Skepticism Fades Over Pre-Clovis Man

When did humans first enter the Americas, before 12,000 years ago or after? "It's an old debate," says David Meltzer of Southern Methodist University, "but I think we've just witnessed a significant change."

Melzer, who has had the reputation among paleontologists as nonaligned in this "old" debate, is excited by new information from a Chilean dig. "Tom Dillehay's evidence on Monte Verde really looks impressive now," he says, adding that if substantiated, Monte Verde would be the first generally accepted evidence of human occupation in the Americas older than the magic 12,000-year figure.

Since 1976 Dillehay, an archeologist at the University of Kentucky, has been going around trying to persuade skeptical colleagues of the reality of his apparently remarkable finding: a human encampment which no less than 17 separate radiocarbon datings, done on various types of material, including bone, wood, and charcoal, all say are around 13,000 years old. The site "yielded not only stone tools and the bones of extinct animals but also well-preserved wooden artifacts, dwelling foundations of both earth and wood, and the remains of useful plants," reported Dillehay. "We even unearthed a human footprint and a hunk of mastodon flesh."

Until last month most leading archeologists continued to place Dillehay's Monte Verde under the heading of "questionable." Dillehay turned this around by what is reported to have been a remarkable presentation at a meeting organized by the University of Maine's Center for the Study of the First Americans. "What convinced me was seeing all the evidence together," says Meltzer. "Previously we'd only seen bits and pieces of the evidence."

So far Dillehay has published very little of the mass of evidence he's accumulated from the creek-side excavation. "There hasn't been much publicly available evidence to go on," says Meltzer. "Just looking at the bits and pieces, there was good reason to continue to be skeptical. But Tom's Maine presentation changed that."

Even Vance Haynes was enthusiastic. Said the severest critic of all pre–12,000-year claims: "I was impressed. Each time his evidence has been getting better and better." The University of Arizona archeologist added: "There is no other archeological site of this type with this quality of material. It is almost too good to be true." Most sites are just the bare bones—literally—of the past. Not Monte Verde.

Situated on the swampy bank of a small creek, Monte Verde's most arresting feature is a series of rectangular arrangements of logs that Dillehay quickly concluded formed the foundations of dwellings. Just a couple of years ago Canadian archeologist Richard Morlan suggested that perhaps the pattern of logs was the result of natural tree fall. "I am not yet convinced that this is an archeological site, but I expect to be proved wrong on this one," he speculated at the time. He has. "I've got egg on my face now," concedes Morlan, who works at the National Museum of Man, Ottawa. "Dillehay showed us that the logs were secured with wooden pegs from a different species of tree," he explains. "And there is even evidence of reeds tied around the logs. That's convincing to me."

Not to Tom Lynch, though. Addressing Dillehay's radiocarbon results, he told *Science*: "There's no question that the dates themselves are good. My problem is with what has been dated. Maybe it is old material mixed with younger artifacts." The Cornell archeologist remains virtually the last hold-out against Monte Verde as a good pre-Clovis site.

Haynes proposes that perhaps the way to nail the issue for good would be to have a team of outsiders visit the site to evaluate it. "The skeptics would then have an opportunity to prove their point, or not," says Haynes. So far Dillehay has not been enthusiastic about this unorthodox idea.

■ ROGER LEWIN

Invisible Evidence?

Monte Verde undoubtedly was the acclaimed star of the recent Maine meeting, but, not surprisingly, there were many other candidates jostling for equal recognition. "These other claims weren't impressive," says Meltzer. "People who weren't convinced before the Maine meeting remained unconvinced."

The heretofore magic figure of 12,000 years ago hangs on the explosion of archeological evidence of Clovis and Folsom people shortly after that date. There is general agreement that people entered the Americas from Siberia across the Bering land bridge, made crossable during periods of severe glaciation.

If Monte Verde is substantiated, then clearly some migrations occurred before Clovis and Folsom times. But, says Morlan, "where are the pre-Clovis sites in North America?" The main contender here is James Adavasio's site of Meadowcroft, near Pittsburgh, said to be some 19,000 old. "Meadowcroft is the one good candidate," says Morlan.

The problem, according to Morlan: either pre-Clovis migration was minimal, or perhaps unfavorable geological conditions failed to preserve sites, thus making a greater presence archeologically invisible. Another explanation, says Meltzer, is that he and his colleagues may simply be blind to a different kind of archeological evidence from pre-Clovis times. However, he guesses it's absent, not invisible.

■ R.L.

New Type of Receptor Found

Maintenance of normal blood pressure depends on many things, one of which is the blood pressure–lowering agent called atrial natriuretic peptide. The cellular receptor through which the peptide exerts its effects would have been of interest then, even if that receptor had been "ordinary."

But it is definitely not ordinary. "It's really interesting," says Marc Caron of Duke University School of Medicine, who has been studying receptors for some 15 years. "It's different. It belongs to a new receptor class."

The intriguing discovery arose from a series of experiments culminating in the cloning of the receptor gene by David Lowe, Ming-Shi Chang, and David Goeddel of Genentech, Inc., in South San Francisco, who did the work in collaboration with receptor specialists Sujay Singh and David Garbers of the Howard Hughes Medical Institute at Vanderbilt University School of Medicine in Nashville. The researchers got help in their quest from a surprising source—the sperm of the sea urchin *Arbacia punctulata*.

Biochemical evidence from several laboratories had indicated that the receptor for atrial natriuretic peptide works by stimulating the production of cyclic GMP, a "second messenger" that tells cells that a signal has been received and that they must take appropriate action. This work had also suggested that the guanylate cyclase, the enzyme that makes the cyclic GMP when the receptor is activated, is either part of the receptor protein or very tightly bound to it.

