The last time I spoke with Sérgio D. J. Pena, he was hunting for ancient Indians in modern blood. The blood was sealed into thin, rodlike vials in Pena’s laboratory at the Federal University of Minas Gerais, in Belo Horizonte, Brazil’s third-largest city. To anyone who has seen a molecular biology lab on the television news, the racks of refrigerating tanks, whirling DNA extractors, and gene-sequencing machines in Pena’s lab would look familiar. But what Pena was doing with them would not. One way to describe Pena’s goal would be to say that he was trying to bring back a people who vanished thousands of years ago. Another would be to say that he was wrestling with a scientific puzzle that had resisted resolution since 1840.

In that year Peter Wilhelm Lund, a Danish botanist, found thirty skeletons in caves twenty miles north of Belo Horizonte. The caves were named Lagoa Santa, after a nearby village. Inside them were a jumble of remains from people and big, extinct beasts. If the human and animal bones were from the same time period, as their proximity suggested, the implication was that people had been living in the Americas many thousands of years ago, much longer than most scientists then believed. Who were these ancient hunters? Regarding Europe as the world’s intellectual capital, the intrigued Lund sent most of the skeletons to a museum in his native Copenhagen. He was certain that researchers there would quickly study and identify them. Instead the bones remained in boxes, rarely disturbed, for more than a century.

Scientists finally examined the Lagoa Santa skeletons in the 1960s. Laboratory tests showed that the bones could be fifteen thousand
years old—possibly the oldest human remains in the Western Hemisphere. Lund had noted the skulls' heavy brows, which are rare in Native Americans. The new measurements confirmed that oddity and suggested that these people were in many ways physically quite distinct from modern Indians, which indicated, at least to some Brazilian archaeologists, that the Lagoa Santa people could not have been the ancestors of today's native populations. Instead the earliest inhabitants of the Americas must have been some other kind of people.

North American researchers tended to scoff at the notion that some mysterious non-Indians had lived fifteen thousand years ago in the heart of Brazil, but South Americans, Pena among them, were less dismissive. Pena had studied and worked for twelve years overseas, mainly in Canada and the United States. He returned in 1982 to Belo Horizonte, a surging industrial city in the nation's east-central highlands. In Brazilian terms, it was like abandoning a glamorous expatriate life in Paris to come back to Chicago. Pena had become interested while abroad in using genetics as a historical tool—studying family trees and migrations by examining DNA. At Belo Horizonte, he joined the university faculty and founded, on the side, Brazil's first DNA-fingerprinting company, providing paternity tests for families and forensic studies for the police. He taught, researched, published in prestigious U.S. and European journals, and ran his company. In time he became intrigued by the Lagoa Santa skeletons.

The most straightforward way to discover whether the Lagoa Santa people were related to modern Indians, Pena decided, would be to compare DNA from their skeletons with DNA from living Indians. In 1999 his team tried to extract DNA from Lagoa Santa bones. When the DNA turned out to be unusable, Pena came up with a second, more unorthodox approach: he decided to look for Lagoa Santa DNA in the Botocudo.

The Botocudo were an indigenous group that lived a few hundred miles north of what is now Rio de Janeiro. (The name comes from botoque, the derogatory Portuguese term for the big wooden discs that the Botocudo inserted in their lower lips and earlobes, distending them outward.) Although apparently never numerous, they resisted conquest so successfully that in 1807 the Portuguese colonial government formally launched a "just war against the cannibalistic Botocudo." There followed a century of intermittent strife, which slowly drove the Botocudo to extinction.

With their slightly bulging brows, deepset eyes, and square jaws, the Botocudo were phenotypically different (that is, different in appearance) from their neighbors—a difference comparable to the difference between West Africans and Scandinavians. More important, some Brazilian scientists believe, the Botocudo were phenotypically similar to the Lagoa Santa people. If the similarity was due to a genetic connection—that is, if the Botocudo were a remnant of an early non-Indian population at Lagoa Santa—studying Botocudo DNA should provide clues to the genetic makeup of the earliest Americans. To discover whether that genetic connection existed, Pena would first have to obtain some Botocudo DNA. This requirement would have seemed to doom the enterprise, because the Botocudo no longer existed. But Pena had an idea—innovative or preposterous, depending on the point of view—of how one might find some Botocudo DNA anyway.

All human beings have two genomes. The first is the genome of the DNA in chromosomes, the genome of the famous human genome project, which proclaimed its success with great fanfare in 2000. The second and much smaller genome is of the DNA in mitochondria; it was mapped, to little public notice, in 1981. Mitochondria are minute, bean-shaped objects, hundreds of which bob about like so much flotsam in the warm, salty envelope of the cell. The body's chemical plants, they gulp in oxygen and release the energy-rich molecules that power life. Mitochondria are widely believed to descend from bacteria that long ago somehow became incorporated into one of our evolutionary ancestors. They replicate themselves independently of the rest of the cell, without using its DNA. To accomplish this, they have their own genome, a tiny thing with fewer than fifty genes, left over from their former existence as free-floating bacteria. Because sperm cells are basically devoid of mitochondria, almost all of an embryo's mitochondria come from the egg. Children's mitochondria are thus in essence identical to their mother's.*

More than that, every woman's mitochondrial DNA is identical not only to her mother's mitochondrial DNA, but to that of her

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* I use the hedge words "basically," "almost," and "in essence" because sperm actually have 50 to 100 mitochondria, just enough to power them through their short lives. By contrast, the egg has as many as 100,000 mitochondria. When the sperm joins the egg, the egg eliminates sperm mitochondria. Every now and then, though, a few escape destruction and end up in the embryo's cells.
mother's mother's mitochondrial DNA, and her mother's mother's mother's mitochondrial DNA, and so on down the line for many generations. The same is not true for men. Because fathers don't contribute mitochondrial DNA to the embryo, the succession occurs only through the female line.

In the late 1970s several scientists realized that an ethnic group's mitochondrial DNA could provide clues to its ancestry. Their reasoning was complex in detail but simple in principle. People with similar mitochondria have, in the jargon, the same "haplogroup." If two ethnic groups share the same haplogroup, it is molecular proof that the two groups are related; their members belong to the same female line. In 1990 a team led by Douglas C. Wallace, now at the University of California at Irvine, discovered that just four mitochondrial haplogroups account for 96.9 percent of Native Americans—another example of Indians' genetic homogeneity, but one without any known negative (or positive) consequences. Three of the four Indian haplogroups are common in southern Siberia. Given the inheritance rules for mitochondrial DNA, the conclusion that Indians and Siberians share common ancestry seems, to geneticists, inescapable.

Wallace's research gave Pena a target to shoot at. Even as the Brazilian government was wiping out the Botocudos, some Brazilian men of European descent were marrying Botocudo women. Generations later, the female descendants of those unions should still have mitochondria identical to the mitochondria of their female Botocudo ancestors. In other words, Pena might be able to find ancient American DNA hidden in Brazil's European population.

Pena had blood samples from people who believed their grandparents or great-grandparents were Indians and who had lived in Botocudo territory. "I'm looking for, possibly, a very old haplogroup," he told me. "One that is not clearly indigenous or clearly European." If such a haplogroup turned up in Pena's assays, it could write a new chapter in the early history of Native Americans. He expected to be searching for a while, and anything he found would need careful confirmation.

Since the sixteenth century, the origins of Native Americans have been an intellectual puzzle.* Countless amateur thinkers took a crack at the problem, as did anthropologists and archaeologists when those disciplines were invented. The professionals made no secret of their disdain for the amateurs, whom they regarded as annoyances, cranks, or frauds. Unfortunately for the experts, in the 1920s and 1930s their initial theories about the timing of Indians' entrance into the Americas were proven wrong, and in a way that allowed the crackpots to claim vindication. Thirty years later a new generation of researchers put together a different theory of Native American origins that gained general agreement. But in the 1980s and 1990s a gush of new information about the first Americans came in from archaeological digs, anthropological laboratories, molecular biology research units, and linguists' computer models. The discoveries once again fractured the consensus about the early American history, miring it in dispute.

"It really does seem sometimes that scientific principles are going out the window," the archaeologist C. Vance Haynes said to me, unhappily. "If you listen to [the dissenting researchers], they want to throw away everything we've established."

Haynes was waxing rhetorical—the critics don't want to jettison everything from the past. But I could understand the reason for his doleful tone. Again the experts were said to have been proved wrong, opening a door that until recently was bolted against the crackpots. A field that had seemed unified was split into warring camps. And projects like Pena's, which not long ago would have seemed marginal, even nutty, now might have to be taken seriously.

In another sense, though, Haynes's unhappy view seemed off the mark. The rekindled dispute over Indian origins has tended to mask a greater archaeological accomplishment: the enormous recent accumulation of knowledge about the American past. In almost every case, Indian societies have been revealed to be older, grander, and more complex than was thought possible even twenty years ago. Archaeologists not only have pushed back the date for humanity's entrance into the Americas, they have learned that the first large-scale societies grew up earlier than had been believed—almost two thousand years earlier, and in a different part of the hemisphere. And even those societies that had seemed best understood, like the Maya, have been placed in new contexts on the basis of new information.

