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ANCIENT TOOLS?

Searching for the First Americans

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ON THE COVER: *Some archaeologists argue that these stone fragments excavated at the Topper site in South Carolina are ancient tools crafted by humans 16,000 to 20,000 years ago. If these experts are correct, it would push back the date of the first Americans' arrival in the New World.* INSET PHOTO/WADE SPEES
BACKGROUND PHOTO/COURTESY OF SOUTH CAROLINA INSTITUTE OF ARCHAEOLOGY AND ANTHROPOLOGY



PHOTO/COURTESY OF SOUTH CAROLINA INSTITUTE OF ARCHAEOLOGY AND ANTHROPOLOGY

POWER TOOL.

Clovis tools have been found in every state in the nation. For decades, archaeologists thought that the Clovis people were the first migrants to the Americas. Now most experts believe that people arrived in the Americas before Clovis.

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TOOL KIT. Albert Goodyear, a University of South Carolina archaeologist, holds a piece of chert, a type of rock broken open by prehistoric Americans. This chert, used to make tools, was found at the Topper site near the Savannah River. PHOTO/WADE SPEES

Ancient Tools? Searching for the First Americans

By John H. Tibbetts

Some ancient Americans migrated to coastal South Carolina for the same reasons that many northerners still relocate here today. They preferred living near water and the seashore in a warm climate.

That's an educated guess by Albert Goodyear, a University of South Carolina archaeologist who has drawn international headlines for excavating and interpreting artifacts at an archaeological site named Topper located along the Savannah River in Allendale County. In May 2005, the USC archaeology team will continue excavating at Topper, named for a local man who first showed Goodyear the site.

Goodyear's findings at Topper have placed South Carolina in the middle of a fierce debate about the origins of the first Americans. Now South Carolina could become central to the changing story of *Homo sapiens*.

Thousands of years ago, when the area now known as South Carolina was colder and dryer than today but more pleasant than farther north, ancient Americans migrated to Topper, Goodyear says. "Topper may have drawn people from all over the hemisphere simply because they were looking to relocate in warmer climes."

Early hunter-gatherers who used Topper were likely coast-dwellers, says Goodyear. Ancient people may have lived in settlements along the South Carolina shoreline most of the year, harvesting shellfish and fishing and perhaps hunting marine mammals.

In the spring, they likely traveled inland along the Savannah River, a major artery linking the Atlantic Ocean to the interior. They might have netted migratory fish swimming upstream to spawn. On a river bluff at the Topper site in Allendale County, early Americans broke open cream-colored rock called chert. Chert is a glassy, flint-like stone used to carve tools from antler, wood, and bone.

The Topper site was one of the best sources of chert in the region. People from across eastern North America probably came to the Topper chert quarry to make tools.

Scientists agree that early Americans used Topper as an important tool-making site at least 13,000 years ago. But, in November 2004, Goodyear, an expert on ancient tool-making, announced that testing appar-

ently showed that people were visiting Topper at least 50,000 years ago.

Goodyear's team had found prehistoric burnt plant material from a charcoal fire buried deep under layers of sediment. The burnt material was sent to a laboratory in California, where its age was determined by state-of-the-art radiocarbon techniques.

Small stone tools and flakes—tool-making byproducts—were found in the same geological level as the burnt material. Scientists cannot date chert; instead, they rely on testing adjacent organic material or sediments.

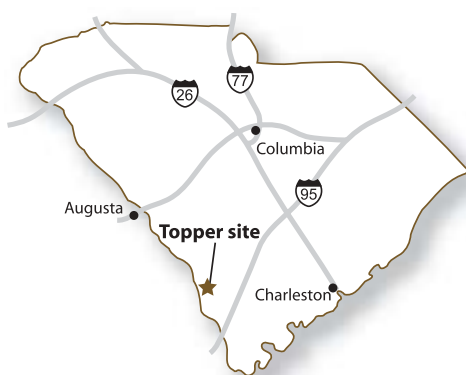
Goodyear's 50,000-year announcement startled his colleagues because it does not jibe with current scientific understanding of when the earliest Americans arrived on this continent.

Today's archaeological evidence strongly indicates an arrival after about 18,000 years ago, at the earliest. Even so, the first Americans' arrival date is a moving target. Just a decade ago, scientists argued adamantly that Americans did not migrate to the Western Hemisphere until 13,500 years ago.

American archaeology is changing quickly because researchers are finding new evidence of earlier explorers of the New World. Nevertheless, a 50,000-

TOPPER MAP.

Excavations at the Topper site have placed South Carolina in the middle of a fierce debate about the origins of the first Americans.



year date at Topper shoots off the charts to most experts, Goodyear acknowledges.

“Until we dig (more artifacts) and publish (results), I doubt you’ll get many people to comment positively on that,” says Goodyear. “I’m sitting out there on a limb, and we have a lot of work to do.”

Nevertheless, Goodyear's team at Topper has also unearthed numerous small tools in sediment dated by optically stimulated luminescence at an age of 16,000 to 20,000 years old.

Although also controversial, these ancient tools could fit neatly into a new model of the first Americans' migration to this continent. If eventually accepted by the research community, the tools would help further undermine a scientific consensus that lasted for generations.

From the 1930s to the late 1990s, archaeologists believed that the first Americans were big-game hunters who arrived in the New World from the Bering land bridge that connected Siberia and Alaska about 13,500 years ago. Ancient hunters followed mammoths and other big game into Canada south along the eastern slope of the Rocky Mountains and then quickly spread across the Great Plains, according to traditional archaeological theory.

