PALEOINDIAN PREHISTORY OF SOUTH AMERICA

by

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I. Introduction

One of the most intriguing and hotly debated problems in American archaeology today is the question of when early man entered America and the level of his technological status. It is almost universally accepted that man arrived by slow migration across the 1300 mile wide expanse of the Bering Land Bridge. But When?

Two articles serve as the basis for this paper. The first is that of Paul S. Martin, in which he proposes that man entered the New World for the first time at about 12,000 years ago; this will be dealt with only in review. Second, and most important, is the theory advanced in reply by Richard S. MacNeish, in which he proposes an original entry date of 70,000 \pm 30,000 years ago. This paper will review the evidence offered by MacNeish and attempt to determine the validity of his claim for the antiquity of man in South America at greater than 20,000 years ago.

Paul S. Martin (1973;1976) proposes that man entered the
New World for the first time about 12,000 years ago. According to this theory, man, already a skilled hunter, had caused the extinction of the Pleistocene megafauna and migrated to the tip of South American by 10,000 years ago. Neither of Martin's theories - that man entered the new world for the first time 12,000 years ago, and was responsible for the extinction of the megafauna - are considered tenable in his paper. Concerning the extinction of the megafauna, suffice to quote C.C. Flerow (in Turekian 1971:483) "...men of the Paleolithic, Neolithic, and even of the Bronze Age, were certainly, absolutely, unable to destroy completely populations of large animals...extinction is determined by a set of causes. For different species, however, different factors are of decisive importance."

Martin considers the earliest reliable dates for man's presence in the New World to be the C-14 dates from the big game hunting tradition sites, i.e., Clovis. All the sites he mentions are mammoth kill sites, which fact presents an argument against Martin's theory. Mammoth bones are highly visible; most kill sites were first located because of the discovery of the enormous bones. This suggests that the sample may be biased, that Clovis and related cultures may not have relied exclusively on the exploitation of the megafauna, but also made
use of smaller game and vegetable resources as well.

That man entered the New World for the first time 12,000 years ago appears unlikely in the light of archaeological data. The site of Tlapacoya in the Valley of México is beneath a deep volcanic ash layer C-14 dated in the range of 24,000 to 20,000 years ago (Willey 1971:27). C-14 analysis resulted in a date of $14,150 \pm 180$ years ago for cultural levels at Pikimachay Cave in Peru (MacNeish 1971:76). Other sites in South America are firmly dated from about 9,000 to about 11,000 years ago. If man was present at Fell's Cave on the Strait of Magellan around 11,000 years ago, he would have had to make the journey from the northern United States to southern Chile in about 1,000 years.

Martin proposed a population explosion among the big game hunting migrants, and a very rapid rate of diffusion. One argument against this is the problem of mobility. These were pedestrian hunters, who transported their possessions themselves, or, at best, on dog back. To preserve mobility, nomads space children; by taboos restricting sexual relations during nursing, or by infanticide, so that the women are encumbered by as few infants and young children as possible. Martin's proposed population explosion would have the paradoxical effect of reducing
mobility, which is the second essential component of his theory.

II. Background

Population movement into the New World, i.e., North, Central and South America, was dependent upon the emergence of the Bering Land Bridge (Beringia) during times of glacial advance and lowered sea levels. Sea level fluctuation and glacial advance and retreat have a complex interrelationship, especially in regard to the Bering Land Bridge and to the availability of an ice free corridor giving access to interior North America, and thus the rest of the New World.

There is no evidence that Beringia was ever glaciated, nor the greater part of Siberia and of interior Alaska. The climate was characterized by tundra conditions throughout the Pleistocene, when the bridge was emergent (Colinvaux 1964). Precipitation was too low to allow formation and expansion of ice systems, except in isolated highlands such as the Brooks range in northern Alaska. The Yukon drainage basin of central Alaska was ice free and rich in game, providing a living for early hunters even during times of maximum glacial advances. The north arctic slope was also continuously ice free. One current theory is that early man migrated across the arctic slope and then down the MacKenzie river valley, when the ice systems
retreated to create a corridor into mainland North America.

For a long time, it was generally accepted that humans had entered the New World 10,000 to 15,000 years ago, following the animals that formed the basis of their subsistence economy (Giddings 1954). Subsequently they migrated very quickly to the less severe environment south of the ice systems.

That view has been changing. Instead of a simple culture that hurried through and out of the inhospitable Arctic environment, early migrants are now thought to have been very highly Arctic adapted. Cultures in northern Eurasia at about 40,000 years ago were already efficiently adapted to the subarctic, tundra, and steppe conditions of that environment (Muller-Beck 1967).