At one point I asked Pena what he thought the reaction would be if he discovered that ancient Indians were, in fact, not genetically
related to modern Indians. He was standing by a computer printer that was spewing out graphs and charts, the results of another DNA comparison. "It will seem impossible to believe at first," he said, flipping through the printout. "But if it is true—and I am not saying that it is—people will ultimately accept it, just like all the other impossible ideas they've had to accept."

LOST TRIBES

So various were the peoples of the Americas that continent-wide generalizations are risky to the point of folly. Nonetheless, one can say that for the most part the initial Indian-European encounter was less of an intellectual shock to Indians than to Europeans. Indians were surprised when strange-looking people appeared on their shores, but unlike Europeans they were not surprised that such strange people existed.

Many natives, seeking to categorize the newcomers, were open to the possibility that they might belong to the realm of the supernatural. They often approached visitors as if they might be deities, possibly calculating, in the spirit of Pascal's wager, that the downside of an erroneous attribution of celestial power was minimal. The Taíno Indians, Columbus reported after his first voyage, "firmly believed that I, with my ships and men, came from the heavens.... Wherever I went, [they] ran from house to house, and to the towns around, crying out, 'Come! come! and see the men from the heavens!'" On Columbus's later voyages, his crew happily accepted godhood—until the Taíno began empirically testing their divinity by forcing their heads underwater for long periods to see if the Spanish were, as gods should be, immortal.

Motecuhzoma, according to many scholarly texts, believed that Cortés was the god-hero Quetzalcoatl returning home, in fulfillment of a prophecy. What historian Barbara Tuchman called the emperor's "wooden-headedness, in the special variety of religious mania" is often said to be why he didn't order his army to wipe out the Spaniards immediately. But the anthropologist Matthew Restall has noted that none of the conquistadors' writings mention this supposed apotheosis, not even Cortés's lengthy memos to the Spanish king, which go into detail about every other wonderful thing he did.

Instead the Quetzalcoatl story first appears decades later. True, the Mexica apparently did call the Spaniards teotoxco, a term referring both to gods and to powerful, privileged people. The ambiguity captures the indigenous attitude toward the hairy, oddly dressed strangers on their shores: recognition that their presence was important, plus a willingness to believe that such unusual people might have qualities unlike those of ordinary men and women.

Similarly, groups like the Wampanoag, Narragansett, and Haude-no-sauwee in eastern North America also thought at first that Europeans might have supernatural qualities. But this was because Indians north and south regarded Europeans as human beings exactly like themselves. In their view of the world, certain men and women, given the right circumstances, could wield more-than-human powers. If the Wampanoag and Mexica had shamans who could magically inflict sickness, why couldn't the British? (The Europeans, who themselves believed that people could become witches and magically spread disease, were hardly going to argue.)

As a rule, Indians were theologically prepared for the existence of Europeans. In Choctaw lore, for example, the Creator breathed life into not one but many primeval pairs of human beings scattered all over the earth. It could not have been terribly surprising to Choctaw thinkers that the descendants of one pair should show up in the territory of another. Similarly, the Zuni took the existence of Spaniards in stride, though not their actions. To the Zuni, whose accounts of their origins and early history are as minutely annotated as those in the Hebrew Bible, all humankind arose from a small band that faded into existence in a small, dark, womb-like lower world. The sun took pity on these bewildered souls, gave them maize to eat, and distributed them across the surface of the earth. The encounter with Europeans was thus a meeting of long-separated cousins.

Contact with Indians caused Europeans considerably more consternation. Columbus went to his grave convinced that he had landed on the shores of Asia, near India. The inhabitants of this previously unseen land were therefore Asians—hence the unfortunate name "Indians." As his successors discovered that the Americas were not part of Asia, Indians became a dire anthropological problem. According to Genesis, all human beings and animals perished in the Flood
except those on Noah's ark, which landed "upon the mountains of Ararat," thought to be in eastern Turkey. How, then, was it possible for humans and animals to have crossed the immense Pacific? Did the existence of Indians negate the Bible, and Christianity with it?

Among the first to grapple directly with this question was the Jesuit educator José de Acosta, who spent a quarter century in New Spain. Any explanation of Indians' origins, he wrote in 1590, "cannot contradict Holy Writ, which clearly teaches that all men descend from Adam." Because Adam had lived in the Middle East, Acosta was "forced" to conclude "that the men of the Indies traveled there from Europe or Asia." For this to be possible, the Americas and Asia "must join somewhere."

If this is true, as indeed it appears to me to be, ... we would have to say that they crossed not by sailing on the sea, but by walking on land.

And they followed this way quite unthinkingly, changing places and lands little by little, with some of them settling in the lands already discovered and others seeking new ones. [Emphasis added]

Acosta's hypothesis was in basic form widely accepted for centuries. For his successors, in fact, the main task was not to discover whether Indians' ancestors had walked over from Eurasia, but which Europeans or Asians had done the walking. Enthusiasts proposed a dozen groups as the ancestral stock: Phoenicians, Basques, Chinese, Scythians, Romans, Africans, Hindus, ancient Greeks, ancient Assyrians, ancient Egyptians, the inhabitants of Atlantis, even straying bands of Welsh. But the most widely accepted candidates were the Lost Tribes of Israel.

The story of the Lost Tribes is revealed mainly in the Second Book of Kings of the Old Testament and the apocryphal Second (or Fourth, depending on the type of Bible) Book of Esdras. At that time, according to scripture, the Hebrew tribes had split into two adjacent confederations, the southern kingdom of Judah, with its capital in Jerusalem, and the northern kingdom of Israel, with its capital in Samaria. After the southern tribes took to behaving sinfully, divine retribution came in the form of the Assyrian king Shalmaneser V, who overran Israel and exiled its ten constituent tribes to Mesopotamia (today's Syria and Iraq). Now repenting of their wickedness, the Bible explains, the tribes resolved to "go to a distant land never yet inhabited by man, and there at last to be obedient to their laws." True to their word, they walked away and were never seen again.

Because the Book of Ezekiel prophesizes that in the final days God "will take the children of Israel from among the heathen ... and bring them into their own land," Christian scholars believed that the Israelites' descendants—Ezekiel's "children of Israel"—must still be living in some remote place, waiting to be taken back to their homeland. Identifying Indians as these "lost tribes" solved two puzzles at once: where the Israelites went and the origins of Native Americans.

Acosta weighed the Indians-as-Jews theory but eventually dismissed it because Indians were not circumcised. Besides, he bluntly explained, Jews were cowardly and greedy, and Indians were not. Others did not find his refutation convincing. The Lost Tribes theory was endorsed by authorities from Bartolomé de Las Casas to William Penn, founder of Pennsylvania, and the famed minister Cotton Mather. (In a variant, the Book of Mormon argued that some Indians were descended from Israelites though not necessarily the Lost Tribes.) In 1650 James Ussher, archbishop of Armagh, calculated from Old Testament genealogical data that God created the universe on Sunday, October 23, 4004 B.C. So August was Ussher's reputation, wrote historian Andrew Dickson White, that "his dates were inserted in the margins of the authorized version of the English Bible, and were soon practically regarded as equally inspired with the sacred text itself." According to Ussher's chronology, the Lost Tribes left Israel in 711 B.C. Presumably they began walking to the Americas soon thereafter. Even allowing for a slow passage, the Israelites must have arrived by around 500 B.C. When Columbus landed, the Americas therefore had been settled for barely two thousand years.

The Lost Tribes theory held sway until the nineteenth century, when it was challenged by events. As Lund had in Brazil, British scientists discovered some strange-looking human skeletons jumbled up with the skeletons of extinct Pleistocene mammals. The find, quickly duplicated in France, caused a sensation. To supporters of Darwin's recently published theory of evolution, the find proved that the ancestors of modern humans had lived during the Ice Ages, tens or hundreds of thousands of years ago. Others attacked this conclusion, and
the skeletons became one of the casus belli of the evolution wars. Indirectly, the discovery also stimulated argument about the settlement of the Americas. Evolutionists believed that the Eastern and Western Hemispheres had developed in concert. If early humans had inhabited Europe during the Ice Ages, they must also have lived in the Americas at the same time. Indians must therefore have arrived before 900 B.C. Ussher's chronology and the Lost Tribes scenario were wrong.

The nineteenth century was the heyday of amateur science. In the United States as in Europe, many of Darwin's most ardent backers were successful tradespeople whose hobby was butterfly or beetle collecting. When these amateurs heard that the ancestors of Indians must have come to the Americas thousands of years ago, a surprising number of them decided to hunt for the evidence that would prove it.