Archaeologists called them Clovis people for their beautiful, sophisticated, and distinctively sculpted spear points first discovered near Clovis, New Mexico, in 1932. Numerous spear points were located near mammoth bones, suggesting that the weapons were used to kill the animal. Clovis points have since been found in every state in the lower 48 and

every county in South Carolina.

For decades, virtually every knowledgeable scientist accepted the Clovis-first theory—that Clovis people were the first Americans. Goodyear himself believed it until the late 1990s. Only apparent fools thought otherwise. “If you were an archaeologist who claimed to find a pre-Clovis site,” says Goodyear, “it was tantamount to saying you just saw Elvis leave Burger King.”

But this theory is wrong and should be abandoned, says Michael B. Collins, an archaeologist at the University of Texas. “We’ve demonstrated fatal flaws in Clovis-first. We’ve got to come up with a replacement theory.”

In recent years, archaeologists have excavated human artifacts that are older than Clovis, or are the same age but reflect a different way of life. Various sites, in both North and South America, prove that Clovis were not the first Americans.

Now Goodyear says he also has strong evidence proving that people were visiting at Topper 16,000 to 20,000 years ago, working with small chert tools such as chisels and scrapers. Microscopic evidence, he argues, shows signs of purposeful scratching and polishing—indications that the artifacts were manmade.

A skeptical colleague, however, says that Goodyear has jumped to conclusions. Stone pieces older than about 13,500 years old at Topper are not tools, says Collins. Instead, natural processes fractured them. “Many of us have looked at these ‘tools,’ and everything I’ve seen is absolutely a natural fracture.”

Most archaeological sites in North America claiming pre-Clovis tools have failed to gain scientific acceptance. Researchers decided that freezing and thawing, fires, or other natural events fractured stone pieces that only looked to some like tools.

Nevertheless, two pre-Clovis sites in North America—one in Pennsylvania called Meadowcroft

HAND MADE.

The earliest Americans could have used stone-and-wood tools like this one to score, groove, and engrave bone as they crafted various implements. Albert Goodyear, an archaeologist at the University of South Carolina, modified a pointed piece of chert, a flint-like rock, and attached it to a wood handle. Goodyear's tool illustrates how ancient Americans could have employed small stone pieces recently excavated from archaeological layers dated 16,000 to 20,000 years old at the Topper site in Allendale County.

PHOTO/WADE SPEES



Rockshelter and another in Virginia called Cactus Hill—have gained significant scientific acceptance in recent years. Both sites indicate human occupation before 13,500 years ago.

Now Goodyear wants Topper added to this short list of solid pre-Clovis candidates.

Topper tools dated 16,000 to 20,000 years old have stood up to scrutiny by some experts. “I’ve had people who are really expert at analysis come to look at (the stone pieces), and most of them agree that they are tools,” says Goodyear. “Not all archaeologists are adept at looking at some of the subtle features” of artifacts.

Joel Gunn, an archaeological consultant based in Chapel Hill, North Carolina, says Topper’s pre-Clovis stones were apparently shaped by human hands. “Probability favors that they are tools. AI has a convincing model for how pre-Clovis people would have used a tool kit.”

Bradley Lepper, an archaeologist with the Ohio Historical Society, also backs up Goodyear’s claim. “There are repetitive patterns of industry. They were systematically reproducing repeated forms, these little bladelets. I don’t know of any natural mechanisms that would systematically form so many (pieces) in the number and consistency that he is finding them. If nature were incidentally making these things, you would expect (their forms) to look more random. AI is persuading many of us that, yes, they are tools, and that people were in America at a surprisingly early date.”

Another problem with many pre-Clovis sites, critics say, is that natural items (such as burnt plant material) dated by radiocarbon techniques do not accurately reflect their real age. Natural processes—floods for example—could have mixed up loose materials from various eras, so that newer tools could have pushed into older sediments.

Topper’s geology, however, has remained intact throughout its

sediment layers. Moreover, several feet of sediment distinctly separate newer Clovis layers from older pre-Clovis ones, says Lepper. As a result, mixing was not possible.

So while many skeptics accept Goodyear’s analysis of Topper’s geology and dating, their doubts focus on the question of whether humans crafted the stone pieces. Goodyear argues the tools are human artifacts; some skeptics say they are not.

Only a decade ago, archaeologists thought they knew when and how the first Americans arrived here. Today, that’s no longer true; there seem to be more questions than answers. The story that once was so clear and simple could have a complex new beginning.

Researchers are working toward a new multi-entry model to explain the migration of the first Americans. Now it seems likely that the first Americans were coastal people, not inland big-game hunters.

The earliest Americans were probably fishermen, shellfish harvesters, and hunters of marine mammals, who migrated in numerous waves.

TIME TRAVEL.

At the Topper site in Allendale County, Albert Goodyear, an archaeologist with the University of South Carolina, excavates white Pleistocene sand dated 16,000 to 20,000 years ago. Goodyear’s team has found numerous stone fragments, which he says are human-made tools, in this sandy geological level. The archaeologists also found Clovis tools in the darker sediments above.

PHOTO/WADE SPEES

From East Asia they could have walked north along ancient coastlines or rowed small canoes made of sealskin. Reaching the southern coast of the Bering land bridge, they could have migrated eastward until they reached North America. Then they could have traveled south along the Northwest Coast of Alaska, British Columbia, and Washington state, down to California and Mexico, and then Central America and South America.

