

Who Were The First Humans?

Nobel Conference® 44 Preview
Gustavus Adolphus College
Saint Peter, Minnesota USA

The Nobel Conference at Gustavus Adolphus College is the first ongoing educational conference in the United States to have the official authorization of The Nobel Foundation, Stockholm.

October 7&8, 2008

Nobel Conference® 44: “Who Were the First Humans”

We human beings have always contemplated our origins. Where did we come from? What were our ancestors like? How did they live? What makes us different from the rest of the creatures on this planet? These questions have traditionally been studied by paleoanthropologists examining ancient skeletal remains or by archaeologists who studied the remains of settlements in search of clues about how these ancestors lived.

During the last couple of decades, however, biologists, climatologists, geneticists, mathematicians, and psychologists, among others, have been adding to the scientific database. We can now speak with some confidence about some other questions as well. When did the first modern humans emerge and where? How and when did they spread across the globe? How did they get along with their neighbors? What was the weather like? What did they eat? Why did they have such big brains and what did they think about and how did they behave? And finally, what makes us humans unique?

As always we’ve assembled a world renowned panel of persons to present their cutting-edge work on these issues and to provide some helpful guidance to the rest of us as we consider our own thoughts about these important questions.

We invite you to visit Nobel Conference online at gustavus.edu/nobelconference for in-depth information about the conference and presenters.

Timothy Robinson, Chair, Nobel Conference 2008

This is my first Nobel Conference as president of Gustavus Adolphus College. It will be a distinct pleasure to meet you and welcome you to this 44th annual conference. Jack Ohle, President, Gustavus Adolphus College

Gustavus Adolphus College and the Nobel Conference

Established in 1862 by Swedish Lutheran immigrants, Gustavus Adolphus College is a private liberal arts college that provides an undergraduate education of recognized excellence for more than 2,500 students.

The Alfred Nobel Hall of Science at the College was named as a memorial to the great Swedish inventor and philanthropist. Following its dedication in 1963, attended by Nobel Foundation officials and 26 Nobel laureates, endorsement of an annual science conference to be held at the College was requested of The Nobel Foundation. Permission was granted and the conference, now in its fifth decade, continues to set a standard for timeliness, intellectual inquiry, and free debate of contemporary issues related to the natural and social sciences.

The Nobel Foundation proudly supports Gustavus Adolphus College and its annual Nobel Conference, which this year delves into the international interest in the human ancestry. Michael Sohlman, Executive Director, The Nobel Foundation, Stockholm

2008 Nobel Conference Committee • Joel Carlin, Assistant Professor of Biology • Patricia Costello, Assistant Professor of Psychology • Patric Giesler, Assistant Professor of Sociology and Anthropology • Jon Grinnell, Associate Professor of Biology • Colleen Jacks, Professor of Biology • Darrell Jodock, Professor of Religion • John Lammert, Associate Professor of Biology • Karen Larson, Professor of Anthropology and Interdisciplinary Studies • Mary E. Morton, Provost and Vice President for Academic Affairs • Charles Niederriter, Professor of Physics • Byron Nordstrom, Professor of History • James K. Robinson, former instructor, Modern Languages, Literatures, and Cultures • Timothy Robinson, Professor of Psychology • Barbara Simpson, Professor of Psychology • Dean Wahlund, Director of Communication Services and Special Events • Janine Wotton, Assistant Professor of Psychology

Background image: Dedication of Alfred Nobel Hall of Science in 1963 with 26 Nobel laureates present.

A.J.S. Rayl

A Magical “Paleo” Mystery Tour

When I view all beings not as special creations, but as the lineal descendants of some few beings which lived long before the first bed of the Cambrian system was deposited, they seem to me to become ennobled. There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one; and that, whilst this planet has gone cycling on according to a fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved. Charles Darwin, *The Origin of Species*

Even before Charles Darwin’s *The Origin of Species* was first published in 1859, science was on the quest to find the first modern humans. It was three years before Darwin’s controversial theory shook the world that mine workers in the Neander Valley of Germany unearthed and reported the first skull that looked more like ours than that of an ape, a discovery that initiated the field of paleoanthropology. Over the next century, more Neanderthal bones were found, in addition to remains of various other hominid species. Who could forget

Lucy, the first *Australopithecus afarensis* skeleton ever found, the world’s most famous early hominid. At 3.2 million years old, the old girl was brought out of “retirement” in November 1974, and earlier this year the Ethiopian government sent her off to become the first *Australopithecus* to tour the world.