Geologic evidence indicates high sea levels, suggesting a substantial retreat of the glacial systems, at between 30,000 to 25,000 BP, at between 48,000 to 40,000 BP in North America. If early cultures had been present in Beringia at these times, they would have been forced to retreat west to Siberia or east to Alaska by the rising sea and changing environment. At the height of the rise, Beringia would have been submerged. Because of the suggested extent of deglaciation, the MacKenzie Corridor would have been ice free and available to southward
expansion by flora, fauna, and early hunters during the latter part of these intervals.

One of the foremost advocates of an early migration, Richard S. MacNeish, suggests that "...migrating bands crossed the Bering Strait landbridge some $70,000 \pm 30,000$ years ago and subsequently moved southward at a very slow rate" (MacNeish 1976:317). The early range of this date, 70,000 to 100,000 years ago, would extend into the Sangamon Interglacial. The main cooling of the Wisconsin Glaciation did not commence until about 73,000 years ago. Therefore, the Bering Land Bridge would extend into the Sangamon Interglacial. The main cooling of the Wisconsin Glaciation did not commence until about 73,000 years ago. Therefore, the Bering Land Bridge would not have been above sea level. Between about 40,000 to 48,000 years ago, which is included in the generally stable conditions of the Middle Wisconsin (59,000 to 32,000 BP), extensive deglaciation is indicated by near modern sea levels. Man could have entered mainland North America at this time.

The United States and Mexico were relatively easy for early migrants to move about in. Central America, however, is characterized by terrain that makes pedestrian travel difficult. During glacial maximums, the environment underwent change. The
The land area was not significantly increased. "Under any conceivable conditions, most of the Isthmus can not have exceeded a hundred miles in width, and much of that was blocked by mountains, many over 3,000 meters high" (Lothrop 1961:110). A slight shift eastward of the present climatic zone would have brought about savanna conditions along the west coast, allowing for the migration of grasses and the fauna characteristic of a savanna environment, along the area presently characterized by dense forest.

A second possible route of migration is by way of the mountain chains in Central America:

"...early human migrants entering South America by way of the Andes easily could have followed the same environmental zone for thousands of miles. These early migrants practiced a big game hunting economy with the animals hunted being adapted to specific vegetal zones. Their hunters would have exploited these game herds wherever they were found and thus would have followed these zones to the southern end of the continent... a movement of only 100 miles or so to the east or west would have forced the hunters to enter quite different environmental zones and to change their economy" (Hester 1966:378).

Hester considers the first migrants to have been big game hunters. MacNeish, on the other hand, considers the first migrants to be "relatively unskilled hunters and gatherers who possessed a technology that seems neither very specialized nor well adapted for undertaking the food quest and dealing
with its by-products" (MacNeish 1976:316). He divides Paleo-
indian prehistory into four stages of development based on tool
assemblages and faunal remains; the stages "to some degree re-
present a classification of subsistence systems, showing a
general evolutionary development" (ibid).

III. Stage I - 20,000 + BP

Stage I of MacNeish's classification is equivalent to the
Pre-projectile point stage. Proponents describe this stage as
a relatively crude stone chipping technology of unspecialized
hunters and gathers; possibly derived from the Asian Chopper-
Chopping tradition and dating back to 30,000 to 40,000 years
ago in the New World (Willey 1971:26). Bird (1965) points out
that "crudeness" is not an indication of great age and that
crude percussion flaked basalt is found contemporaneous with
fine bilateral pressure flaking of chalcedony, jasper, and
chert. Bird (ibid) also points out that the subsistence base
will dictate the tool kit, i.e., preceramic fishing cultures
lacked projectile points.

The technology of Stage I is characterized by a "series
of chipped stone bifacial hand-held choppers with sinuous sharp
edges, chipped cores, unspecialized bifaces, and thick flake
scrapers and spokeshavelike tools" (MacNeish 1976:316). This technology is associated with a wide variety of fauna and probably flora, suggesting unspecialized hunters and gatherers.

For South America, Stage I is placed at greater than 20,000 years ago. The lowest levels of Pikimachay Cave, in the Ayacucho Basin of highland Peru, are considered the best evidence for Stage I in South America. The earliest phase, Paccaicasa, includes, from the lowest, levels k, j, i1, and i.

Zone k occurs in a depression in the lava bedrock and is 8" thick. The neutral acidity of the soil is interpreted as indicating a grassland environment (MacNeish 1971:73). Near the top of the deposit were found vertebrae fragments and a rib fragment, possibly of an extinct ground sloth, although exact identification has not been made. In association were "four crude tools fashioned from volcanic tuff and a few flakes that had been struck from tools" (ibid). One flake is of a green stone that would appear to have been transported into the cave from an outside source. Carbon-14 analysis of bone from this level yielded a date of 20,200 ± 1,000 years ago (MacNeish 1976:317).