Small bands of humans exploring and colonizing unknown continents, says Goodyear, probably would have used seashores and major rivers to move around and harvest resources. They would have known how to find shellfish, finfish, and marine mammals along the coast. “I think the coast had to play an important role in transcontinental migrations,” says Goodyear.

Could the first Americans have arrived here from Europe or Africa?



No. Genetic evidence proves that East Asians populated the Americas before Europeans began arriving in the sixteenth century.

Linguistic evidence also shows that the first Americans came from East Asia. “There are structural properties that are common in (language) in the Americas that are common in Asia, and rare elsewhere,” says Johanna Nichols, a linguist and professor of Slavic languages at the University of California at Berkeley.

The timing and the routes to America, however, remain a mystery. “We don’t know how the Americans were peopled,” says University of Oregon archaeologist Jon Erlandson. “We don’t know when the Americas were first colonized. Ten years ago, many people thought it was all figured out. Now we find ourselves in a completely different scenario, with multiple different hypotheses calling for attention. It’s a much more wide-open field, which is really exciting.”

THE COASTAL-MIGRATION MODEL

People physically like us evolved in Africa perhaps as early as 160,000 years ago. Still, there was another evolutionary stage yet to come.

About 80,000 to 50,000 years ago, *Homo sapiens* began developing radically improved technologies, making more diverse tools, which allowed them to hunt more efficiently. Scholars believe that these technologies were combined with more sophisticated art forms and language, which spawned a genetic and cultural revolution in human consciousness that geographer Jared Diamond has called “The Great Leap Forward.”

Suddenly, people who looked like us began to think like us, too. They became innovators and explorers on an unprecedented scale.

Armed with new cognitive and social capabilities, fully modern humans for the first time began



leaving Africa. Some populations moved into Central Asia about 50,000 years ago and into Europe about 40,000 years ago.

But if fully modern people were just beginning to reach Central Asia about 50,000 years ago, how could they have arrived at Topper at about the same time? One possible answer is that they moved with blazing speed along coastlines across southern and eastern Asia to the New World.

Fully modern people apparently did migrate swiftly eastward about 50,000 years ago from Africa along the southern shoreline of Asia, the “coastal superhighway,” writes population geneticist Spencer Wells in his 2002 book *The Journey of Man*.

It’s common for hunter-gatherer bands to move several miles a year, following animals, searching for water or plants, or getting stones for tool-making. In this fashion, people could have traversed the southern Asian coastline in a few thousand years.

Coastal migration along the southern Asian coast would have been much faster than traveling inland to Central Asia. Coastal hunter-gatherers did not have to climb mountains or adjust to dramatically different weather and food sources. Searching for food and water along a shoreline would have required the same tools and techniques in coastal Africa, India, or East Asia.

When hunter-gatherers reached the southeastern corner of Asia, they apparently looked to the sea. Recent discoveries prove that *Homo sapiens* built some kind of watercraft—probably logs lashed together—to sail or row across 60 miles of ocean from Southeast

Asia to colonize Australia about 50,000 years ago. At that time, sea levels were much lower, so coastlines of the two continents were closer than they are today. But people did need boats or rafts to reach Australia.

At Lake Mungo in southeastern Australia, University of Melbourne geomorphologist Jim Bowler and his colleagues have dated remains of an anatomically modern man and a woman at about 40,000 years old. Humans had been living at Lake Mungo at least 6,000 years previously.