Between 200,000 and 300,000 years ago, several types of *Homo sapiens* species roamed the Earth. Only one survived. Ultimately, it evolved into us. But who, exactly, were our forebears? What made them human and different from all the others? What gave them the edge to survive the Ice Age and come to dominate the planet, to become the kings and queens of the world?

The search for answers has been something of a magical “paleo” mystery tour that has yet to end. But in newfound artifacts from Africa and the Americas, and from the recently recovered “recorded” history in our DNA, the light at the end of the tunnel is shining more brightly than ever.

Nobel Conference® 44 brings together six esteemed individuals to present the latest findings and thoughts about the first modern humans. Beyond the latest findings, this renowned group of field researchers, laboratory scientists and scholars will also consider—during the conference’s legendary panel sessions—what our distant ancestors have to teach us about adaptation to a planet undergoing a life-changing period of dramatic climate change.

Throughout those many years, the search for our origins was advanced by field researchers who meticulously chipped out delicate skeletal and cultural remains from ancient community sites, usually in exotic places in Europe and Africa. The presumption was that a series of links forming a neat linear chain of evolution from monkey to man would eventually be discovered. With the belief being that one missing link between early hominids and Cro-Magnon man was all it would take, the mystery seemed imminently solvable, if frustratingly elusive. But we’ve learned that, like a lot of things, evolution is not quite that simple.

Once the domain of paleoanthropologists and archaeologists, the quest has expanded and intensified during the last several decades. Advances in other scientific fields and in archaeological technologies and techniques have opened the “cave doors” to biologists and geneticists, mathematicians and computer modelers, neurologists, psychologists, even theologians, among other specialists. Together, they have turned the “dig,” as it were, big, into a multidisciplinary international effort involving people from all over the scientific map.

Nearly 150 years after Darwin first rocked the world, discoveries



from a variety of fields are rewriting the textbooks and informing us in fundamental and thought-provoking ways. “We’ve gotten to the point where we can really start to answer some of these questions and that’s very exciting,” says paleoanthropologist Curtis Marean of Arizona State University. Just last year, Marean reported the oldest evidence for “modern” human behavior, dating back to 164,000 years ago. These folks dined not on woolly mammoths but on seafood





in a cave along the coastline of South Africa, where they left behind signs of culture. This and other recent discoveries serve as evidence that the first modern humans did not emerge in a “revolution of modernity” between 40,000 to 70,000 years ago as was conventional wisdom. Rather, the evidence is showing they became “modern” over a much longer time period, in fits and starts, here and there, with some characteristics appearing, disappearing, then reappearing later.

As work began on the human genome project in the 1980s, research into human origins began a fantastic voyage backward to the very cradle of humanity. The journey started in 1985 when molecular biologist Svante Pääbo extracted DNA from Egyptian mummies during his doctoral work at Sweden’s Uppsala University. His experiment was a major milestone and its success launched the field of paleogenetics. It wasn’t long before biologists and geneticists around the world were using the genome’s data to assess the affinities and origins of the various populations that make up humankind.

Within just a few years, a team from the University of California, Berkeley, led by Allan Wilson, was proposing that

mitochondrial DNA (mtDNA) could be traced to a single ancestor who lived in Africa about 200,000 years ago—a theory known as the Mitochondrial Eve hypothesis. During the ensuing decade, Wilson’s team in the United States, and Pääbo and other paleogeneticists on the other side of the Pond, dug in and did the painstaking research. The data that resulted from the genetic research was consistent and supported the notion of Africa as humanity’s birthplace. The realization that followed was nothing less than profound: all humans—each of us everywhere, black, red, brown, yellow, and white, came from Africa.

The genetic findings of the late 1980s and 1990s basically flattened the Multiregional Continuity Model that maintained there is no single location for the origin of modern humans, and advanced what came to be known as the Out of Africa theory. Modern humans,

according to the data stored in our DNA, were “born” in Africa and 50,000 to 70,000 years ago expanded across the planet, eventually replacing all other existing hominid populations around the world, with little or no mixing with the other species. The evidence was undeniable.