"BLIND LEADERS OF THE BLIND"

In 1872 one such seeker—Charles Abbott, a New Jersey physician—found stone arrowheads, scrapers, and axheads on his farm in the Delaware Valley. Because the artifacts were crudely made, Abbott believed that they must have been fashioned not by historical Indians but by some earlier, "ruder" group, modern Indians' long-ago ancestors. He consulted a Harvard geologist, who told him that the gravel around the finds was ten thousand years old, which Abbott regarded as proof that Pleistocene Man had lived in New Jersey at least that far in the past. Indeed, he argued, Pleistocene Man had lived in New Jersey for so many millennia that he had probably evolved there. If modern Indians had migrated from Asia, Abbott said, they must have "driven away" these original inhabitants. Egged on by his proselytizing, other weekend bone hunters soon found similar sites with similar crude artifacts. By 1890 amateur scientists claimed to have found traces of Pleistocene Americans in New Jersey, Indiana, Ohio, and the suburbs of Philadelphia and Washington, D.C.

Unsurprisingly, Christian leaders rejected Abbott's claims, which (to repeat) contradicted both Ussher's chronology and the theologically convenient Lost Tribes theory. More puzzling, at least to contemporary eyes, was the equally vehement objections voiced by professional archaeologists and anthropologists, especially those at the Smithsonian Institution, which had established a Bureau of American Ethnology in 1879. According to David J. Meltzer, a Southern Methodist University archaeologist who has written extensively about the history of his field, the bureau's founders were determined to set the new disciplines on a proper scientific footing. Among other things, this meant rooting out pseudoscience. The bureau dispatched William Henry Holmes to scrutinize the case for Pleistocene proto-Indians.

Holmes was a rigorous, orderly man, with Meltzer told me, "no sense of humor whatsoever." Although Holmes in no way believed that Indians were descended from the Lost Tribes, he was also unwilling to believe that Indians or anyone else had inhabited the Americas as far back as the Ice Ages. His determined skepticism on this issue is hard to fathom. True, many of the ancient skeletons in Europe were strikingly different from those of contemporary humans—in fact, they were Neanderthals, a different subspecies or species from modern humans—whereas all the Indian skeletons that archaeologists had seen thus far looked anatomically modern. But why did this lead Holmes to assume that Indians must have migrated to the Americas.
anthropologist of his time, shot them down. *The skeletons are completely modern,* he would say. And the sediments around them were too disturbed to ascertain their age. *People dig graves,* he reminded the buffs. *You should assume from the outset that if you find a skeleton six feet deep in the earth that the bones are a lot newer than the dirt around them.*

With his stern gaze, scowling moustache, and long, thick hair that swept straight back from the forehead, Hrdlička was the very image of celluloid-collar Authority. He was an indefatigably industrious man who wrote some four hundred articles and books, founded the *American Journal of Physical Anthropology,* forcefully edited it for twenty-four years; and collected, inspected, and cataloged more than 32,000 skeletons from around the world, stuffing them into boxes at the Smithsonian. By temperament, he was suspicious of anything that smacked of novelty and modishness. Alas, the list of things that he dismissed as intellectual fads included female scientists, genetic analysis, and the entire discipline of statistics—even such simple statistical measures as standard deviations were notably absent from the *American Journal of Physical Anthropology.* Hrdlička regarded himself as the conscience of physical anthropology and made it his business to set boundaries. So thoroughly did he discredit all purported findings of ancient Indians that a later director of the Bureau of American Ethnology admitted that for decades it was a career-killer for an archaeologist to claim to have “discovered indications of a respectable antiquity for the Indian.”

In Europe, every “favorable cave” showed evidence “of some ancient man,” Hrdlička proclaimed in March 1928. And the evidence they found in those caves was “not a single implement or what not,” but of artifacts in “such large numbers that already they clog some of the museums in Europe.” Not in the Americas, though. “Where are any such things in America?” he taunted the amateurs. “Where are the implements, the bones of animals upon which these old men have fed? . . . Where is the explanation of all this? What is the matter?”

**Folsom and the Graybeards**

Twenty years before Hrdlička’s mockery, a flash flood tore a deep gully into a ranch in the northeast corner of New Mexico, near the hamlet of Folsom. Afterward ranch foreman George McJunkin checked the fences for damage. Walking along the new gully, he spotted several huge bones projecting from its sides. Born a slave before the Civil War, McJunkin had no formal education—he had only learned to read as an adult. But he was an expert horseman, a self-taught violinist, and an amateur geologist, astronomer, and natural historian. He instantly recognized that the bones did not belong to any extant species and hence must be very old. Believing that his discovery was important, he tried over the years to show the bones to local Folsomites. Most spurned his entreaties. Eventually a white blacksmith in a nearby town came, saw, and got equally excited. McJunkin died in 1922. Four years later, the blacksmith persuaded Jesse D. Figgins, head of the Colorado Museum of Natural History, to send someone to Folsom.

Figgins wanted to display a fossil bison in his museum, especially if he could get one of the big varieties that went extinct during the Pleistocene. When he received a favorable report from Folsom, he dispatched a work crew to dig out the bones. Its members quickly stumbled across two artifacts—not crude, Abbott-style arrowheads, but elegantly crafted spear points. They also found that a piece from one of the spear points was pressed into the dirt surrounding a bison bone. Since this type of mammal had last existed thousands of years ago, the spear point and its owner must have been of equivalent antiquity.

The spear points both intrigued and dismayed Figgins. His museum had discovered evidence that the Americas had been inhabited during the Pleistocene, a major scientific coup. But this also put Figgins, who knew little about archaeology, in the crosshairs of Aleš Hrdlička.

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anthropologist of his time, shot them down. The skeletons are completely modern, he would say. And the sediments around them were too disturbed to ascertain their age. People dig graves, he reminded the buffs. You should assume from the outset that if you find a skeleton six feet deep in the earth that the bones are a lot newer than the dirt around them.

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met both Hrdlička and Holmes, who, to Figgins's relief, treated him courteously. Hrdlička told Figgins that if more spear points turned up, he should not excavate them, because that would make it difficult for others to view them in their archaeological and geological context. Instead, he should leave them in the ground and ask the experts to supervise their excavation.

Figgins regarded Hrdlička's words as a friendly suggestion. But according to Meltzer, the Southern Methodist University anthropologist, the great man's motives were less charitable. Figgins had sent excavation teams to several areas in addition to Folsom, and had also found implements in them. Encouraged by the increasing number of discoveries, Figgins's estimation of their import was growing almost daily. Indeed, he was now claiming that the artifacts were half a million years old. Half a million years! One can imagine Hrdlička's disgust—Homo sapiens itself wasn't thought to be half a million years old. By asking Figgins to unearth any new "discoveries" only in the presence of the scientific elite, Hrdlička hoped to eliminate the next round of quackery before it could take hold.

In August 1927 Figgins's team at Folsom came across a spear point stuck between two bison ribs. He sent out telegrams. Three renowned scientists promptly traveled to New Mexico and watched Figgins's team brush away the dirt from the point and extract it from the gully. All three agreed, as they quickly informed Hrdlička, that the discovery admitted only one possible explanation: thousands of years ago, a Pleistocene hunter had speared a bison.

After that, Meltzer told me, "the whole forty-year battle was essentially over. [One of three experts, A. V. Kidder said, 'This site is real, and that was it.'] Another of the experts, Barnum Brown of the American Museum of Natural History in New York City, took over the excavations, shouldering Figgins aside. After spending the next summer at Folsom, he introduced the site to the world at a major scientific conference. His speech did not even mention Figgins.

Hrdlička issued his caustic "where are any such things" speech months after learning about Folsom—a disingenuous act. But he never directly challenged the spear points' antiquity. Until his death in 1943, in fact, he avoided the subject of Folsom, except to remark that the site wasn't conclusive proof that the Americas were inhabited during the Pleistocene. "He won every battle but lost the war," Meltzer said. "Every one of the sites that he discredited was, in fact, not from the Pleistocene. He was completely right about them. And he was right to insist that Figgins excavate the Folsom points in front of experts. But Abbott and the rest of the 'nutcases' were right that people came much earlier to the Americas."

**The Clovis Consensus**

Early in 1929, the Smithsonian received a letter from Ridgely White-\*man, a nineteen-year-old in the village of Clovis, New Mexico, near the state border with Texas. Whiteman had graduated from high school the previous summer and planned to make his living as a carpenter and, he hoped, as an artist. Wandering in the basins south of Clovis, he observed what looked like immense bones protruding from the dry, blue-gray clay. Whiteman, who was part Indian, was fascinated by Indian lore and had been following the archaeological excitement in Folsom, two hundred miles to the north. He sent a letter to the Smithsonian, informing the staff that he, too, had found "extinct elephant bones" and that someone there should take a look. Surprisingly, the museum responded. Paleontologist Charles Gilmore took the train to Clovis that summer.