Zone j occurs as a brownish soil 12" thick over a wider area of the cave. Faunal remains consist of rib and vertebrae
fragments of ground sloth and an unidentified leg bone of a smaller mammal. Cultural remains consist of fourteen crude tools of volcanic tuff and forty flakes of unspecified material, interpreted as waste from toolmaking (MacNeish 1971:73). The soils of zone j and the succeeding zone i1 are quite acid, suggesting that they were formed when the climate was less arid and the vegetation included forest cover. Carbon-14 analysis of one of the ground sloth vertebrae resulted in a date of 19,600 ± 3,000 BP.

Zone i1 occurs as a 15" thick orange soil layer. The level contains fossilized and burned animal bone, some of it possibly worked with a burin. Tools of unspecified material and type occurred in the level. A carbon-14 analysis of a fragment of sloth scapula yielded a date of 16,050 ± 1,200 BP (MacNeish 1971:73).

The uppermost level of the Paccaicasa phase, zone i, consists of 18" of slightly browner soil, suggesting a return to drier climatic conditions (MacNeish 1971:73). Crude stone tools and waste flakes of unspecified material occur throughout the layer. Faunal remains consist of sloth and horse bones. Carbon-14 analysis of one of the bones resulted in a date of 14,700 ± 1,400 BP (ibid).
The Paccacasa phase artifact inventory consists of fifty tools, of uniformly large and crude workmanship. Most of the artifacts are of volcanic tuff, which MacNeish himself (1971) says does not flake well and that "...it takes a skilled eye to distinguish many of them from unworked tuff detached from the cave walls by natural processes." Other tools were made of rounded pebbles and pieces of basalt, said to come from outside the cave (ibid:75).

"Artifacts include large crude bifacial and slab choppers, cleavers, hammers, scraping planes, and crude concave-and convex-sided unifacial scrapers or spokeshavelike objects, as well as a single pointed flake that could have served on a projectile, and a flake showing blows from a burin" (MacNeish 1976:317).

Pikimachay Cave is located in a hill composed of volcanic rock; the roof and walls are volcanic tuff, the same material as the crude "tools" recovered from the Paccacasa phase zones. There is a possibility that at least some of the artifacts are natural fragments detached from roof or walls - so called "naturefacts." There are also many sources of good chipping stone, including obsidian, available in the Ayacucho Basin. An unexplained problem is why early tool makers did not take advantage of good quality stone that was easily obtained in the vicinity of Pikimachay Cave.
The Alice Boer site on the Rio Claro, Brazil, has crude tools in the earliest level that may be related to the Pikimachay material (MacNeish 1976). The site is undated. The report is apparently not yet available in translation.

IV. **Stage II - 16,000 -12,000 BP**

Stage II cultures are also considered to be unskilled hunters and gatherers, with a technology somewhat better adapted to the food quest than that of the previous stage. "Fair but still inadequate" samples suggest the technology emphasized stone flake tools manufactured by percussion and pressure and the fashioning of bone tools (MacNeish 1976:318). Besides the older types of implements of Stage I, the tool types include specialized unifacial tools, such as drills, spokeshaves, end-scrappers, denticulates, and unifacial projectile points; the bone tools include perforators, scrapers and projectile points made with burins (ibid:316). The dates for Stage II in South America range from 12,000 to perhaps as much as 16,000 years ago (ibid:317).

Two levels at Pikimachay Cave contain good evidence for Stage II. Zone h1, 20" of a deep, yellow soil, is of neutral acidity indicating cold conditions. Faunal remains consisted of sloth, horse, and possibly saber-toothed tiger, with other
species unspecified. Artifacts include some seventy tools and numerous waste flakes. The majority of the material was of basalt, chalcedony, chert, and quartzite pebbles. These lithic materials would have had to have been introduced into the cave from outside sources.

Zone h soil was 12" deep and of a soft, light orange color, strongly acidic, indicating a return to a forested environment. Faunal remains include sloth, horse, ancestral camel, puma, extinct deer, skunk, and other unidentified species (MacNeish 1971:75). The cultural material of zone h is also characterized by the use of new tool materials, i.e., chalcedony, chert. About 250 finished artifacts and over 1,000 waste flakes were recovered. Core tools include choppers, heavy spokeshaves, split pebble scrapers and fluted wedges. The inventory of flake tools include burins, gravers, sidescrapers, flake spokeshaves, denticulate flakes, and unifacial projectile points. Bone tools include triangular projectile points, polishers, antler punches, rib bone "fleshers" and one polished animal toe bone which may have been an ornament (ibid:76). Carbon-14 analysis of sloth bone from zone h resulted in a date of 14,150 ± 180 BP.

The unifacial artifacts from Ayacucho seem closely related to the materials from the lowest levels of Los Toldos Cave in
Argentinian Patagonia (MacNeish 1976:318). The indirect date of Los Toldos of around 12,600 years ago may represent the end point of the Stage II complex (ibid). The Los Toldos report is apparently not yet available in translation.

