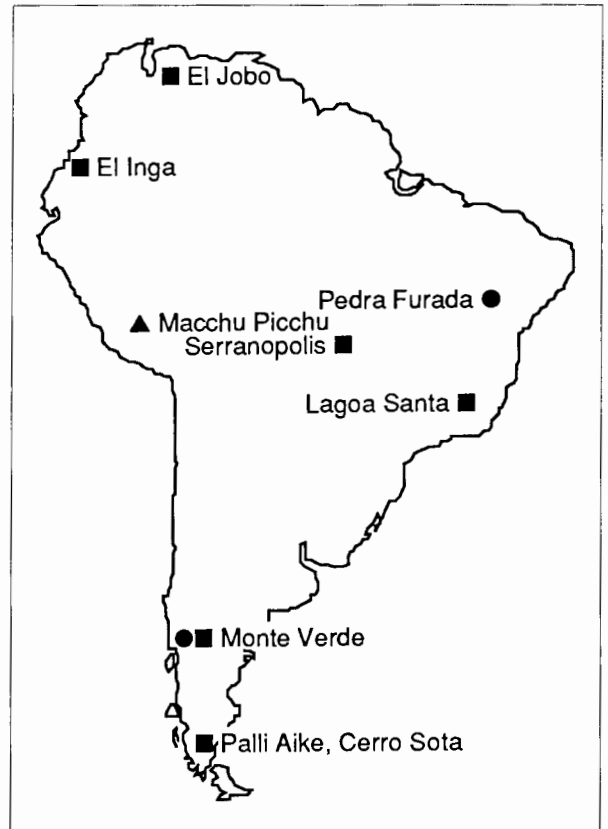
Despite such evidence from Meadowcroft, Monte Verde, and numerous other sites, we have no unequivocal, indisputable archaeological documentation of a pre-Clovis occupation in the New World. The Clovis culture was firmly established in North America prior to 12 Ka. This widespread complex spans the width of North America and can be traced from northern Alaska to Guatemala. The Clovis, or Llano, complex comprises the oldest well-dated cultural material with clearly established association of humans and animals in North America. These sites, which lack established cultural antecedents, often contain choppers, cutting tools, a variety of bone tools, and (very rarely) milling stones, in addition to the diagnostic Clovis fluted points.

Despite technological similarities, the Paleoindian life-way in eastern North America differed from the big-game-hunting pattern evident on the Plains. By 12 Ka, the floral and faunal resources in the Ohio Valley and far north into Wisconsin, Michigan, and Ontario were adequate to support scattered bands of hunters. Animal bones found in association with these Paleoindian sites are usually woodland caribou. Eastern Paleoindians concentrated their efforts on river-valley resources, in effect earning a head start toward the highly efficient gathering economies usually associated with later archaic periods.

Similar early hunting adaptations can be traced in South America. The diagnostic artifact of this tradition, fish-tail projectile points from El Inga and elsewhere, resembles the Clovis-derived points of North America. Established largely in Andean South America, this early hunting tradition spread to the southern tip of the continent and eastward into the Argentine Plains. Between 13 and 12 Ka, people in Central Colombia and southern Chile were collecting plants and hunting small game; there is no definite evidence that they hunted mastodons, as did contemporary El Jobo people in northern Venezuela. In southern Patagonia, people hunted horses and ground sloths ca. 11 Ka, but there is no evidence that people in Central and northern Brazil ever hunted such megamammals.

Later Developments

As the climate ameliorated, and an ever-thickening forest barrier formed between periglacial tundra and the temperate



Selected South American archaeological sites. Age indicated by symbols as follows: Pre-Clovis ● (35–13 Ka); Paleoindian ■ (13–9 Ka); Postclassic ▲.

grasslands, different cultural orientations formed. In the far north, this archaic stage is a generalized, primary response to forest conditions emerging during this period of flux. Although this tradition arose from a Paleoindian substratum of big-game hunting, a series of regional modifications emerged. Caribou hunting remained the primary economic activity on the northern fringes of the forest, but to the south other large species (elk, moose, and deer) became mainstays. The regional density of seasonal hunting camps and more permanent settlements increased; migratory patterns involved smaller areas; and groups became increasingly sedentary. As a result, technological capacities improved and intensified.

In South America, the early hunting tradition gave rise to an Andean archaic pattern, a cultural tradition in which subsistence was provided by hunting deer and camelids and by collecting vegetable foods. A hallmark of this tradition was seasonal transhumance, shifting community residence as people pursued either highland hunting or coastal-lowland collecting. A distinctive tradition also developed along the Peruvian and Chilean coasts, where seasonal collecting camps began to be replaced by permanent villages whose inhabitants depended primarily upon marine foods, although, in Peru, plant gathering remained an important

economic activity and provided the basis for the evolution of agriculture.

This full archaic stage of cultural development is evident throughout the New World, in general beginning with the climatic optimum, ca. 7 Ka and lasting in some places until 4 Ka. Pottery is found in a number of archaic-stage cultures, as among the Valdivia tradition in northwestern South America and the late archaic fiber-tempered ceramics in the southeastern United States. There are, of course, continuities of this stage into historic times in both North and South America, as, for example, in the later cultures of the California coast and the Northwest coast.