Clovis is at the southern end of the Llano Estacado (the "Staked Plain"), fifty thousand square miles of flat, almost featureless sand and scrub. Whiteman's bones were in Blackwater Draw, which during the Pleistocene served as a wide, shallow regional drainage channel, a kind of long, slow-moving lake. As the Ice Ages ended, Blackwater Draw slowly dried up. The continuous flow of water turned into isolated ponds. Game animals congregated around the water, and hunters followed them there. By the time of Gilmore's visit, Blackwater Draw was an arid, almost vegetation-free jumble of sandy drifts and faces of fractured caliche. In one of archaeology's great missed opportunities, Gilmore walked around the area for an hour, decided that it was of no interest, and took the train back to Washington.

The thumbs-down response stupefied Whiteman, who had already turned up dozens of fossils and artifacts there. On and off, he continued his efforts to attract scholarly interest. In the summer of 1932 a local newspaper reporter put him into contact with Edgar B.
Howard, a graduate student at the University of Pennsylvania, who had, one of his assistants later wrote, a “driving mania” to discover a Folsom-like site of his own. Howard had already spent three years combing the Southwest for ancient bones, crawling into rattlesnake caves and taking a pack of to rock faces. Intrigued by Whitteman’s curious, he asked if he could examine them that winter during his down time. Howard took them back to Philadelphia but had no chance to inspect them. A few weeks after his return a construction project near Clovis unearthed more huge bones. Locals gleefully took them away—one bowling-ball-size mammoth molar ended up as a doorstop. After hearing the news, Howard raced back to see what he could salvage. He telegraphed his supervisors on November 16:

EXTENSIVE BONE DEPOSIT AT NEW SITE. MOSTLY BISON, ALSO HORSE & MAMMOTH. SOME EVIDENCE OF HEARThS ALONG EDGES. WILL TIE UP PERMISSIONS FOR FUTURE WORK.

Howard returned to Clovis in the summer of 1933 and systematically surveyed Blackwater Draw, looking for areas in which, like Folsom, human artifacts and extinct species were mixed together. He quickly found several and set to digging. Once again, the telegrams went out. A parade of dignitaries from the East trooped out to inspect the excavations. Howard worked at Clovis for four years, each time staffing the field crews with a mix of sunburned locals in boots and jeans and well-tailored Ivy League college students on vacation. “One greenhorn was heard upbraiding his Massachusetts friend for not having perceived at once, as did he,” Howard’s chief assistant later recalled, “that the purpose of a [local farmer’s] windmill was for fanning heat-exhausted cattle.” Windmills were not the only surprise in store for the students. The temperature in the digging pits sometimes hit 130°F.

Slowly peeling away the geological layers, Howard’s workers revealed that Blackwater Draw had hosted not one, but two ancient societies. One had left relics just like those at Folsom. Below the dirt strata with these objects, though, was a layer of quite different artifacts: bigger, thicker, and not as beautifully made. This second, earlier culture became known as the Clovis culture.

Because Clovis was so dry, its stratigraphy—the sequence of geological layers—had not been jumbled up by later waterflow, a common archaeological hazard. Because of this unusual clarity and because Howard meticulously documented his work there, even the most skeptical archaeologists quickly accepted the existence and antiquity of the Clovis culture. To trumpet his findings, Howard arranged for the Academy of Natural Sciences, in Philadelphia, to sponsor an international symposium on Early Man. More than four hundred scientists migrated to Philadelphia from Europe, Asia, Africa, and Australia. The symposium featured a full-scale reproduction, fifteen feet wide and thirty-four feet long, complete with actual artifacts and bones, of a particularly profitable section of Howard’s excavation. (Whiteman was not invited; he died in Clovis in 2003 at the age of ninety-one.)

The most prominent speaker in Philadelphia was Aleš Hrdlička, then sixty-eight. Hrdlička gave Clovis the ultimate accolade: silence. Before one of the biggest archaeological audiences in history, Hrdlička chose to discuss the skeletal evidence for Indians’ early arrival in the Americas. He listed every new find of old bones in the last two decades, and scoffed at them all. “As far as human skeletal remains are concerned,” he concluded, “there is to this moment no evidence that would justify the assumption of any great, i.e., geological antiquity” for American Indians. Every word Hrdlička said was true—but irrelevant. By focusing on skeletons, he was able to avoid discussing Clovis, the focus of the conference, because Howard had found no skeletons there.

Clovis culture had a distinctive set of tools: scrapers, spear-straighteners, hatchetlike choppers, crescent-moon-shaped objects whose function remains unknown. Its hallmark was the “Clovis point,” a four-inch spearhead with a slightly cut-in, concave tail; in sil-

*Hrdlička’s complaint about the lack of skeletal evidence was unfair for another reason: paleo-Indian skeletons are extremely rare. In Europe, archaeologists have discovered scores of skeletons ten thousand years old or more. By contrast, only nine reasonably complete skeletons of similar age have been found in North America (a few more exist in South America, although, as with the Lagosa Santa skeletons, their provenance is often unclear). “It’s a big mystery why we don’t find the burial,” the University of Vermont archaeologist James Petersen told me. “Some Indians will tell you that their dead all moved to a spiritual plane, and that’s about as good as any answer that we’ve got.”
houette, the points somewhat resemble those goldfish-shaped cocktail crackers. Folsom points, by contrast, are smaller and finer—perhaps two inches long and an eighth of an inch thick—and usually have a less prominent tail. Both types have wide, shallow grooves or channels called “flutes” cut into the two faces of the head. The user apparently laid the tip of the spear shaft in the flute and twisted hide or sinew repeatedly around the assembly to hold it together. When the point broke, inevitable with stone tools, the head could be loosened and slid forward on the shaft, letting the user chip a new point. A paleo-Indian innovation, this type of fluting exists only in the Americas.

With Blackwater Draw as a pattern, scientists knew exactly what to look for. During the next few decades, they discovered more than eighty large paleo-Indian sites throughout the United States, Mexico, and southern Canada. All of them had either Folsom or Clovis points, which convinced many archaeologists that the Clovis people, the earlier of the two, must have been the original Americans.

Nobody really knew how old the Clovis people were, though, because geological strata can’t be dated precisely. Figgins surmised that Folsom had been inhabited fifteen to twenty thousand years ago, which meant that Clovis must be a little before that. More precise dates did not come in until the 1930s, when Willard F. Libby, a chemist at the University of Chicago, invented carbon dating.

Libby’s research began in the global scientific race during the 1930s and 1940s to understand cosmic rays, the mysterious, ultrahigh-velocity subatomic particles that continually rain onto the earth from outer space. Like so many bullets, the particles slam into air molecules in the upper atmosphere, knocking off fragments that in turn strike other air molecules. Along the way, Libby realized, the cascade of interactions creates a trickle of carbon-14 (C⁴), a mildly radioactive form of carbon that over time disintegrates—decays, as scientists say—back into a form of nitrogen. Libby determined that the rate at which cosmic rays create C⁴ is roughly equal to the rate at which it decays. As a result, a small but steady percentage of the carbon in air, sea, and land consists of C⁴. Plants take in C⁴ through photosynthesis, herbivores take it in from the plants, and carnivores take it in from them. In consequence, every living cell has a consistent, low level of C⁴—they are all very slightly radioactive, a phenomenon that Libby first observed empirically.

When people, plants, and animals die, they stop assimilating C⁴. The C⁴ already inside their bodies continues to decay, and as a result the percentage of C⁴ in the dead steadily drops. The rate of decline is known precisely; every 5,730 years, half of the C⁴ atoms in nonliving substances become regular carbon atoms. By comparing the C⁴ level in bones and wooden implements to the normal level in living tissues, Libby reasoned, scientists should be able to determine the age of these objects with unheard-of precision. It was as if every living creature had an invisible radioactive clock in its cells.

In 1949 Libby and a collaborator ascertained the C⁴ level in, among other things, a mummy coffin, a piece of Hittite floor, an Egyptian pharaoh’s funerary boat, and the tomb of Sneferu of Meydum, the first Fourth Dynasty pharaoh. Archaeologists already knew their dates of construction, usually from written records; the scientists wanted to compare their estimates to the known dates. Even though Libby and his collaborator were still learning how to measure C⁴,
their estimates were rarely more than a century off—a level of agreement, they wrote dryly, that was "seen to be satisfactory."

Libby won a well-deserved Nobel Prize in 1960. By that time, carbon dating was already revolutionizing archaeology. "You read books and find statements that such and such a society or archaeological site is 20,000 years old," he remarked. "We learned rather abruptly that these numbers, these ancient ages, are not known." Archaeologists had been making inferences from limited, indirect data. With radiocarbon, these numbers, these ancient ages, could be known, and with ever-increasing accuracy.