The Ayacucho complex from Pikimachay Cave and Los Toldos Cave material are the best South American representatives of Stage II (MacNeish 1976:319). The El Bosque site in Nicaragua yielded chipped stone unifacial implements of unspecified type from a large fossil bed (ibid). A date for the fossil bed in general is placed at around 22,000 BP. It is not known if the cultural material is contemporaneous with the fossils or more recently intrusive.

The lowest levels of Guitarrero Cave in northern Peru, in the Callejon de Huaylas, fall in the recent end of the time range for Stage II. Carbon-14 analysis of charcoal from the lower levels resulted in dates of 9,790 ± 240 and 12,560 ± 360 BP (Lynch and Kennedy 1970:1308); the first date of 9,790 ± 240 BP is actually later than dates from samples from the levels 15 cm above it is the same stratigraphic column. As the upper level (Guitarrero II) yielded 4 consistent dates, the second date of 12,560 ± 360 BP is accepted as accurate for the lower level (Guitarrero I).
The lithic industry from Guitarrero I consists almost entirely of simple flake tools and unretouched flakes (Lynch and Kennedy 1970:1308). Scrapers predominate in the more than 500 artifacts recovered and other types include a few choppers, hammerstones, crude cores and lamellar flakes, graver scrapers, a small bifacial knife, and some stream rounded pebbles, possibly bolas (ibid). "The Guitarrero industry shares general characteristics with MacNeish's Ayacucho complex and the early flake industry at Laguna de Tagua-Tagua in central Chile" (ibid).

A human mandible was found in association with the Guitarrero I complex in the lowest stratum of the cave (Lynch and Kennedy 1970:1309). The likelihood of an intrusive burial or other disturbance is considered unlikely, as "ten levels of unbroken and apparently uncontaminated preceramic deposits lay directly above" (ibid). If in true association, the mandible may be the oldest human skeletal material recovered in South America, dating around 12,000 BP.

The site of Laguna de Tagua-Tagua in central Chile is in a basin surrounded by mountains. The site is near the outlet of a lake, making a favorable location to hunt animals coming in to water. A charcoal sample submitted for carbon-14 analysis was dated at 11,380 ± 320 BP - "the earliest date yet obtained
for human occupation in Chile" (Montane 1968:1138). As at Guitarrero Cave, the date appears too recent for inclusion in Stage II.

Chipped stone was found in association with extinct fauna, including horse, mastodon, deer, and canid (Montane 1968:1137). The horse remains represent one individual. Some of the bone exhibits prominent cuts made by a tool, and many of the bones were smashed. Both the horse and the mastodon, of which one was represented, were scattered, totally lacking anatomical arrangement (ibid), and were incomplete. The same stratigraphic level as the fauna yielded 50 artifacts, frequently found as close at 2 to 5 cm from the bones (ibid). The material is principally chalcedony and basalt, with obsidian flakes and an obsidian knife also occurring; other tools types are scrapers, hammers, and many sharpening flakes. Bone tools are flakers and smashed mastodon incisors that may have been used in the process of butchering.

The El Abra rock shelters in Colombia are also included in Stage II although the carbon-14 date of 12,400 ± 160 BP for the first evidence of human occupation is again almost out of the time range for Stage II. Subunit C3 was characterized by a warm moist climate with a forest, mostly alder, vegetation
cover (Hurt et al 1972:1107). The lower level yielded 16 chert flakes and pebbles from the outside of the shelter; the upper level yielded 21 flakes and pebbles. Most of the tools were characterized by "alteration of only the working edge of a single face by percussion flaking of the raw material" (ibid:1106). Chert is not found in the vicinity of the rock shelters, but does occur in the extinct lake bed and in the river terraces (ibid:1106-1107). Since the tool type was primarily scrapers, unifacially percussion flaked, the early levels could possibly have been specialized work areas where only one activity was carried out.

V. **Stage III - 15,000 - 11,000 BP**

Stage III is represented by complexes in the 15,000 to 11,000 year range in South America. This extensive overlap in time with Stage II is explained by MacNeish as the co-existence of Stage II hunter/gatherers with the more specialized Stage III big game hunters. The cultures of Stage III are characterized by a series of relatively specialized tools to hunt and process Pleistocene game and...
"...were specialized hunters of big game or herd animals in a wide variety of environments. Their technology seems considerably advanced over the previous stage, for they fashioned fine leaf-shaped bifacial projectile points as well as blades and produced skillfully made flint burins, perhaps for making even better bone tools" (MacNeish 1976:320).

MacNeish (1976) believes that these new subsistence techniques were ultimately derived from Asia. He seems to consider an actual migration of people from the Bering Strait area to be responsible for the introduction of the culture in the Americas. If MacNeish's hypothesis is accurate, then blockage of the Mackenzie River valley by the merging of the Laurentide and Cordilleran ice systems did not occur, as many Canadian archaeologists and geologists now believe (ibid).