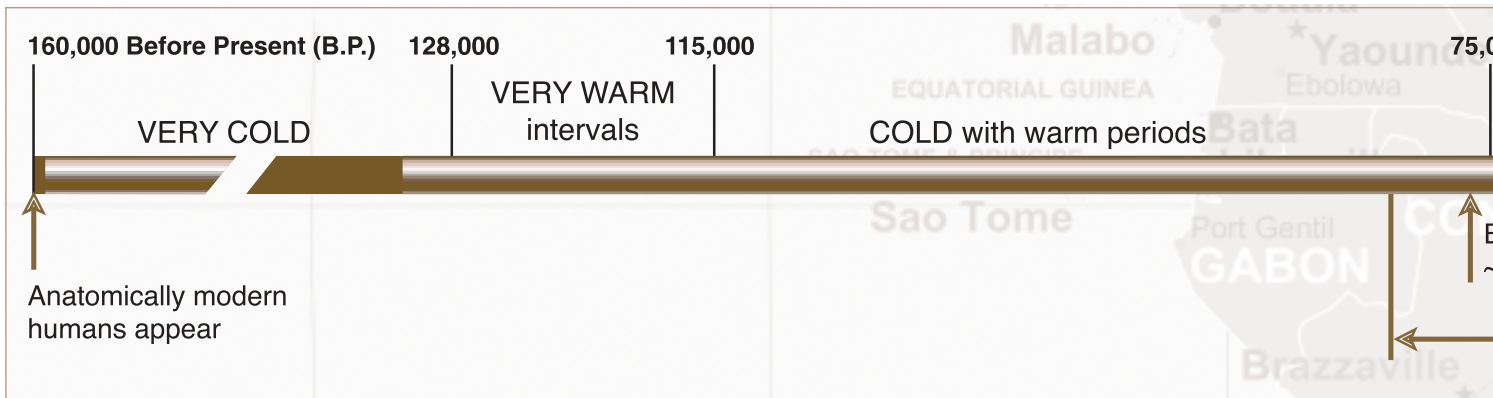
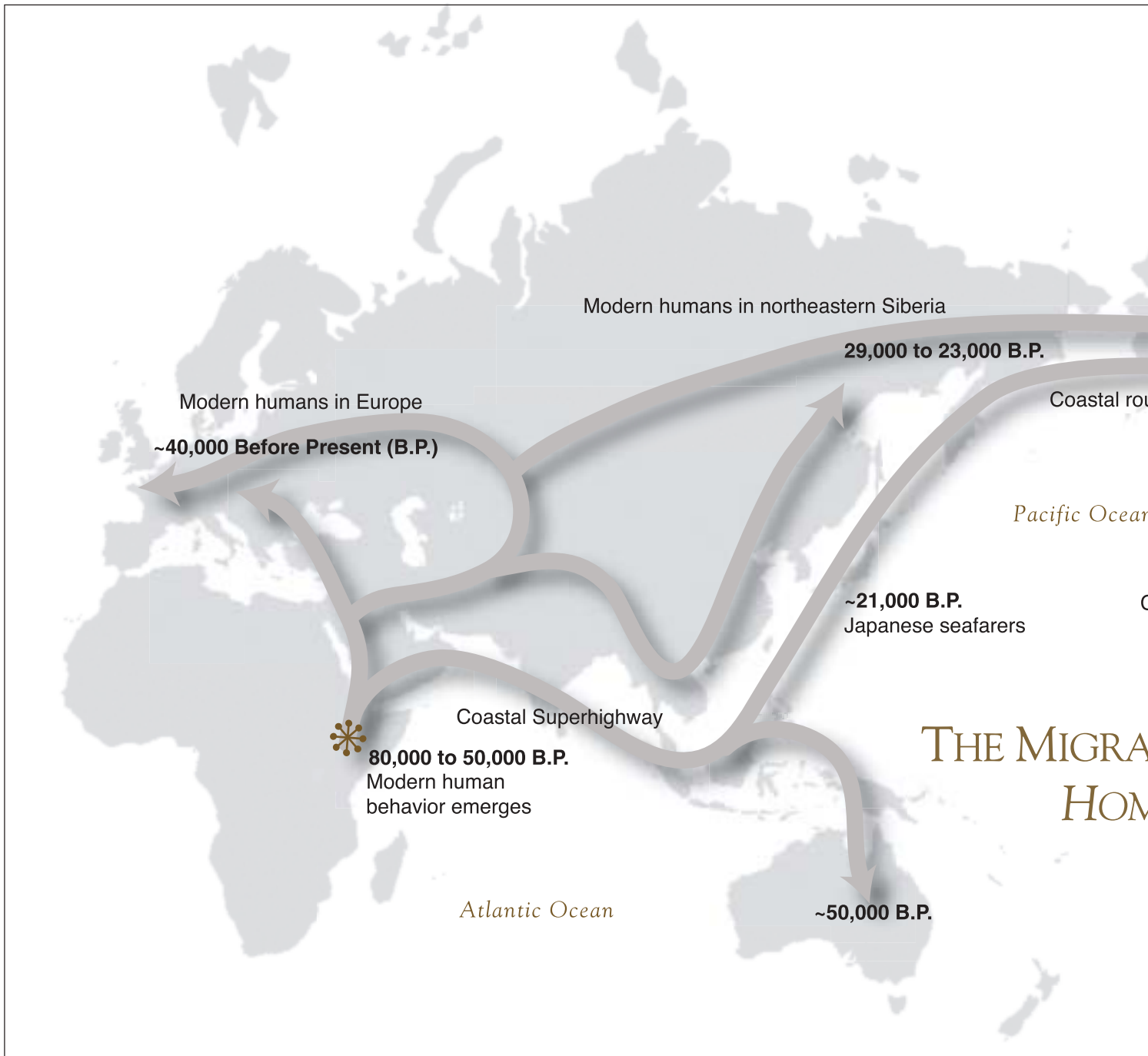
These early Australians were probably coastal people who moved seasonally inland following a prehistoric river to Lake Mungo, now a semi-arid landscape. Ancient artifacts found there indicate that the first Australians hunted small game, gathered mussels and other shellfish from the lake, and fished for cod and perch, possibly using nets.