One of the first tasks assigned to the new technique was determining the age of the Clovis culture. Much of the work occurred at the University of Arizona, in Tucson, which in 1958 established the world's first major archaeological carbon-dating laboratory. At the new lab was a doctoral student named C. Vance Haynes. Haynes was a mining engineer who became fascinated by archaeology during a stint in the air force. While serving at a base in the Southwest, he began collecting arrowheads, a hobby that ultimately led to his abandoning geology and coming to the University of Arizona as a graduate student in archaeology. As the Clovis-culture dates crossed his lab bench, Haynes was struck by their consistency. No matter what the location of a site, carbon dating showed that it was occupied between 13,500 and 12,900 years ago. To Haynes, with his geologist's training, the dates were auspicious. The Clovis culture arose just after the only time period in which migration from Siberia seemed to have been possible.

*Here and throughout I give the currently accepted dates, which are made with better techniques and more grasp of the vagaries of carbon dating than were then available to Haynes. Scientists discovered in the 1960s that the rate of C\(^{14}\) formation and intake varied more than Libby had thought. As a result, raw C\(^{14}\) dates must be corrected ("calibrated," in the jargon) to obtain calendar dates, something archaeologists do not always make clear. In addition, they often write dates not as years A.D. or B.C. but as years B.P. (Before Present), with the present set by convention at 1950 A.D. Thus 2000 B.P. is 50 B.C. In an attempt to reduce confusion, all dates in this book are ordinary calendar dates—that is, radiocarbon dates corrected by the most recent calibration. Scientists usually report C\(^{14}\) dates with their potential error, as in 3000 ± 150 B.P. (1900 ± 150 B.C.). To avoid typographical clutter, I do not include the error spread, believing that readers understand the unavoidable uncertainties in measuring minute levels of residual radioactivity.

During the Ice Ages so much of the world’s water was frozen into glaciers that sea levels fell as much as four hundred feet. The strait between Siberia’s Chukotsky Peninsula and Alaska’s Seward Peninsula is now only 56 miles wide and about 120 feet deep, shallower than many lakes. The decline in sea levels let the two peninsulas join up. What had been a frigid expanse of whale habitat became a flat stretch of countryside more than a thousand miles wide. Beringia, as this land is called, was surprisingly temperate, sometimes even warmer than it is today; masses of low flowers covered it every spring. The relative salubriousness of the climate may seem incredible, given that Beringia is on the Arctic Circle and the world was still in the throes of the Ice Ages, but many lines of evidence suggest that it is true. In Siberia and Alaska, for instance, paleoentomologists—scientists who study ancient insects—have discovered in late-Pleistocene sediments fossil beetles and weevils of species that live only in places where summer temperatures reach the fifties.

Beringia was easily traversable. Western Canada was not, because it was buried beneath two massive, conjoined ice sheets, each thousands of feet deep and two thousand miles long. Even today, crossing a vast, splintered wilderness of ice would be a risky task requiring special vehicles and a big support staff. For whole bands to walk across it with backpacks full of supplies would be effectively impossible. (In any case, why would they want to do it?)

There was a short period, though, when the barrier could be avoided—or at least some scientists so believed. The Ice Ages drew to a close about fifteen thousand years ago. As the climate warmed, the glaciers slowly melted and sea levels rose; within three thousand years, Beringia had again disappeared beneath the waves. In the 1950s some geologists concluded that between the beginning of the tem-
perature rise and the resubmergence of the land bridge the inland edges of the two great ice sheets in western Canada shrank, forming a comparatively hospitable pathway between them. This ice-free corridor ran down the Yukon River Valley and along the eastern side of the Canadian Rockies. Even as the Pacific advanced upon Beringia, these geologists said, plant and animal life recolonized the ice-free corridor. And it did so just in time to let paleo-Indians through.

In a crisply argued paper in Science in 1964, Haynes drew attention to the correlation between the birth of "an ice-free, trans-Canadian corridor" and the "abrupt appearance of Clovis artifacts some 700 years later." Thirteen thousand to fourteen thousand years ago, he suggested, a window in time opened. During this interval—and, for all practical purposes, only during this interval—paleo-Indians could have crossed Beringia, slipped through the ice-free corridor, and descended into southern Alberta, from where they would have been able to spread throughout North America. The implication was that every Indian society in the hemisphere was descended from Clovis. The people at Blackwater Draw were the ancestral culture of the Americas.

Haynes was the first to put together this picture. The reaction, he told me, was "pretty gratifying." The fractious archaeological community embraced his ideas with rare unanimity; they rapidly became the standard model for the peopling of the Americas. On the popular level, Haynes’s scenario made so much intuitive sense that it rapidly leapt from the pages of Science to high school history textbooks, mine among them. Three years later, in 1967, the picture was augmented with overkill.

If time travelers from today were to visit North America in the late Pleistocene, they would see in the forests and plains an impossible bestiary of lumbering mastodon, armored rhinos, great dire wolves, sabertooth cats, and ten-foot-long glyptodonts like enormous armadillos. Beavers the size of armchairs; turtles that weighed almost as much as cars; sloths able to reach tree branches twenty feet high; huge, flightless, predatory birds like rapacious ostriches—the tally of Pleistocene monsters is long and alluring.

At about the time of Clovis almost every one of these species vanished. So complete was the disaster that most of today’s big American mammals, such as caribou, moose, and brown bear, are immigrants from Asia. The die-off happened amazingly fast, much of it in the few centuries between 11,500 and 10,900 B.C. And when it was complete, naturalist Alfred Russell Wallace wrote, the Americas had become "a zoologically impoverished world, from which all of the hugest, and fiercest, and strangest forms [had] recently disappeared."

The extinctions permanently changed American landscapes and American history. Before the Pleistocene, the Americas had three species of horse and at least two camels that might have been ridden; other mammals could have been domesticated for meat and milk.
Had they survived, the consequences would have been huge. Not only would domesticated animals have changed Indian societies, they might have created new zoonotic diseases. Absent the extinctions, the encounter between Europe and the Americas might have been equally deadly for both sides—a world in which both hemispheres experienced catastrophic depopulation.

Researchers had previously noted the temporal coincidence between the paleo-Indians’ arrival and the mass extinction, but they didn’t believe that small bands of hunters could wreak such ecological havoc. Paul Martin, a paleontologist who was one of Haynes’s Arizona colleagues, thought otherwise. Extinction, he claimed, was the high-inevitable outcome when beasts with no exposure to *Homo sapiens* suddenly encountered “a new and thoroughly superior predator, a hunter who preferred killing and persisted in killing animals as long as they were available.”

Imagine, Martin said, that an original group of a hundred hunters crossed over Beringia and down the ice-free corridor. Historical records show that frontier populations can increase at astonishing rates; in the early nineteenth century, the annual U.S. birthrate climbed as high as 5 percent. If the first paleo-Indians doubled in number every 20 years (a birthrate of 3.4 percent), the population would hit 10 million in only 340 years, a blink of an eye in geological terms. A million paleo-Indians, Martin argued, could easily form a wave of hunters that would radiate outward from the southern end of the ice-free corridor, turning the continent into an abattoir. Even with conservative assumptions about the rate of paleo-Indian expansion, the destructive front would reach the Gulf of Mexico in three to five centuries. Within a thousand years it would strike Tierra del Fuego. In the archaeological record, Martin pointed out, this hurricane of slaughter would be visible only as the near-simultaneous appearance of Clovis artifacts throughout North America—and “the swift extermination of the more conspicuous native American large mammals.” Which, in fact, is exactly what one sees.

Not everyone was convinced by Martin’s model. Paleontologists noted that many non-game species vanished, too, which in their view suggests that the extinction wave was more likely due to the abrupt climatic changes at the end of the Pleistocene; Martin pointed out that previous millennia had experienced equally wild shifts with no extinction spasm. In addition, similar extinctions occurred when human beings first invaded Madagascar, Australia, New Zealand, and the Polynesian Islands.

Despite overkill’s failure to enjoy full acceptance, it helped set in stone what became the paradigmatic image of the first Americans. Highly mobile, scattered in small bands, carnivorous to a fault, the paleo-Indians conjured by archaeologists were, above all, “stout-hearted, daring, and voracious big-game hunters,” in the skeptical summary of Norman Easton, an anthropologist at Yukon College, in Whitehorse. Clovis people were thought to have a special yen for mammoth: great ambulatory meat lockers. Sometimes they herded the hairy creatures en masse into gullies or entangling bogs, driving the animals to their doom with shouts, dogs, torches, and, possibly, shamanic incantations. More often, though, hunters stalked individual beasts until they were close enough to throw a spear in the gut. “They just followed them around for a day or two until they keel over from blood loss or infection,” Charles Kay, an ecological archaeologist at Utah State University, told me. “It’s not what we think of as sporting, but it’s very effective and a hell of a lot safer than hand-to-hand combat with a mammoth.”