Meanwhile, the Garbers group had found that a guanylate cyclase in the membrane of the sea urchin sperm is the receptor for a chemical that the sea urchin eggs release to

attract the sperm. So, Lowe says, after he and Singh cloned the gene for the sperm enzyme, "We took the intellectual leap that the catalytic site would be conserved enough to use the sea urchin gene as a probe for the receptor gene." It was, and the researchers were able to capture the human, and then the rat, receptor gene.

The proteins encoded by the mammalian receptor genes contain slightly in excess of 1000 amino acids. The receptor sequence indicates that it is embedded in the cell membrane with the segment containing the first 440 amino acids projecting to the cell exterior, where it forms the binding site for the blood pressure–regulating peptide. The remainder of the protein projects into the cell interior. This inner segment contains a sequence that has all the earmarks of a guanylate cyclase, thus confirming that the enzyme is an integral part of the receptor.

That is what makes this receptor so unusual. Certain others, such as the adrenergic receptors studied by Caron and his colleagues, use cyclic AMP, a structural cousin of cyclic GMP, as their second messengers. But these receptors do not synthesize the cyclic AMP themselves. They work through intermediaries, the G proteins, that control the cyclic AMP–synthesizing enzyme.

Atrial natriuretic peptide actually has two receptors. The gene for the other one has also been cloned, by John Lewicki's group at California Biotechnology, Inc., in Mountain View. The external, peptide-binding segments of the two receptors are similar.

But the internal portion of the receptor cloned by the Lewicki group is very short and does not contain a guanylate cyclase segment. This receptor may not be involved in signal transmission, but may instead help to regulate blood concentrations of atrial natriuretic peptide by binding it and taking it out of commission.

The larger receptor has, in addition to the peptide-binding and guanylate cyclase domains already mentioned, a third domain. "The protein is an intersection in evolution," Lowe says. "It has three different and distinct domains found in three different families of proteins."

The third domain has the features of a tyrosine kinase, an enzyme activity found in growth factor receptors. In the natriuretic peptide receptor it may just bind the compound that guanylate cyclase converts to cyclic GMP.

Whether other cyclic GMP–linked receptors will prove to contain integrated guanylate cyclase activity remains to be seen. But at very least, the cloning of the genes for the natriuretic peptide receptor should help to clarify how the blood pressure regulator produces its effects. ■ JEAN L. MARX

Superconductivity Stars Move

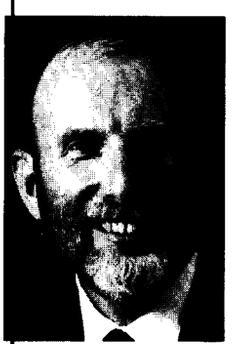
Two top players in the high-temperature superconductivity game have announced they are leaving their teams to join new franchises. Arthur Sleight, a research leader at Du Pont, will move to Oregon State University in Corvallis this September, and Allen Hermann, chairman of the physics department at the University of Arkansas, will defect to the University of Colorado at Boulder in January. Neither hiring university has an active superconductivity research effort now, so that each of them is like an expansion club trying to build a team around a single superstar.

Both scientists cited the opportunity to do their own research more effectively as part of the reason for the move.

Sleight, 50, will hold the Milton Harris Chair in the Oregon State chemistry department. It is the university's first endowed chair, named after the Oregon State alumnus who donated $1 million for its creation. The position will pay $84,000 over a 9-month academic year. Sleight spent the past year on sabbatical from Du Pont at the University of California at Santa Barbara, and had been recruited by several universities, including the University of California at Berkeley. It was the second time Berkeley missed a shot at a top name in high-temperature superconductivity—last year, it failed in a highly publicized effort to woo Paul Chu from the University of Houston.

Arthur Sleight

Hermann, also 50, will become the most highly paid professor in the University of Colorado physics department, with an academic-year salary of $81,500. In 1988, along with Zhengzhi Sheng of the University of Arkansas chemistry department, Hermann announced the discovery of a thallium-based superconductor that lost resistance to an electric current at more than 120 K, still the highest critical temperature of any known superconductor. That discovery catapulted the Arkansas team from an obscure superconductivity research group to one of the best known and best respected in the country.



Allen Hermann

The two relocations have several parallels. Both scientists are moving from established superconductivity programs to schools where they will practically have to start from scratch. Both Colorado and Oregon State, however, do have scientists in related fields, especially materials science.

Further, both schools can point to nearby institutions that should interact well with their new hires. Teledyne Wah Chang, an Albany, Oregon–based division of Teledyne Corporation, is a major producer of low-temperature superconducting materials and contributed $60,000 in start-up funds for Sleight's lab. Near the University of Colorado are the National Institute of Standards and Technology and the Colorado School of Mines, each with programs in or related to high-temperature superconductivity.

Why would a researcher move from a successful program to an expansion team? "A number of us who have been right smack in the middle [of the race to develop high-temperature superconductors] are looking to get off to the side," Sleight said. It is quite demanding to be a scientist in a large program, he said, and many superconductivity researchers are looking back fondly on the days when they could actually take time off on the weekends. During his 25 years at Du Pont, Sleight rose to research manager, directing about 100 people, and later stepped down to a research leader in charge of a team of about 12. Taking early retirement from Du Pont will allow him to pursue his own interests more closely, including looking for totally new superconducting materials, he said.

Hermann told local newspapers that several factors influenced his choice. He gets a 33% salary increase and, since he will not serve as department chairman, he will have more time for research. The University of Colorado offers better facilities for his work, and the Boulder area has a better support structure for superconductivity research than Fayetteville, Arkansas. He also cited personal reasons—he has family in Colorado, and both he and his wife like the area. ■ ROBERT POOL