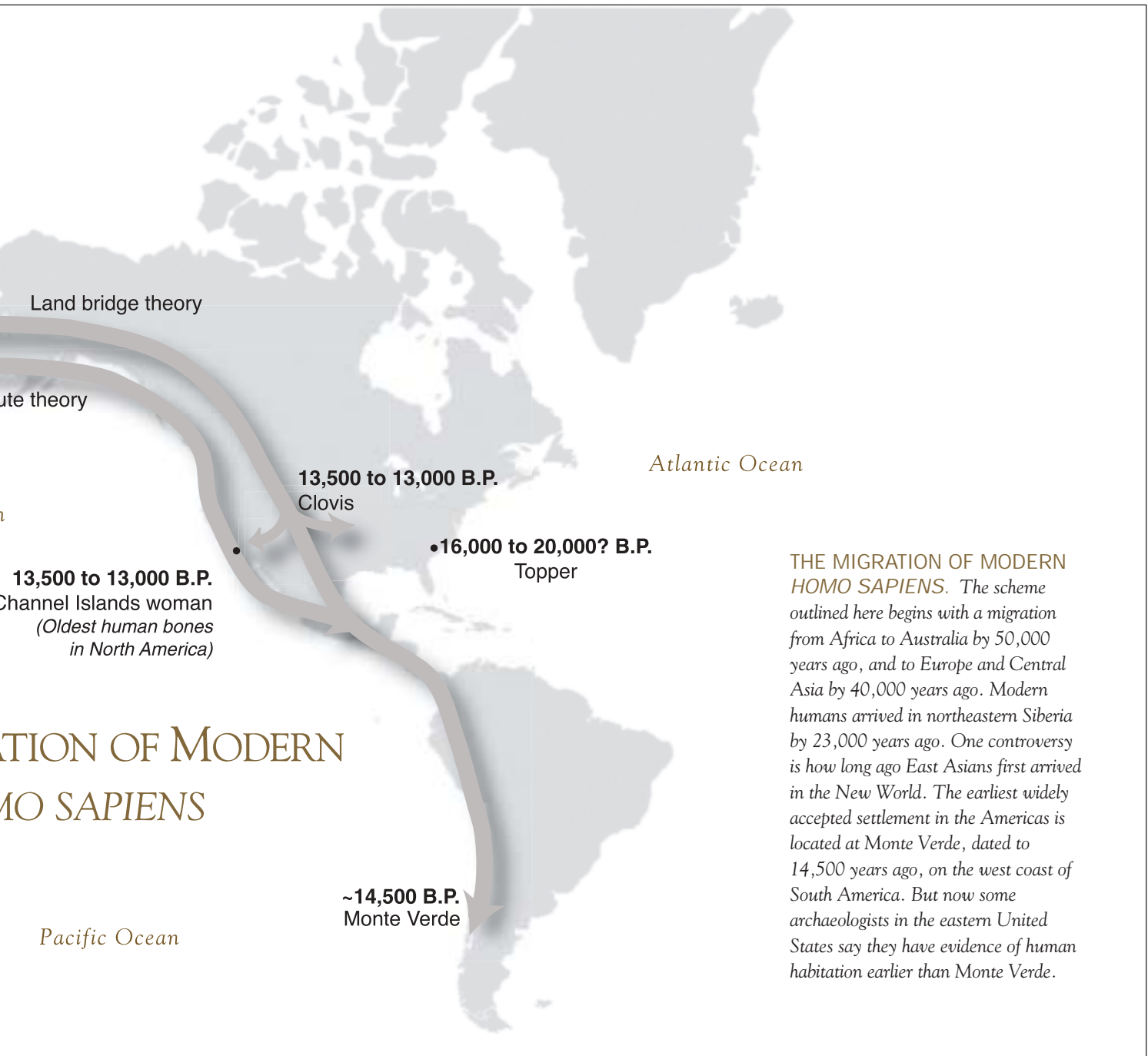
From Southeast Asia, people also began exploring by boat offshore islands in the far western Pacific. About 35,000 years ago, ancient mariners rowed or sailed across 100 miles of ocean to settle islands that are now part of Papua New Guinea.

The earliest maritime cultures therefore got established in warm-climate regions offshore from Southeast Asia. “There is considerable evidence for maritime activity on the western side of the Pacific,” says Erlandson.

But if the first Americans arrived here via a coastal route, they must have been adapted to a temperate or arctic maritime climate, which would have been much more challenging than the climate of Southeast Asia and Australia. That’s because the first Americans almost certainly traveled across the northern Pacific region during an era much colder than today.

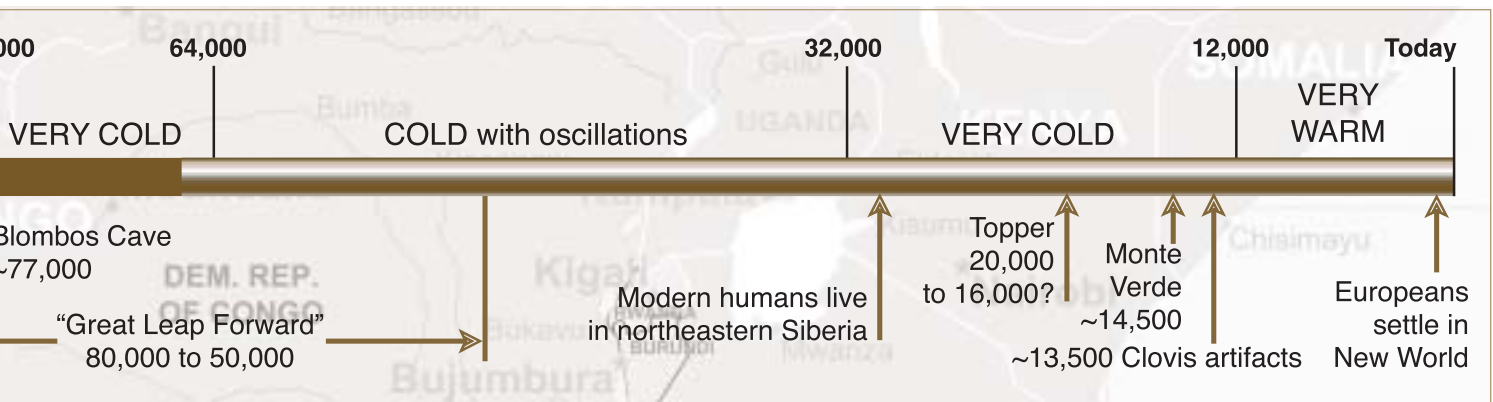
To volunteer at the Topper site, e-mail Goodyear@sc.edu or visit www.allendale-expedition.net/





MIGRATION OF MODERN HOMO SAPIENS

THE MIGRATION OF MODERN HOMO SAPIENS. The scheme outlined here begins with a migration from Africa to Australia by 50,000 years ago, and to Europe and Central Asia by 40,000 years ago. Modern humans arrived in northeastern Siberia by 23,000 years ago. One controversy is how long ago East Asians first arrived in the New World. The earliest widely accepted settlement in the Americas is located at Monte Verde, dated to 14,500 years ago, on the west coast of South America. But now some archaeologists in the eastern United States say they have evidence of human habitation earlier than Monte Verde.