Shifting location to follow game, the Clovis people prowled roughly circular territories that could have been two hundred miles in diameter (the size would vary depending on the environmental setting). With any luck, the territory would contain flint, Jasper, or chalcedony, the raw material for spear points, meat scrapers, and other hunting tools. Bands may have had as many as fifty members, with girls going outside the group to marry. At camp, women and girls made clothes, gathered food—wild plums, blackberries, grapes—and tended babies. Men and boys went hunting, possibly as a group of fathers and sons, probably for days at a time.

As the extinctions proceeded, the Clovis people switched from mammoths to the smaller, more numerous bison. The spear points grew smaller, the hunting more systematic (with prey becoming scarcer, it needed to be). Bands camped on ridges overlooking ponds—the men wanted to spot herds when they came to drink. When the animals plunged their muzzles into the water, hunting parties attacked, forcing the startled bison to flee into a dead-end gully. The beasts bellowed in confusion and pain as the paleo-Indians moved...
in with jabbing spears. Sometimes they slaughtered a dozen or more at once. Each hunter may have gobbled down as much as ten pounds of bison flesh a day. They came back staggering under the load of meat. Life in this vision of early America was hard but pleasant; in most ways, archaeologists said, it was not that different from life elsewhere on the planet at the time.

Except that it may not have been like that at all.

**CONTINENTAL DIVIDE**

In the early 1980s a magazine asked me to report on a long-running legal battle over Pacific Northwest salmon. A coalition of Indian tribes had taken Washington State to court over a treaty it had signed with them in 1854, when the state was still part of the Oregon Territory. In the treaty, the territory promised to respect the Indians’ “right of taking fish, at all usual and accustomed grounds and stations,” which the tribes interpreted as guaranteeing them a share of the annual salmon harvests. Washington State said that the treaty did not mean what the Indians claimed, and in any case that circumstances had changed too much for it still to be binding. The courts repeatedly endorsed the Indian view and the state repeatedly appealed, twice reaching the U.S. Supreme Court. As the Indians approached final victory, tension rose in the fishing industry, then almost entirely controlled by whites. The magazine wanted me to write about the fight.

To learn more about the dispute, I visited the delta of the Nisqually River, at the southern tip of Puget Sound. Housing the Nisqually tribe, the sliver of land that is their reservation, and the riverbank meadow on which the treaty was signed, the delta is passed through, unnoticed, every day by the thousands of commuters on the interstate highway that slices through the reservation. At the time of my visit, the Nisqually had been annoying state authorities for decades, tenaciously pursuing what they believed to be their right to fish on their ancestral fishing grounds. I met the Franks, the stubborn, charismatic father-and-son team who then more or less ran the tribe, in a cluttered office that in my recollection occupied half of a double-wide trailer. Both had been arrested many times for “protest fishing”—fishing when the state said they couldn’t—and were the guiding spirits behind the litigation. After we spoke, Billy Frank, the son, told me I should visit Medicine Creek, where the Nisqually and eight other tribes had negotiated the treaty. And he asked someone who was hanging around to give me a tour.

That someone introduced himself as Denny. He was slim and stylish with very long black hair that fell unbound over the shoulders of his Levi jacket. Sewn on the back of the jacket was a replica of the American eagle on the dollar bill. A degree in semiotics was not required to see that I was in the presence of an ironist. He was not a Nisqually, he said, but from another Northwest group—at this remove, I can’t recall which. We clambered into an old truck with scraped side panels. As we set off, Denny asked, “Are you an archaeologist?”

Journalist, I told him.

“Good,” he said, slamming the truck into gear.

Because journalists rarely meet with such enthusiasm, I guessed—correctly—that his approval referred to my non-archaeological status. In this way I learned that archaeologists have aroused the ire of some Native American activists.

We drove to a small boat packed with fishing gear that was tied down on the edge of the Nisqually. Denny got the motor running and we puttered downstream, looking for harbor seals, which he said sometimes wandered up the river. Scrubby trees stood out from gravel banks, and beneath them, here and there, were the red-flushed, spawned-out bodies of salmon, insects happy around them. Freeway traffic was clearly audible. After half an hour we turned up a tributary and made land on a muddy bank. A hundred yards away was a tall snag, the dead stalk of a Douglas fir, standing over the meadow like a sentinel. The treaty negotiations had been conducted in its shelter.

From under its branches the territorial governor had triumphantly emerged with two sheets of paper which he said bore the X marks of sixty-two Indian leaders, some of whom actively opposed the treaty and apparently were not at the signing.

Throughout our little excursion Denny talked. He told me that the claw holding the arrows on the back of the one-dollar bill was copied by Benjamin Franklin from an incident in Iroquois lore; that the army base next door sometimes fired shells over the
reservation; that Billy Frank once had been arrested with Marlon Brando; that a story Willie Frank, Billy’s father, had told me about his grandparents picking up smallpox-infected blankets on the beach was probably not true, but instead was an example of Willie’s fondness for spoofing gullible journalists; that Denny knew a guy who also had an eagle on the back of his jean jacket, but who, unlike Denny, could make the eagle flex its wings by moving his shoulders in a certain way that Denny admired; that most Indians hate the Internal Revenue Service even more than they hate the Bureau of Indian Affairs, because they believe that they paid taxes for all time when the federal government forced them to give up two billion acres of land; and that if I really wanted to see a crime against nature, I should visit the Quinault reservation, on the Olympic Peninsula, which had been plundered by loggers in the 1950s (I did, a few weeks afterward; Denny was right). He also explained to me why he and some other Indians had it in for archaeologists. The causes were many, in his telling, but two of them seemed especially pertinent: Aleš Hrdlička and the overkill hypothesis.

Hrdlička’s zeal for completeness made him accumulate as many Indian skeletons as possible. Unfortunately, his fascination with the bones of old Indians was not matched by an equivalent interest in the sensibilities of living Native Americans. Both his zeal and his indifference were gaudily on display on Kodiak Island, Alaska, where he exhume about a thousand skeletons between 1923 and 1936 at Larsen Bay, a village of Alutiiq Indians. Many of the dead were two thousand years old, but some were ripped from recent Alutiiq graves, and a few were not Alutiiq at all—the wife of a local salmon-cannery manager, eager to help Science, shipped Hrdlička the cadavers of Chinese workers when they died.

Larsen Bay was the single most productive excavation of Hrdlička’s long career. Confronted with what he viewed as an intellectual treasure trove, this precise, meticulous, formal man was to all appearances overcome by enthusiasm and scholarly greed. In his pop-eyed hurry to pull bones out of the ground, he tore open the site with a bulldozer and didn’t bother taking notes, sketching maps, or executing profile drawings. Without documentation, Hrdlička was unable afterward to make head or tail of the houses, storage pits, hearths, and burial wells he uncovered. He pored through old Russian and American accounts of the area to find answers, but he never asked the people in Larsen Bay about their own culture. Perhaps his failure to approach the Alutiiq was a good thing. Hrdlička’s excavation, made without their permission, so angered them that they were still steaming when Denny was there on a salmon boat fifty years later. (In 1991 the Smithsonian gave back the skeletons, which the townspeople reburied.)

Overkill was part of the same mindset, Denny told me. As the environmental movement gathered steam in the 1960s, he said, white people had discovered that Indians were better stewards of the land. Indigenous peoples were superior to them—horrors! The archies—that was what Denny called archaeologists—had to race in and rescue Caucasian self-esteem. Which they did with the ridiculous conceit that the Indians had been the authors of an ecological mega-disaster. Typical, Denny thought. In his view, archaeologists’ main function was to make white people feel good about themselves—an opinion that archaeologists have learned, to their cost, is not Denny’s alone.

“Archaeologists are trapped in their own prejudices,” Vine Deloria Jr., the Colorado political scientist, told me. The Berkeley geographer Carl Sauer first brought up overkill in the 1930s, he said. “It was immediately knocked down, because a lot of shellfish and little mammals also went extinct, and these mythical Pleistocene hit men wouldn’t have wiped them out, too. But the supposedly objective scientific establishment likes the picture of Indians as ecological serial killers too much to let go of it.”

To Deloria’s way of thinking, not only overkill but the entire Clovis-first theory is a theoretical Rube Goldberg device. “There’s this perfect moment when the ice-free corridor magically appears just before the land bridge is covered by water,” he said. “And the paleo-Indians, who are doing fine in Siberia, suddenly decide to sprint over to Alaska. And then they sprint through the corridor, which just in time for them has been replenished with game. And they keep sprinting so fast that they overrun the hemisphere even faster than the Europeans did—and this even though they didn’t have horses, because they were so busy killing them all.” He laughed. “And these are the same people who say traditional origin tales are improbable!”

Activist critiques like those from Denny and Deloria have had relatively little impact on mainstream archaeologists and anthropologists.
In a sense, they were unnecessary: scientists themselves have launched such a sustained attack on the primacy of Clovis, the existence of the ice-free corridor, and the plausibility of overkill that the Clovis consensus has shattered, probably irrecoverably.