Throughout the archaic in Central and South America, interrelated developments ultimately brought about the emergence of settled village life based on full-time farming. Native American population grew beyond the limits that could be supported by a hunting-gathering economy. Under human selection, certain plants, notably maize, became larger and more productive, and it became increasingly cost-effective to clear away the wild vegetation in order to plant crops. As crops contributed more to the human diet, communities became increasingly sedentary. Improved farming technology increased productivity still further, and settlement patterns began to select for agricultural needs rather than for hunting and foraging.

The term *Formative* (or *Preclassic*) commonly designates the threshold of subsistence agriculture in the traditions of Mesoamerica, the American Southwest, the Mississippian, the Great Plains, and the Eastern Woodlands. In South America, this stage includes similar traditions in Peru, the South Andes, the Caribbean, and Amazonia. Of these, the latter two featured manioc (cassava) cultivation; all others were primarily maize based. In general, the Formative stage dates from ca. 4 Ka into the historic period (after AD 1600).

In Mesoamerica and Peru, the criterion of settled urban life is used to define a *Classic* stage, beginning about the opening of the Christian era. Regional expressions of the Mesoamerican Classic include Teotihuacan (Valley of Mexico), the Zapotec culture (Oaxaca), and the Maya (Guatemalan highlands and Yucatan lowlands). Classic Andean cultures include the Mochica and the Nazca kingdoms. How far the Classic can be extended into other areas is debatable, but it probably applies to the cultures of the Ecuadorian coast after 1 Ka.

The *Postclassic* is an epiphenomenon of the Classic, characterized by developments in urban living, an increase in large-scale warfare and empire building, and secularization of political control, in contrast to previously religious leadership. In Mesoamerica, the Postclassic began with the fall of the city of Teotihuacan (AD 730) and the rise of the militaristic Toltec empire and continued through the Aztec society encountered by the Spanish explorer Cortes in the sixteenth century AD. In Peru, this chronology corresponds to the time when the Tiahuanaco-Huari empire overran the Moche and the Nazca ca. 600 AD.

See also Adapiformes; Anaptomorphinae; Anthrozoidea; Atelidae; Atelinae; Blackwater Draw; Branisellinae; Calico

Hills; Callitrichinae; Carpolestidae; Cebidae; Cebinae; Cenozoic; Clovis; Diet; Domestication; Ekgmowechashalinae; Eocene; Euprimates; Extinction; Fells Cave; Folsom; Guitarrero Cave; La Venta; Llano Complex; Locomotion; Meadowcroft Shelter; Miocene; Monte Verde; Notharctidae; Old Crow; Oligocene; Omomyidae; Omomyinae; Paleobiogeography; Paleocene; Paleoindian; Paromomyidae; Pedra Furada; Picrodontidae; Pitheciinae; Plano; Platyrrhini; Plesiadapidae; Plesiadapiformes; Plesiadapoidea; Primates; Sandia; Tarsiiformes; Tlapacoya. [D.H.T., E.D.]

Further Readings

- Adovisio, J.M., and Carlisle, R.C. (1984) An Indian hunter's camp for 20,000 years. *Scien. Am.* (May):130-136.
- Adovisio, J.M., Donahue, J., Pedler, D.R., and Stuckenrath, R. (1998) Two decades of debate on Meadowcroft Rockshelter. *North American Archaeologist*. 19(4): 317-341.
- Bonnichsen, R., and Turmire, K.L. (1991) *Clovis: Origins and Adaptations*. Corvallis: Oregon State University Center for the Study of the First Americans.
- Bryan, A.L., ed. (1986) *New Evidence for the Pleistocene Peopling of the Americas*. Orono: University of Maine Center for Study of Early Man.
- Carlisle, R., ed. (1988) *Americans before Columbus: Ice Age Origins*. (Ethnology Monographs No. 12). Pittsburgh: Department of Anthropology, University of Pittsburgh.
- Dillehay, T.D., and Meltzer, D.J., eds. (1991) *The First Americans: Search and Research*. Boca Raton: CRC Press.
- Fleagle, J.G., and Rosenberger, A.L., eds. (1990) *The Platyrrhine Fossil Record*. London: Academic.
- Greenberg, J., Turner, C., and Zegura, S. (1986) The settlement of the Americas: A comparison of the linguistic, dental and genetic evidence. *Cur. Anthropol.* 17:477-497.
- Guidon, N., Pessis, A.M., Parenti, F., Fontugue, M., and Guérin, C. (1996) Nature and age of the deposits in Pedra Furada, Brazil: reply to Meltzer, Adovisio and Dillehay. *Antiquity* 70:408-421.
- Kay, R.F., Madden, R.H., Cifelli, R.L., and Flynn, J.J., eds. (1996) *Vertebrate Paleontology in the Neotropics*. Washington, D.C.: Smithsonian Institution Press.
- Meltzer, D.J., Adovisio, J.M., and Dillehay, T.D. (1994) On a Pleistocene human occupation at Pedra Furada, Brazil. *Antiquity* 68:695-714.
- Roosevelt, A.C. et al. (1996) Paleoindian Cave dwellers in the Amazon: the peopling of the Americas. *Science* 272:373-384.
- Soffer, O., and Praslov, N.D., eds. (1993) *From Kostenki to Clovis: Upper Paleolithic-Paleo-Indian Adaptations*. New York: Plenum.
- Stanford, D.J., and Day, J.S., eds. (1992) *Ice Age Hunters of the Rockies*. Boulder: University of Colorado Press.
- Szalay, F.S., and Delson, E. (1979) *Evolutionary History of the Primates*. New York: Academic.