Since then, Pääbo, now director of genetics at the Max Planck Institute in Leipzig, Germany, and colleagues recovered and sequenced a fragment of Neanderthal mtDNA. They found that it was distinctly different from ours, showing that modern humans and Neanderthals were unlikely to have interbred, as was previously believed, and that modern humans and Neanderthals diverged from a common ancestor around 650,000 years ago.

They are currently working to complete the entire Neanderthal genome, which will reveal more about us, as well as them,

including perhaps what changed when and where in our genome that caused us—and not them—to become modern humans.



Other sleuthing expeditions within the contemporary human genome have shown the differences that do exist among us—skin and eye color, hair texture, bone structure, and things like the ability to digest milk—are superficial, appearing only within the last 30,000 years, a veritable blip in evolutionary time.

“Under the skin, we are all largely the same,” says mathematical biologist Marcus Feldman. At Stanford University,



Photo: Bela Dornon, MPI-EVA

PÄÄBO

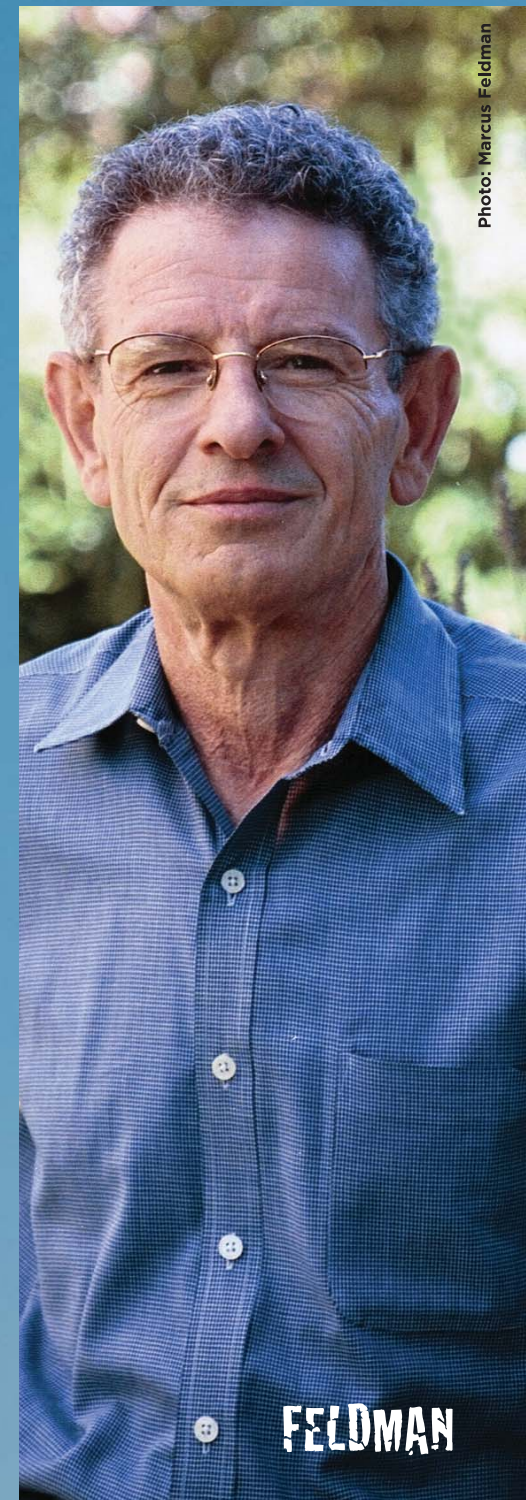


Photo: Marcus Feldman

FELDMAN

Feldman’s research group uses applied mathematics and computer modeling to simulate and analyze the genetic processes of evolution. His team is focusing on complex genetic systems that can undergo both natural selection and recombination, as well as the interaction of biological and cultural evolution, among other things.

The Feldman group has traced, for example, the evolution of the lactase persistent gene, the gene that gives humans the ability to digest milk, to

Europe. As agriculture began about 10,000 years ago and people reined in cows for their milk, those people able to digest it had an evolutionary advantage, he says. As hard as it may be for an American in the Midwest to swallow, there are still people today in Africa and Asia who cannot digest milk. "It's a classic example of how culture has impacted our genome," says Feldman, who has also conducted the largest study to date tracking the various routes humans took to migrate around the world.