GLACIER MELTING CLUES

The likeliest period when the first Americans arrived in the Western Hemisphere was not long after the last glacial maximum when continental glaciers were beginning to melt.

Glaciers at their greatest extent covered nearly a third of the world's landmass 20,000 years ago, reaching as far south as New York City. Following this deep freeze, the Earth's climate saw extreme variations, but its overall trend was warmer for the next 12,000 years.

About 15,000 years ago, ancestors of the Clovis people were probably living on the Bering land bridge between Siberia and Alaska. But two continental glaciers in Canada blocked their entry to the Americas. As warming accelerated 13,500 years ago, the glaciers began to melt and separate in northwestern Canada.

Subsequently, the Clovis people traveled south through an ice-free corridor to the eastern foothills of the Rocky Mountains, according to traditional archaeological theory. They could not have migrated south

through this ice-free corridor any earlier than 13,500 years ago; glaciers blocked their way.

The Clovis-first theory remained dominant until a scientific breakthrough suddenly damaged its credibility and changed the direction of American archaeology.

In 1997, Thomas D. Dillehay, an archaeologist at Vanderbilt University, and his colleagues distributed a site report on their excavation of an ancient settlement called Monte Verde about 40 miles from the Pacific Ocean in Chile. Dillehay's team had excavated the remains of several ancient structures, stone and wood implements, and clay-lined hearths that contained charcoal and burned plant foods. All were buried in the same geological layer under a muddy bog.

Radiocarbon testing, adjusted to calendar years, showed that Monte Verde materials were more than 14,500 years old. A committee of experts visited the site in 1997 and verified Monte Verde's authenticity.

The discovery at Monte Verde meant that humans were living in the southern cone of South America at least a thousand years before the Clovis people could have traveled south through the ice-free corridor in Canada. Many archaeologists had to drop their pet theory and acknowledge that Clovis people were not first in the Americas.

When the Clovis-first orthodoxy fell apart, some scholars who had believed in it began re-examining why ice-age hunters would have pursued big game for some two thousand miles south through a narrow gap between giant ice sheets in Canada about 13,500 years ago.

"The corridor was an unbelievably hostile environment for humans," says Collins, who before Monte Verde accepted Clovis-first orthodoxy. "What would pull people into that? What were they chasing? The biggest megafauna there were probably mosquitoes."

EARLY BOATS

Archaeologists cast around for another possible route into the Americas—and a coastal pathway made sense.

Scientists are now testing the coastal-entry theory of migration first proposed by Knut Fladmark of Simon Fraser University almost 30 years ago. In recent years, increasing numbers of archaeologists have become supporters of the theory.

The theory is based on the fact that coasts usually have milder climates than inland places at the same latitude. As the ice age wound down, glaciers melted and withdrew sooner along most coastlines than inland areas. Maritime warming would have allowed an earlier migration of animals and people along coastlines into the Americas.

There were only two methods with which coastal people from Asia could have migrated along shorelines to North America. They could have

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walked the entire distance. Or they could have used boats.

Many recent studies on the glacial history, climatic history, sea-level changes, and archaeology and paleoecology of the Northwest Coast show that a coastal route was open before an inland corridor, says Carole Mandryk, a geoarchaeologist at Harvard University. "The Northwest Coast was available (for migration) at least two thousand years earlier than the (ice-free inland) corridor."

By 16,000 years ago, glaciers along the shoreline route from Asia to America had retreated inland. The coasts by then were covered in grass and trees and rich in wildlife. As a result, people could have walked from northeastern Asia to North America and farther south to Monte Verde on the west coast of South America by 14,500 years ago.

Or perhaps people built small boats tens of thousands of years ago in East Asia and used them to travel to the New World. Glacier-free refuges began to appear as early as 18,000 years ago along northern Pacific coastlines. Migrants could have rowed boats from island to island, refuge to refuge, to America.

In fact, an ancient Japanese maritime culture did exist at least 21,000 years ago. Seeking obsidian (a volcanic rock) for toolmaking, Japanese at that time traveled by boat across open water about 35 miles to an island in the Pacific Ocean east of present-day Tokyo. Ancient Japanese were adapted to a climate resembling that of the far northern Pacific, which was warmed by an ocean current from the south. Could early Japanese have traveled along the coastline to the land bridge connecting Asia and North America?

Traditional Inuit technology might provide an answer. Among some native communities in Alaska, hunters still build large skin-on-frame canoes, or umiaks, to catch sea mammals.

Instead of using sawn lumber for the umiak frame, ancient people could

have shaped driftwood with stone axes and scrapers. Bearded seal or split walrus hides could have been sewn together and stretched over the frame. These boats would have been tough, light, flexible, and capable of carrying heavy loads.

Ancient Asian migrants on their route to America could have lived in caves in coastal refuges or built dugout shelters covered with mammal skins. Perhaps they burned driftwood or downed trees for fuel. They could have dug for clams, gathered and dried seaweed, and hunted seals and sea lions.

Maritime people did have boats off the North American West Coast at least 13,000 years ago—or about the same time as Clovis people arrived. Archaeologists have excavated shell middens dated to 12,000 to 13,000 years old in the Channel Islands off California, which could have only been reached by boat from the mainland. The oldest human bones—a woman's—found in North America, excavated in the Channel Islands, are about 13,000 years old.