The Joboid series from the Rio Pedregal river terraces on the north coast of Venezuela have been grouped into four successive complexes: Camare, the earliest, Las Lagunas, El Jobo, and Las Casitas (Rouse and Cruxent 1963:29).

"Crude chopping tools, made by battering a piece of quartzite with another stone in order to knock off flakes and thereby to sharpen the edges of the original stone, are characteristic of the entire Joboid series. Larger flakes ... were used after further trimming, the thinner ones probably as knives and the thicker ones probably as scrapers ... the Camare and Las Lagunas complexes, of the upper terraces, lack projectile points of stone. Presumably ... spears (made) entirely of hard, tropical woods (were fashioned). (Rouse and Cruxent 1963:29-30).
Stone projectile points begin in the El Jobo sites on the second terrace of the Rio Pedregal. Knives, scrapers, gravers, and coarse hammerstones were also found in the surface collections of the El Jobo site (Cruxent and Rouse 1956). The El Jobo points and the knives are lanceolate or leaf-shaped, of an sandy quartzite, percussion chipped with fine trimming along the edges (ibid). Because of the great quantity of chips and the absence of bone and shell, the authors suggest that the site is the remains of a workshop.

Two charcoal samples were collected from the Joboid sites, but resulted in modern dates (Rouse and Cruxent 1963:29). Geologic study of the river terraces suggests an age of possibly greater than 10,000 BP for El Jobo and possibly around 15,000 BP for Camare (ibid:29-30).

Three other sites in the Rio Pedregal area are advanced as the most reliable evidence for Stage III in South America. At all of them were found the diagnostic leaf-shaped El Jobo or Lagunas-like points (MacNeish 1976:322).

The site of Tiama-Tiama yielded a series of extinct animal bones in the lowest four "clearly defined strata" (MacNeish 1976:322). The species represented include mastodon, glyptodont, megatheridae and horse, in a context suggesting that the
animals were killed at a waterhole. In associated with the bones were three El Jobo points, a possible semi-lunar scraper, crude flakes, an anvil stone, and rocks which may have been used as hammers, axes, or choppers. Eleven radiocarbon dates taken from this bone layer ranged from 11,860 BP to 14,400 BP (ibid).

The site of Muaco lies around a spring. The species found include mastodon, megatheridae and horse. The fauna and flora were adapted to a humid climate, upon which basis the deposit has been assigned to the late Pleistocene (Rouse and Cruxent 1963:35). Some of the bones of extinct species had been broken, burned, and grooved, indicating human activity. The cultural material includes three leaf-shaped points, one definitely identified as El Jobo; retouched flakes, pebble choppers, a Joboid type scraper, and a number of hammerstones (ibid); (MacNeish 1976:322). Three Carbon-14 dates on bone range from 9,030 to 16,375 years ago.

The site of Cucuruchu, in the same general area as Muaca and Taima-Taima, is a dry site, although there are a number of springs in the area, and offered the possibility of an undisturbed stratigraphy (Cruxent 1970:223). A bone bed of fluvial origin was dry and showed no evidence of disturbance of any
kind, nor were there any intrusive materials (ibid:224).
Species represented include mastodon, megatheridium, and glyptodon. Native horse was not present as at the other two sites.
Two points of the El Jobo type were found among the fossil bones (ibid). A wider, thicker "point" found among the bones may be a knife.

"...not yet able to determine the exact age of association but believe it may vary between 9000 and 16,000 BP. This is the range of three radiocarbon determinations obtained from burned bones at Muaco and two at Taima-Taima" (Cruxent 1970:225).

The Huanta phase at Pikimachay Cave in the Ayacucho Basin, Peru, is found in strata bracketed by dates of 14,150 and 10,4000 years ago (MacNeish 1976:322). The characteristic artifacts of the phase include bifacially flaked projectile points with a "fishtail" base, gravers, burins, blades, semi-lunar sidescrapers, and "teardrop" shaped endscrapers (MacNeish 1971:77). Faunal remains include horse, an extinct species of deer, and possibly llama (ibid).

The second Peruvian site, Cerro Chivateros, is the largest of the fine grained quartzite outcrops in a range of steep hills in the lower Chillon valley (Lanning and Patterson 1967:64). The site appears to be a quarry and workshop but not a campsite; the slopes are thickly covered with debitage (ibid).
The lowest of five major strata, the "Red Zone", is a reddish silt containing unworked quartzite fragments and little quartzite tools, including simple straight-edged and notched scrapers, single and bi-pointed perforators, and a few burins (Lanning and Patterson 1967:64-65). The reddish silt may indicate a dry climate similar to the modern conditions. The Red Zone is tentatively dated between 12,000 and 10,500 BC.