In 1964, the year Haynes announced the Clovis-first model, archaeologist Alex D. Krieger listed fifty sites said to be older than Clovis. By 1988 Haynes and other authorities had shot them all down with such merciless dispatch that victims complained of persecution by the "Clovis police." Haynes, the dissenters said, was a new Hrdlička (minus the charge of insensitivity to living Native Americans). As before, archaeologists became gun-shy about arguing that Indians arrived in the Americas before the canonical date. Perhaps as a result, the most persuasive scientific critiques on Clovis initially came from fields that overlapped archaeology, but were mainly outside of it: linguistics, molecular biology, and geology.

From today's vantage, the attack seems to have begun, paradoxically, with the publication in 1986 of a landmark pro-Clovis paper in Current Anthropology by a linguist, a physical anthropologist, and a geneticist. The linguistic section attracted special attention. Students of languages had long puzzled over the extraordinary variety and fragmentation of Indian languages. California alone was the home of as many as 86 tongues, which linguists have classified into between 5 and 15 families (the schemes disagree with one another). No one family was dominant. Across the Americas, Indians spoke some 1,200 separate languages that have been classified into as many as 180 linguistic families. By contrast, all of Europe has just 4 language families—Indo-European, Finno-Ugric, Basque, and Turkic—with the great majority of Europeans speaking an Indo-European tongue. Linguists had long wondered how Indians could have evolved so many languages in the thirteen thousand years since Clovis when Europeans had ended up with many fewer in the forty thousand years since the arrival of humans there.

In the first part of the 1986 article, Joseph H. Greenberg, a linguist at Stanford, proclaimed that the profusion of idioms was more apparent than real. After four decades of comparing Native American vocabularies and grammars, he had concluded that Indian languages belonged to just three main linguistic families: Aleut, spoken by northern peoples in a broad band from Alaska to Greenland; Na-
out strong confirmation” from molecular biology. To the authors’ critics, the lack of confirmation had an obvious cause: the whole tri-migrations theory was wrong. “Neither their linguistic classification nor their dental/genetic correlation is supported,” complained Lyle Campbell, of the State University of New York at Buffalo. Greenberg’s three-family division, Campbell thought, “should be shouted down in order not to confuse non-specialists.” The Amerind-language family was so enormous, Berkeley linguist Johanna Nichols complained, that the likelihood of being able to prove it actually existed was “somewhere between zero and hopeless.”

Although the three-migrations theory was widely attacked, it spurred geneticists to pursue research into Native American origins. The main battleground was mitochondrial DNA, the special DNA with which Pena, the Brazilian geneticist, hoped to find the Botocudo. As I mentioned before, a scientific team led by Douglas Wallace found in 1990 that almost all Indians belong to one of four mitochondrial haplogroups, three of which are common in Asia (mitochondria with similar genetic characteristics, such as a particular mutation or version of a gene, belong to the same haplogroup). Wallace’s discovery initially seemed to confirm the three-migrations model: the haplogroups were seen as the legacy of separate waves of migration, with the most common haplogroup corresponding to the Clovis culture. Wallace came up with further data when he began working with James Neel, the geneticist who studied the Yanomami response to measles.

In earlier work, Neel had combined data from multiple sources to estimate that two related groups of Central American Indians had split off from each other eight thousand to ten thousand years before. Now Neel and Wallace scrutinized the two groups’ mitochondrial DNA. Over time, it should have accumulated mutations, almost all of them tiny alterations in unused DNA that didn’t affect the mitochondria’s functions. By counting the number of mutations that appeared in one group and not the other, Neel and Wallace determined the rate at which the two groups’ mitochondrial DNA had separately changed in the millennia since their separation: 2 to 3 percent every ten thousand years. In 1994 Neel and Wallace sifted through mitochondrial DNA from eighteen widely dispersed Indian groups, looking for mutations that had occurred since their common ancestors left Asia.

Using their previously calculated rate of genetic change as a standard, they estimated when the original group had migrated to the Americas: 22,414 to 29,545 years ago. Indians had come to the Americas ten thousand years before Clovis.

Three years later, Sandro L. Bonatto and Francisco M. Bolzano, two geneticists at the Federal University of Rio Grande do Sul, in the southern Brazilian city of Porto Alegre, analyzed Indian mitochondrial DNA again—and painted a different picture. Wallace and Neel had focused on the three haplogroups that are also common in Asia. Instead, the Brazilians looked at the fourth main haplogroup—Haplogroup A is its unimaginative name—which is almost completely absent from Siberia but found in every Native American population. Because of its rarity in Siberia, the multiple-migrations theory had the implicit and very awkward corollary that the tiny minority of people with Haplogroup A just happened to be among the small bands that crossed Beringia—not just once, but several times. The two men argued it was more probable that a single migration had left Asia, and that some people in Haplogroup A were in it.

By tallying the accumulated genetic differences in Haplogroup A members, Bonatto and Bolzano calculated that Indians had left Asia thirty-three thousand to forty-three thousand years ago, even earlier than estimated by Wallace and Neel. Not only that, the measurements by Bonatto and Bolzano suggested that soon after the migrants arrived in Beringia they split in two. One half set off for Canada and the United States. Meanwhile, the other half remained in Beringia, which was then comparatively hospitable. The paleo-Indians who went south would not have had a difficult journey, because they arrived a little bit before the peak of the last Ice Age—before, that is, the two glacial sheets in Canada merged together. When that ice barrier closed, though, the Indians who stayed in Beringia were stuck there for the duration: almost twenty thousand years. Finally the temperatures rose, and some of them went south, creating a second wave and then, possibly, a third. In other words, just one group of paleo-Indians colonized the Americas, but it did so two or three times.

As other measurements came in, the confusion only increased. Geneticists disagreed about whether the totality of the data implied one or more migrations; whether the ancestral population(s) were small (as some measure of mitochondrial DNA diversity suggested)
or large (as others indicated); whether Indians had migrated from
Mongolia, the region around Lake Baikal in southern Siberia, or
costal east Asia, even possibly Japan.

Everything seemed up for grabs—or, anyway, almost everything.
In the welter of contradictory data, University of Hawaii geneticist
Rebecca L. Cann reported in 2003, "only one thing is certain": scien-
tists may argue about everything else, she said, but they all believe
that "the 'Clovis First' archaeological model of a late entry of
migrants into North America is unsupported by the bulk of new
archaeological and genetic evidence."

COAST TO COAST

The "new archaeological evidence" to which Cann referred was from
Monte Verde, a boggy Chilean riverbank excavated by Tom Dillehay
of the University of Kentucky; Mario Pino of the University of Chile
in Valdivia; and a team of students and specialists. They began work in
1977, finished excavation in 1985, and published their final reports in
two massive volumes in 1989 and 1997. In the twenty years between
the first shovelful of dirt and the final errata sheets, the scientists
concluded that paleo-Indians had occupied Monte Verde at least
12,800 years ago. Not only that, they turned up suggestive indica-
tions of human habitation more than 32,000 years ago. Monte Verde,
in southern Chile, is ten thousand miles from the Bering Strait.
Archaeologists have tended to believe that paleo-Indians would
have needed millennia to walk from the north end of the Americas
to the south. If Monte Verde was a
minimum of 12,800 years old, Indi-
ans must have come to the Ameri-
cas thousands of years before that.
For the most part, archaeologists
had lacked the expertise to address
the anti-Clovis evidence from genetics and linguistics. But Monte
Verde was archaeology. Dillehay had dug up something like a village,
complete with tent-like structures made from animal hides, lashed
together by poles and twisted reeds—a culture that he said had existed
centuries before Clovis, and that may have been more sophisticated.
Skepticism was forceful, even rancorous; arguments lasted for years,
with critics charging that Dillehay's evidence was too low-quality to
accept. "People refused to shake my hand at meetings," Dillehay told
me. "It was like I was killing their children."

In 1997 a dozen prominent researchers, Haynes among them, flew
to Chile to examine the site and its artifacts. The hope was to settle the
long-standing dispute by re-creating the graybeards' visit to Folsom.
After inspecting the site itself—a wet, peaty bank strikingly unlike the
sere desert home of Folsom and Clovis—the archaeologists ended up
at a dimly lighted cantina with the appropriate name of La Caverna.
Over a round of beers an argument erupted, prompted, in part, by
Haynes's persistent skepticism. Dillehay told Haynes his experience
with stone tools in Arizona was useless in evaluating wooden imple-
ments in Peru, and then stomped outside with a supporter. But
despite the heated words, a fragile consensus emerged. The experts
wrote an article making public their unanimous conclusion. "Monte
Verde is real," Alex W. Barker, now at the Milwaukee Public Museum,
told the New York Times. "It's a whole new ball game."