Archaeologist Dennis Stanford, curator of archaeology and former chairman of the anthropology department at the Smithsonian Institution, and research partner Bruce Bradley, now of the University of Exeter in the United Kingdom (U.K.), believe they've already homed in on one of those migration routes from physical evidence they've found all along the Eastern seaboard. That evidence shows, they say, that among the earliest immigrants to

America were Paleolithic mariners from southwestern Europe who were exploiting the edge of the eastern coast, following the margin of the pack ice that bound all of the land masses closer together some 21,000 to 16,000 years ago. In other words, the first immigrants to America came from Europe and not just from Asia across the Bering Land Bridge as has long been believed.

Their Solutrean Solution Model proposes these first folk brought their hunting technology with them and that Clovis fluted spear points found in the Americas evolved from the advanced style of carved stone projectiles found in Solutré, France, thousands of years before. Moreover, from the consumptive artifacts and shells found alongside or near the fluted stone weapons, Stanford and Bradley are now thinking the first immigrants were not the hunter-gatherers we always assumed they were, but fishers of the sea, surviving and



Photo: Marcia Bakry, Smithsonian Institution

thriving on marine resources along the eastern coastline, something that correlates with Marean's finds in South Africa dating more than 100,000 years earlier. "It's a whole new view of early man," Stanford says.

Where recent research really humbles us though is in the findings from comparative studies with our primate cousins. "We are faced with a situation today where we can almost *not* put our finger on any particular realm where we are truly unique," says Pääbo, who did the investigative genetic work that revealed DNA sequences of humans and chimpanzees differ by only 1.2 percent. "We have more sophisticated tool use, a more complex language, and have more cultures that change more rapidly than the Great Apes. But in all these respects, they have some avail of this. That's a rather fundamental insight about ourselves."

The genetic and newfound artifact discoveries made in the last two decades are among the most important finds in science, and the realizations that result, these researchers say, are integral to

our continued evolution. "They show dramatically how unified the human race actually is, how recent its origins actually are, and how the way it thinks and moves is all pretty much the same," sums up evolutionary biologist Robin I. M. Dunbar of Oxford University. While there has not been any enormous change in the general DNA in the six or seven million years since we parted ways with the chimpanzee, what has changed is undeniably significant, making the quest to find our origins as much a quest to find what makes us *human*. What catalyzed the genetic, cultural, and anatomical points of departure from the other primates?

Physically, the one obvious difference is our big brain, which commands an extraordinary amount of "fuel" given its size relative to the body, notes Dunbar, who for years has investigated the mystery of human distinction. Given that a brain as large as ours is just not needed to survive, his

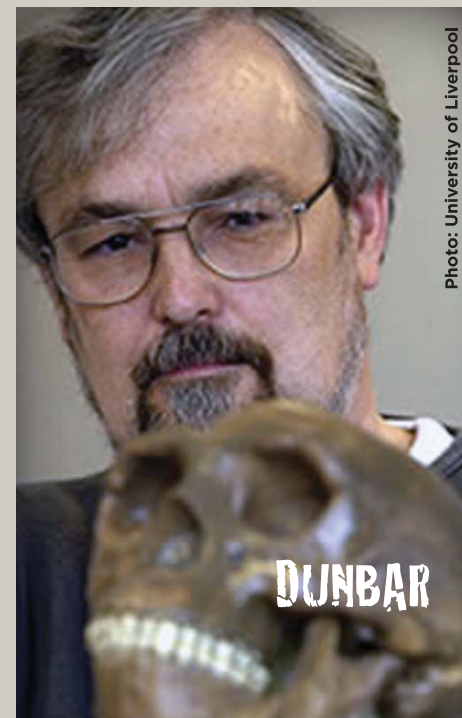


Photo: University of Liverpool

research led him to propose the Social Brain hypothesis in 1998. It holds that our sociality—our ability to step outside our world and wonder—is why human brains are supersized. That ability "to step back and ask if it can be different," he says, has created our world, from language to religion to science. As director of the U.K.'s Lucy to Language Project, Dunbar has brought together an eclectic group of scientists, including ecologists, sociologists, linguists, historians, and musicologists, along with the usual suspects, to further explore the



Photo: Nolan Huizinga

things that make humans different and when and how they emerged and evolved.