A hard salitre crust formed during a time of increased humidity, with only a few artifacts of the Red Zone complex, underlay the third strata, a silt layer deposited under dry conditions. The Chivateros I complex is typical of the Andean Biface Horizon (Lanning and Patterson 1967:65), and consists of thick, pointed bifacial tools, large tools with serrated edges, and heavy unretouched flakes, large scrapers, notched stones, knives, and bifacially flaked leaf-shaped points. The beginning of the complex is placed at about 9500 BC. Chivateros I is overlain by a second salitre layer, indicating a return to more humid conditions. Wood from the Upper Salitre resulted in dates of 8,420 ± 160 and 8,440 ± 160 BC and apply to late Chivateros I (ibid).
VI. **Stage IV – 13,000 to 8,500 BP**

Stage IV covers the time range of 13,000 to 8,500 years ago. The cultures are assigned by MacNeish to the specialized big-game hunters. Specialized tools had been developed for a wide variety of tasks (MacNeish 1976:317) and include blades, haftable end-scrapers, bifacial knives, bone needles and awls, flint burins, many other tool types for working skin, butchering, and preparing food, and a "whole series of specialized bifacial projectile points".

"Distributions of these specialized point types and their associated artifact complexes suggest that the Amerindians of Stage IV had adapted their hunting techniques and tool kits to specific large environmental zones with certain indigenous fauna and flora that would require slightly different food collecting techniques" (MacNeish 1976:317) ... they had developed a number of secondary subsistence options that aided them in their adaptations to these environments and even to the seasonal and microenvironmental differences within them" (ibid:323).

The most widely reported point type for South America is a narrow, long "fishtail" point, which has been found in almost every country in South America, as well as Panama and Honduras (MacNeish 1976:323). Sites where this point type occur include El Inga, Ecuador; Los Toldos Cave, Argentina; Fell's and Palli Aike Caves on the Straits of Magellan.
The El Inga fishtail points exhibit pronounced fluting of the stem and basal-edge grinding, both also characteristic of the North American Clovis-Folsom complexes (Willey 1971:45). "...excavations at El Inga might provide the link between the Paleo-Indians of the Plains region and the men of Fell's Cave and so tell much about the nature of the north-south migrations" (Mayer-Oakes 1963:53). El Inga I artifacts are principally of obsidian and include bifacially flaked knives, flake and blade scrapers, and simple angle burins (Willey 1971:45). The radiocarbon date for El Inga is $9,030 \pm 144$, the sample coming from a deep provenience and resulting in the earliest date for the site (ibid).

Willey (1971:45) considers this date too young if one is to assume a relationship between the "almost identical" Magellan I and El Inga I projectile points and between these and the similar Clovis-derived points of North America. He suggests that a date of closer to 9000 BC would be "more in keeping with the spread of this fish-tailed and fluted point form from north to south". H.M. Wormington, E. Mott Davis and Alex D. Krieger (in Cruxent and Rouse 1956) agree that the similarities in point forms are suggestive of relationship between the complexes.
The magellan I complex includes Fell's Cave and Palli Aike Cave, on the north side of the Strait of Magellan. Fell's Cave is a rock shelter, the first occupational level containing many bone fragments, including native horse, sloth, and guanaco; and four fire hearths (Bird 1938:270). The Magellan fishtail points were bifacially worked by percussion and pressure flaking; on many specimens is a short fluting of the fish tail (Willey 1971:44). Other artifacts include unifacial flake end and side scrapers, bone flaking tools and awls, and dislike implements of lava, which are found elsewhere associated with fishtail points (Bird 1970); (Bird 1938:270). The Palli Aike tool assemblage is basically the same; the faunal remains consist of native horse and sloth, as at Fell's Cave; three cremation burials occur with the Magellan I level (ibid:269). The radiocarbon date for Palli Aike is around 6700 BC, which may be to late to be valid (Willey 1971:45).

Another complex which seems to be contemporaneous is characterized by broad bodied, wide, contracting-stem points with keeled and plano-convex end-scrapers, scraper planes, large side-scrapers, and perhaps blade tools. (MacNeish 1976:323). The best evidence for the complex is from the lower levels of Tequendama Cave, near Bogota, Colombia. Five dates on it range
from 10,025 to 10,920 BP (ibid). The lower four levels of the Alice Boer site, on the Rio Claro, Brazil, contained most of the tool types mentioned above and bears a date of 14,200 BP. MacNeish (ibid) suggests that the complex of broad-stemmed points was a late Pleistocene savanna-selva adaptation, but does not offer evidence in support of this hypothesis.

Peruvian sites assigned to Stage IV include Lauricocha I (about 9,500 BP); Tres Ventanas I (9,000 to 10,500 BP); Guitarrero 1b and 2e (9,000 to 10,500 BP); and the Puente phase of Ayacucho (9,100 to 10,500 BP) (MacNeish 1976:323). The fauna hunted include modern species, e.g., llama, as well as now extinct Pleistocene species.