Not everyone wanted to play. Two years later Stuart J. Fiedel, a
consulting archaeologist in Alexandria, Virginia, charged that Dille-
hay's just-published final Monte Verde report was so poorly exec-
cuted—"bungled" and "loathsome"—"were among the descriptors he
provided when we spoke—that verifying the original location "of vir-
tually every 'compelling,' unambiguous artifact" on the site was
impossible. Stone tools, which many archaeologists regard as the
most important artifacts, have no organic carbon and therefore cannot
be carbon-dated. Researchers must reckon their ages by ascertain-
ing the age of the ground they are found in, which in turn requires
meticulously documenting their provenance. Because Dillehay's team
had failed to identify properly the location of the stone tools in Monte
Verde, Fiedel said, their antiquity was up to question; they could have
been in a recent sediment layer. Haynes, who had authenticated
Monte Verde in 1997, announced in 1999 that the site needed "further
testing."
The dispute over the Clovis model kept growing. In the 1990s geologists laid out data indicating that the ice sheets were bigger and longer lasting than had been thought, and that even when the ice-free corridor existed it was utterly inhospitable. Worse, archaeologists could find no traces of paleo-Indians (or the big mammals they supposedly hunted) in the corridor from the right time. Meanwhile, paleontologists learned that about two-thirds of the species that vanished did so a little _before_ Clovis appears in the archaeological record. Finally, Clovis people may not have enjoyed hunting that much. Of the seventy-six U.S. paleo-Indian camps surveyed by Meltzer and Donald K. Grayson, an archaeologist at the University of Washington at Seattle, only fourteen showed evidence of big-game hunting, all of it just two species, mastodon and bison. "The overkill hypothesis lives on," the two men sneered, "not because of [support from] archaeologists and paleontologists who are expert in the area, but because it keeps getting repeated by those who are not."

Clovis defenders remained as adamant as their critics. Regarding Monte Verde, Haynes told me, "My comment is, where are the photographs of these 'artifacts' when they were in place? If you're trying to prove that site to other archaeologists and you find an unequivocal stone artifact in situ in a site that's twelve thousand years old, everyone should run over with a camera. It wasn't until after we brought this up that they dug up some photographs. And they were fuzzy! I really became a doubter then." Such putative pre-Clovis sites are "background radiation," he said. "I'm convinced that a hundred years from now there will still be these 'pre-Clovis' sites, and this will go on ad infinitum."

"Some of our colleagues seem to have gone seriously wrong," lamented Thomas F. Lynch of Texas A&M in the _Review of Archaeology_ in 2001. Proudly claiming that he had helped "blow the whistle" on other Clovis challengers, Lynch described the gathering support for pre-Clovis candidates as a manifestation of "political correctness." He predicted that Monte Verde would eventually "fade away."

For better or worse, most archaeologists with whom I have spoken act as if the Clovis-first model were wrong, while still accepting that it might be correct. Truly ardent Clovisites, like Low Counters, are "in a definite minority now," according to Michael Crawford, a University of Kansas anthropologist—a conclusion that Fiedel, Haynes, and other skeptics ruefully echo. Following Monte Verde, at least three other pre-Clovis sites gained acceptance, though each continued to have its detractors.

The ultimate demise of the Clovis dogma is inevitable, David Henige, author of _Numbers from Nowhere_, told me. "Archaeologists are always dating something to five thousand years ago and then saying that this must be the first time it occurred because they haven't found any earlier examples. And then, incredibly, they defend this idea to the death. It's logically indefensible." Clovis-first, he said, is "a classic example of arguing from silence. Even in archaeology, which isn't exactly rocket science"—he chuckled—"there's only so long you can get away with it."

HUGGING THE SHORE

Since Holmes and Hrdlička, archaeologists and anthropologists have tried to separate themselves from Abbott's modern descendants: the mob of sweaty-palmed archaeology buffs who consume books about Atlantis and run Web sites about aliens in Peru and medieval Welsh in Iowa. The consensus around Clovis helped beat them back, but the confused back-and-forth ushered in by the genetic studies has provided a new opening. Unable to repel the quacks with a clear theory of their own, archaeologists and anthropologists found themselves enveloped in a cloud of speculation.

The most notorious recent example of this phenomenon is surely Kennewick Man. A 9,400-year-old skeleton that turned up near Kennewick, Washington, in 1997, Kennewick Man became a center of controversy when an early reconstruction of the skeleton's face suggested that it had Caucasian features (or, more precisely, "Caucasoid" features). The reconstruction, published in newspapers and magazines around the world, elicited assertions that Indians had European ancestry. Archaeologists and Indian activists, for once united, scoffed at this notion. Indian and European mitochondrial DNA are strikingly different. How could Indians descend from Europeans if they did not inherit their genetic makeup?

Yet, as Fiedel conceded to me, the collapse of the Clovis consensus means that archaeologists must consider unorthodox possibilities,
including that some other people preceded the ancestors of today’s Indians into the Americas. Numerous candidates exist for these pre-paleo-Indians, among them the Lagoa Santa people, whose skulls more resemble the skulls of Australian aborigines than those of Native Americans. Skull gauging is, at best, an inexact science, and most archaeologists have dismissed the notion of an Australian role in American prehistory. But in the fall of 2003 an article in the journal Nature about ancient skulls in Baja California revived this possibility. Aborigines, in one scenario, may have traveled from Australia to Tierra del Fuego via Antarctica. Or else there was a single ancestral population split, with the ancestors of Australians heading in one direction and the ancestors of Indians heading in another. In either version of the scenario the ancestors of today’s Indians crossed the Bering Strait to find the Americas already settled by Australians. Migration across Antarctica—exactly the sort of extravagant notion that the whiteshots sought to consign to the historical dustbin. Now they may all be back. If Clovis was not first, the archaeology of the Americas is wide open, a prospect variously feared and welcomed. “Anything goes now, apparently,” Fiedel told me. “The lunatics have taken over the asylum.”

Despite such misgivings, one can see, squinting a little, the outlines of an emerging theory. In the last few years researchers have focused more and more on a proposal linked to the name of Knut Fladmark, an archaeologist at Simon Fraser University, in British Columbia. As a graduate student in the mid-1970s, Fladmark was so surprised to learn of the paucity of evidence for the ice-free corridor that he wondered if Paleo-Indians had instead gone down the Pacific coast by boat. After all, aborigines had reached Australia by boat tens of thousands of years ago. Nonetheless, most archaeologists pooh-poohed the idea, because there was no substantiation for it.

By examining pollen in the ocean sediments near the Pacific coastline, researchers have recently learned that even in the depths of the Ice Age warm southern currents created temperate refuges along the shore—islands of trees and grass in a landscape of ice. Hopping from refuge to refuge, Paleo-Indians could have made their way down the coast at any time in the last forty thousand years. “Even primitive boats,” Fladmark has written, “could traverse the entire Pacific coast of North and South America in less than 10–15 years.”

Evidence for the coastal route is sparse, not least because archaeologists have never looked for paleo-Indian settlements on the shoreline. Future searches will be difficult. Thousands of years ago, the melting glaciers raised the seas, inundating coastal settlements, if they existed. Coastal-route proponents like to point out that Clovis-firsters believed in the existence of the ice-free corridor without much supporting data. The coastal route has equally little empirical backing, but in their view makes more sense. Most important, the image of a seagoing people fits into a general rethinking of paleo-Indian life.

Because the first-discovered Clovis site was a hunting camp, archaeologists have usually assumed that Clovis society was focused on hunting. Indeed, Clovis sites were thought to have entered the ice-free corridor by pursuing game—“follow the reindeer,” as skeptics refer to this scheme. In contemporary hunting and gathering societies, anthropologists have learned, gathering by women usually supplies most of the daily diet. The meat provided by male hunters is a kind of luxury, a special treat for a binge and celebration, the Pleistocene equivalent of a giant box of Toblerone. Compared to its brethren around the world, Clovis society, with its putative focus on massive, exterminating hunts, would have been an anomaly. A coastal route helps bring the paleo-Indians back in line.

Then as now, the Northwest Coast, thick with fruit and fruits de mer, was a gatherer’s paradise: wild strawberries, wild blueberries, soapberries, huckleberries, thimbleberries, salmonberries; clams, cockles, mussels, oysters, flounder, hake, salmon. (To get breakfast, the local saying says, take a walk in the forest; to get dinner, wait for low tide.) Perhaps the smell of candlefish fat, ubiquitous in later Northwest Coast Indian cookery, even then hovered over the first visitors’ fires. One can guess that their boats were not made of wood, because they had long lived on the almost treeless plains of Beringia. Instead they may have been made from animal skin, a readily available resource; though soft beneath the foot, fragile-looking hide vessels have been known to traverse hundreds of miles of open water. A visitor to the Northwest twenty thousand years ago might have seen such a crafts bobbing over the waves like a long, floating balloon, ten or twenty men lining its sides, chasing minke whales with stone-tipped spears.

All of this is speculative, to say the least, and may well be wrong.