"Paleoindians on the Channel Islands needed seaworthy boats to get there," says Erlandson. "They were on the Channel Islands about the same time as Clovis, so this showed that paleoindians had boats that were cruising about off the Pacific."

The problem with the boat-migration model, says David Meltzer, an anthropologist at Southern Methodist University, is that boats do not exist in the archaeological record that far back. "We lack any evidence of boats until the mid-Holocene times (5,000 to 6,000 years ago) along the Northwest Coast and along the coast of Alaska. In the absence of any evidence of boats whatsoever, you probably have them walking along coastlines. The idea that people would be crossing entire oceans in the



CHAIN REACTION

Our ancient ancestors coped with dramatic climate fluctuations, but now for the first time humans are contributing significantly to global climate change, which could cause a violent, abrupt climate disruption.

Over hundreds of thousands of years, intense cold periods called glacials—popularly known as ice ages—have been interspersed with briefer, much warmer periods called interglacials. Glacial ages usually last about 90,000 years followed by interglacials that average about 10,000 years. Some warm periods last 5,000 years, others 20,000.

The Earth's natural state is very cold; its most common age is ice. But even the last glacial age was not uniformly cold; there were many extreme, sudden temperature changes.

The current interglacial has lasted about 12,000 years, and it has been an unusually stable period of warmth. Eventually the Earth will cool down again into another ice age.

Changes in the Earth's orbit trigger abrupt but long-term shifts in climate. Wobbles in the Earth's orbit alter the amount and distribution of solar radiation on the planet's surface, which strongly reshapes atmospheric and ocean currents. Such currents are great movers of heat around the world, particularly from the equator to the temperate regions. When these currents are altered, the Earth can turn much warmer or much colder.

Such natural disruptions have altered global climate many times in the geological record, sending the planet from warm-and-wet periods to very cold-and-dry periods. Extreme changes in global climate have occurred over periods as brief as 20 to 50 years.

Today's problem, many scientists say, is that no one knows whether human activities—such as burning fossil fuels—could set off a similar chain reaction in the Earth's climate, spawning another extreme swing in global temperature.

rafting technology that would have been available in those days doesn't make a lot of sense to me."

However, northern maritime Asians were probably not crossing large stretches of open water but instead following the coastline, says Mandryk. They could have traveled by watercraft over short distances, stopping at glacier-free islands and coastal refuges along the way. They were coastal people who could have lived off marine resources but also hunted and fished inland along the banks of river valleys.

About 18,000 years ago, coastal hunter-gatherers could have used boats to migrate across the land's edge in the northern Pacific to reach California. Then, in a matter of centuries, hunter-gatherers could have moved south to Panama and crossed the isthmus and then followed the coastline of the Gulf of Mexico to the East Coast of North America. It seems likely that they could have thus arrived at Topper perhaps by 16,000 to 17,000 years ago.

Many questions remain, however. If the first Americans did arrive several thousand years before Clovis, why haven't archaeologists found more evidence of them in North America? Only a small number of genuine pre-Clovis sites exist in the Americas—and no human skeletons.

One reason may be that global warming following the last glacial maximum 20,000 years ago drowned the evidence of coastal settlements. When glaciers shrank in response to rising temperatures, huge amounts of freshwater were released into the oceans. Sea levels rose and swamped river valleys and coastal plains. Coastlines moved steadily landward. The Bering land bridge between Asia and North America disappeared under water.

The shoreline off Charleston 13,000 to 18,000 years ago was about 60 to 70 miles farther east than it is today, according to Paul Gayes, a marine scientist at Coastal Carolina



University. If there are any ancient remains of villages off the South Carolina shoreline, they are buried under 300 to 400 feet of seawater. With current technology, it's almost impossible to find where the earliest communities were located along the ice-age coastlines of the Americas. The best ice-age coastal sites exist in places like Monte Verde that were lifted by tectonic activity above rising seas.

A NEW CONSENSUS?

Today, scholars are increasingly building a rough new consensus—that numerous small-scale groups arrived in the Americas at various times. They probably included hunter-gatherer bands that traveled through an ice-free corridor, people who walked here along coastlines, perhaps in tandem with seal-boat groups over many centuries, all from East Asia.

The Clovis people could have arrived in North America through an ice-free corridor following a coastal migration. "There is a striking correlation between the opening of the ice-free corridor and the appearance of Clovis" artifacts in the archaeological record, says Meltzer. Or perhaps there was a near-simultaneous Clovis-first migration and a coastal migration. "You can have your cake and eat it, too."

But East Asians could not have migrated to North America as early as 50,000 years ago, as Goodyear's "out-on-a-limb" preliminary findings at Topper suggest, many experts say.

The earliest archaeological site where modern humans lived in northeastern Siberia is only 29,000 years old. There is no evidence that

modern humans had the skills and tools enabling them to survive on the land bridge in Arctic conditions between Asia and North America earlier than 30,000 years ago.

"It's incomprehensible to me that anything (human-made) at Topper could be 50,000 years old," says Mandryk. "You can't have people migrating to North America before they exist anywhere to migrate from."

American archaeology, though, is changing fast. There are untold mysteries about the first Americans; facts are still buried underground and underwater. "We're never arguing from complete knowledge," says Brad Lepper of the Ohio Historical Society. "Whenever someone reports 'the oldest date site in Siberia,' you can bet that within a decade, another site will be found that's earlier."

A scientific consensus, moreover, can be mistaken, Goodyear points out. Not long ago, scholars supported the Clovis-first orthodoxy, which many now say was dead wrong.