Willey (1971:49-50) suggests that the biface projectile point technology was introduced into South America from North America in the form of a fish-tailed semi-fluted point. He considers these cultures to have been specialized big-game hunters, and exploited a different series of environmental niches then the older inhabitants, so that there was no significant "displacing" effect as the nomadic hunters moved southward. This north to south movement was rapid, occurring between 9,000 to 8,000 BC, generally. Willey further suggests (ibid) that the leaf-shaped projectile points characteristic of South
American complexes, e.g., El Jobo, resulted from the influence of the new technology.

An alternate hypothesis is offered (Willey 1971:50) which would see the early leaf-shaped points as an indigenous South American development out of the antecedent Biface tradition; the fish-tail point could thus have been developed out of the simpler leaf-shaped form (ibid).

MacNeish is more in agreement with the latter hypothesis. He considers Stage IV to be "uniquely American in its development" (MacNeish 1976:322).

"...(Stage IV cultures) everywhere seem to have originated at the end of the Pleistocene roughly 10,000 to 13,000 years ago. Movement of these developed complexes was apparently relatively fast within certain microenvironments, but there is little evidence of inter- or even large-scale intra-continental migrations, either fast or slow" (MacNeish 1976:323).
VII. Conclusion

The middle interval of the Wisconsin refrigeration, 
(59,000 - 32,000 BP) was characterized by generally stable conditions; the late interval (32,000 - 13,000 BP) was characterized by greatly varying conditions and included the coldest intervals of the glaciation (Langway et al 1973:319). However, during the mid-Wisconsin, deglaciation may have been more extensive then generally assumed (Porter 1971). Geologic evidence indicates the submergence of coastal Georgia at about 48,000 - 40,000 BP, and again at about 30,000 - 25,000 BP. Evidence from the U.S. Atlantic continental shelf suggests that sea level was near the present level at about 35,000 - 30,000 BP. Evidence indicates a marine transgression about 50,000 BP and one at about 35,000 BP in New Guinea, during which sea level rose to within 25 meters of its present level (ibid).

"Because large magnitude fluctuations of sea level were chiefly a function of changes in volume of upper middle latitude continental ice sheets, these inferred high sea levels imply substantial volume loss and terminal recession of the Laurentide ice sheet. These intervals may have been times of extensive deglaciation in north-central North America, and, because of the widespread effects of the continental ice sheets on world climate, times of extensive deglaciation in the Cordillera." (Porter 1971:322-323).

Melting of a glacial system does not simply commence at the
"head" or terminus and progress back to the source. A recent theory suggests that continental glaciers begin to thin substantially in the central areas, the moisture ultimately returning to the sea and contributing to a rise in sea level; this thinning occurs long before the margins are affected by any noticeable retreat (Hopkins 1967:463). If this theory is correct, a passage southward would not have become available until the middle to last part of each episode of increased warmth and glacial retreat. Thus, between 48,000 BP and 25,000 BP, conditions occurred coincidentally that would have facilitated migration into mainland U.S. "From at least 25,000 to 12,500 years ago, the trans-Canadian migration route was blocked by coalescence of the Cordilleran and Laurentide ice sheets... The paucity of radiocarbon-dated sites suggests a sparse population at best (before closure)" (Haynes 1964:1412).

MacNeish "...tentatively propose(s) that the last of the pre-Punte strata at Flea Cave... coincide with the last Andean glacial advance" (MacNeish 1971:77). Based on the evidence of soil types and faunal remains encountered in the Paccalacasa, Ayacucho, and Huanta complexes, MacNeish states that "... if the Ayacucho evidence holds true for Andean glacial activity in general, the South American glacial advances and retreats do
not coincide with those of the Wisconsin glaciation in North America" (ibid); and, in fact, are in reverse sequence, i.e., and advance in North America would be a time of glacial retreat in South America. Other geologists (Morner and Frumanis 1973) interpret the evidence from South America as indicating the glaciation to have been synchronous with that of North America and Europe. The opinion of geologists in general is that "Late Pleistocene glacial chronology in South America is believed to parallel that of both Europe and the United States; that is, the major events - the glacial advances and retreats - are thought to have been essentially synchronous on all three continents" (Willey 1971:33).

The environmental sequence indicated by the succession of soils in Pikimachay Cave may reflect local conditions and variations; possibly the radiocarbon dates obtained from the small bone samples are inaccurate; or MacNeish's interpretation may be proven inaccurate by further analysis. Zones k, j, and iI of the Paccaicasa phase yielded fragmentary bones of extinct animals, evidence that the deposits had been laid down during the Pleistocene. The 'tools' from these three zones were of volcanic tuff native to the cave interior, of uniformly large and crude workmanship. One green flake from zone k may have
originated outside the cave; it could as well have been transported into the cave stuck between a sloth's toes, as to have been carried there by man. The dates for these three zones range from 20,000 ± 1,000 BP (zone k) to 16,050 ± 1,200 BP (zone i1).

The uppermost level of the Paccaicasa phase, zone i, is C-14 dated at 14,700 ± 1,400 BP. Three of the 50 artifacts, and 12 of the more than one hundred flakes were derived from pinkish basalt pebbles "not found in or near the cave" (MacNeish 1970: 14). This would appear to be more acceptable evidence of human activity then the tuff artifacts, but the date does not support the extreme range of greater then 20,000 BP proposed by MacNeish. There is also the possibility that the basalt, also of volcanic origins, may have been introduced into the cave by natural means, or occurred within the volcanic tuff matrix of the cave, or may be intrusive from the overlying zone h, which is included in Stage II.

Stage II, characterized by complexes of relatively unskilled hunter-gatherers, is dated by MacNeish at between 16,000 and 12,000 BP. Two of the seven sites assigned to this stage, the Ayacucho phase of Pikimachay Cave (14,500 ± 180 BP) and Los Toldos Cave in Argentina (indirect date of 12,600 BP), offer good evidence
of human activity. Four of the sites - Tagua-Tagua, 11,300;
Cueva de la Indies, 10,500 - 13,100; Guitarrero, 12,560; and
El Abra, 12,400 - do not fit in the assigned time range well,
the assigned dates being too young, although the cultural material
appears to fit the description of Stage II. There is the pos-
sibility that these assemblages may be incomplete, giving, there-
fore, a biased idea of the technology and subsistence base of
the Stage II cultures.

Stage III is dated as extending from 15,000 to 11,000 BP.
The extensive overlap in time is explained as the co-existence
of the presumed hunter/gatherers of Stage II with the more
specialized big game hunters of the Stage III complexes.
MacNeish is in apparent agreement with some Canadian geologists
that the Laurentide and Cordilleran ice systems did not merge
during the Classic Wisconsin stage; he considers Stage III
people to be a physical migration of people from the Bering
Strait region, through the MacKenzie River Valley.

During the Classic Wisconsin maximums, lobes of the ice
system in the Brooks range reached to within 10 miles of the
Arctic shore on the north slope of Alaska; even if the ice
systems did not merge in the MacKenzie region, it was quite
likely to have been almost or totally uninhabitable due to the
proximity of 3-mile high ice masses to the east and to the west. Frigid arctic air, blocked behind the bulk of the glaciers, would have funneled through the one open corridor, adding a windchill factor to the environmental conditions. Beringia and the Yukon drainage basin were ice free and abounding with game. A question arises - why would a band of hunters abandon a game-rich environment to move into the glacier-dominated terrain of the arctic slope and the MacKenzie? They could not have known that the New World was in existence to the south. And it has still not been convincingly demonstrated that this corridor, did, in fact, exist at the time MacNeish assigns for the migration of Stage III cultures, at between 25,000 - 13,000 BP. It is this time range that many American geologists consider to be when the Cordilleran and Laurentide ice systems had merged. If this latter viewpoint is the correct one, i.e., that passage was impossible between the two ice systems, then Stage III cultures would of necessity have been an indigenous development out of the older, less specialized cultures.

The site of Cucuruchu in Venezuela appears to be undisturbed despite the presence of springs in the area; two El Jobo points were found in a bone bed containing extinct species, including mastodon. An indirect date places the site in the range of
16,000 to 9,000 BP. Date and point type include Cucuruchu in Stage III. Two sites in Peru - Huanta phase at Pikimachay Cave, and Chivateros I, are included on the basis of dating (10,400 to 14,150 BP, and before 10,400, respectively) - and on the tool assemblage, and are certain evidence of the presence of man.

MacNeish lists seventeen sites as evidence for Stage IV, dating between 13,000 to 8,500 years ago. These are the complexes characterized by bifacial projectile points and associated with extinct Pleistocene megafauna as well as modern species. There is little doubt as to the validity of the evidence offered to support this stage. MacNeish's view of this stage as an indigenous development is acceptable. By 13,000 - 8,500 PB, the population of the New World was not great, but dense enough to offer a certain amount of restriction of actual large scale population movements. It is reasonable to assume that interaction occurred between populations, allowing for exchanges of items and ideas, i.e., trade of raw materials, etc.

Geologic evidence supports the presence of man in the New World at around 40,000 years ago and possibly even earlier. The archaeologic evidence for South America advanced by MacNeish to support the presence of man at before 20,000 BP is, however,
not convincing. His Stage I site, the Paccaicasa phase at Pikimachay Cave, does not offer acceptable evidence of human activity until the top zone of the phase, dated at 14,700 ± 1,400 BP, which is within the time range assigned to both of the subsequent Stages II and III, and is not evidence of an early occupation at around 20,000 BP. It is reasonable to assume the possibility of the presence of man at around 20,000 BP; a route south of the ice systems was available between 48,000 and 25,000 BP. It remains to be seen if convincing evidence can be found to support the hypothesis of the peopling of South America at greater than 20,000 years ago.
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