"The Western Hemisphere is a vast place," says Goodyear, "and to think that human beings, as clever as they are, with the technologies they knew how to create, couldn't somehow leak into this hemisphere (thousands of years before Clovis) seems the height of hubris to me now. You have to leave all of these hypotheses on the table. It's not good enough anymore to say, 'That's impossible.' We have to leave our minds open."

One hypothesis about the first Americans, though, is gaining particularly strong support. The first explorers of the Americas followed shorelines to arrive here. Tens of thousands of years ago, people in East Asia were already living off the resources of the littoral edge. And some hunter-gatherers were heading across open water in small vessels, rowing into the unknown. Near the beginnings of modern human history, we were already a coastal species, drawn to the sea. ♡

COASTS INSPIRE MODERN HUMANITY

The first flowering of modern intelligence might have been stimulated along the edge of the ocean by our ancestors' use of coastal resources.

Our distant ancestors evolved on Earth for about seven million years, over which time some 20 different known hominid species thrived and then disappeared. All are extinct now but one—our species, *Homo sapiens*.

Homo sapiens—anatomically modern people who look like us—evolved in Africa perhaps as early as 160,000 years ago. Although modern-style humans were physically less robust than any of their predecessors, early *Homo sapiens* were blessed with the large brain that we have today.

Even so, early anatomically modern humans lacked our capacity for complex thought. They continued to use relatively primitive stone tools for thousands of years.

But about 80,000 to 50,000 years ago *Homo sapiens* began a remarkably rapid intellectual transformation.

During this period people began fashioning more sophisticated tools—buttons, needles, and harpoons—from a variety of materials: ivory, antler, and shell. They also started creating art in the form of carvings, engravings, ornaments, and cave paintings; keeping records on bone and stone plaques; making music on wind instruments; and organizing increasingly complex hunting and fishing practices.

This burst of creativity is what we associate today with modern human intelligence and behavior.

What stimulated the human mind? William H. Calvin, a neurobiologist at the University of Washington, argues that a new mental operating system abruptly appeared in humans—a “software upgrade” that enhanced our ancestors' ability to anticipate and plan.

Did this revolution result from a genetically based change in the wiring of our brains? Or did it emerge from cultural adaptation—the innate creativity of humans flowering to a higher potential? Or both?

When humans experienced this burst of creativity, they also probably began creating complex sentences that made sense to other humans. People developed language syntax—the logical patterns within

strings of words—to communicate. Such innovations allowed our ancestors to play games that had intricate rules, to break down and understand how things work, and to experiment and pass on what they

had learned through stories and intergenerational lessons.

Researchers point to two behaviors that especially indicate modern behavior and both involve art forms: people intentionally drawing or carving images on cave walls or other materials; and people using ornaments such as beads.

Art is interwoven with higher language skills. Humans need

complex language to share cultural meaning of beadworks and etchings. The first behaviorally modern humans, Calvin writes, began to show the “cognitive ability to reduce the world around them to symbols expressed in words and art.”

So when did these symbols first occur? The oldest documented modern human behavior has been found in a cave on the southern Cape shore of the Indian Ocean in South Africa. In Blombos Cave, archaeologists excavated sophisticated hunting and fishing tools, necklace beads, and engraved ochre pieces, dating from about 75,000 years ago, according to studies by archaeologist Christopher S. Henshilwood and his colleagues.

About 80,000 years ago, the world was growing much colder as the ice age accelerated to a deep freeze. In East Africa, the changing climate made water and prey scarcer; savannah was turning to steppe and desert. Some populations began moving to ribbons of coast where they could exploit food resources from the sea but also hunt land animals nearby.

The southern Cape about 75,000 years ago had a moderate climate and more consistently available resources than inland areas.

Archaeologists suggest that inland people migrating to the coast competed for resources with people already living there. Both populations could have created more complex social relations to share those resources, which spawned the world's first known art forms.

Temperate weather and a more diverse food supply near the sea in a time of rapid climate change could have encouraged cooperation among various populations, which pushed *Homo sapiens* on the path to modern human consciousness. ♡



The oldest documented modern human behavior has been found in Blombos Cave on the South African coast.

EBBS & FLOWS

Solutions to Coastal Disasters Conference 2005

Charleston, South Carolina
May 8–11, 2005

This is a conference for coastal planners, managers, scientists, engineers, geologists, economists, oceanographers, meteorologists, property owners, elected officials, and others interested in the coast. Conference topics will focus on the science and management of erosion, hurricanes, coastal storms, tsunamis, seismic events, climate change, sea level rise, and wind hazards. For more information, visit www.asce.org/conferences/cd05/

Clovis in the Southeast Conference

Columbia, South Carolina
Oct. 26–29, 2005

This conference will consist of programs, exhibits, and traditional scientific presentations, concluding with a tour of South Carolina's Big Pine Tree and Topper sites. Presenting a scientific summary of Clovis in the Southeast, the conference will address issues such as Clovis origins, dating, geoarchaeological issues, Clovis technology, and site variation. For more information, visit www.allendale-expedition.net/csc.html

3rd International Symposium on Deep-Sea Corals

Miami, Florida
Nov. 28–Dec. 2, 2005

Understanding the ecosystem role, function, and value of deep-sea corals and associated fauna has become a priority topic for many national governments and international regional resource management bodies. This international symposium will facilitate global exchange of current scientific knowledge on deep-sea corals and associated fauna and to discuss possible statutory means available to conserve and protect deep-sea habitat. For more information, visit conference.ifas.ufl.edu/coral

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