The "paleo" mystery tour in search of human uniqueness is, interestingly, running on two tracks. "The other one is theological anthropology," says J. Wentzel van Huyssteen, professor of theology and science at Princeton Theological Seminary, who has been studying human origins and evolution in the context of theology for two decades. "In Christianity, Islam, and Judaism, there is a really clear view that humans are unique and different in the sense that they image God in ways the other animals do not," explains the South African native. Focusing on the "epistemological overlaps" between "the vastly different discourses in science and theology," he has found, he says, that "there is an interesting dialogue between theological anthropology, comparing some of the Biblical materials to what we find in paleoanthropology and genetics."

When the dialogue begins at Nobel Conference 44, the dual tracks of the "paleo" mystery tour will merge. The take-home message from these important new findings about our origins is relevant today more than ever, these researchers say, and is bound to leave a lasting impression about our future as well as our past.

As Feldman puts it: "There is no biological or scientific justification for racism." That may seem simple, Stanford adds. "But it's a real important concept for people to understand as we move into the future."

A.J.S. Rayl is a freelance science journalist, writer, and author based in Malibu, California. She has written on assignment for a wide variety of magazines, including Air & Space, Astronomy, Discover, Psychology Today, and Smithsonian, and online ventures, including The Planetary Society's <http://planetary.org>.



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Nobel Conference Mailing List Status continue remove add

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Conference Tickets

Individual Nonreserved and Overflow Seating

No. @ \$45 per person = \$

Seating in Lund Arena is limited to arena capacity. Late arrivals and overflow seating will be in Lund Center Forum and honored in the arena as space allows.

Individual Reserved Main Floor Seating @ \$75

SOLD OUT

Student Delegations (20 tickets per delegation)

No. @ \$60 per delegation = \$

Name of Delegation (high school/college/university)

Dining Tickets

THREE CROWNS BAG LUNCHES

Tuesday, October 7

No. @ \$10 per person = \$

Wednesday, October 8

No. @ \$10 per person = \$

NOBEL CONFERENCE BUFFET, 5:00 – 6:30PM

The buffet is in place of the traditional Nobel Conference Banquet, and will serve as a prelude to the Tuesday evening events.

Tuesday, October 7

No. @ \$20 per person = \$

Certification of Attendance

Certificates of attendance will be issued.

No. @ \$25 per person = \$

Individual conference ticket also required.

TOTAL AMOUNT ENCLOSED = \$

Nobel Conference 44 Schedule

Tuesday, October 7

9:30am Academic Procession and Opening Ceremony

Welcome

Jack Ohle, President of the College

10:00am Lecture

Curtis Marean, Institute of Human Origins, Arizona State University

1:00pm Lecture

Svante Pääbo, Max Planck Institute of Evolutionary Anthropology, Leipzig

3:00pm Lecture

Marcus Feldman, Morrison Institute for Population and Resource Studies, Stanford University

5:00 – 6:30pm Nobel Conference Buffet

Evelyn Young Dining Room, Jackson Campus Center

6:00 – 8:00pm Reception/Art at Nobel Conference

Hillstrom Museum of Art, Jackson Campus Center

6:30pm Forums: Peopling of Minnesota

Venue 1 – Lund Center Arena

Venue 2 – Alumni Hall, Johnson Student Union

Two concurrent Tuesday evening sessions are planned. The sessions are open to the public without charge.

8:00pm Music at Nobel Conference

Christ Chapel

Wednesday, October 8

9:30am Opening and Welcome

10:00am Lecture

Dennis Stanford, Division of Archaeology, Smithsonian National Museum of Natural History

1:00pm Lecture

Robin Dunbar, Institute of Cognitive and Evolutionary Anthropology, University of Oxford

3:00pm Lecture

J. Wentzel van Huyssteen, Princeton Theological Seminary

4:30pm Closing Remarks

All events are held in Lund Center Arena unless otherwise indicated. Schedule of lectures is subject to change.

Ticket Order

Mail completed order form with payment in full, payable to Gustavus Adolphus College, for all lecture and meal reservations, or order online with MasterCard or VISA at gustavus.edu/nobelconference. Tickets for lectures are good for the two-day conference. No refunds for lecture tickets or meal tickets will be made after Monday, September 22, 2008.

Please enclose a stamped, self-addressed envelope for timely receipt of lecture and meal tickets. Tickets will be mailed after August 1, 2008. Tickets ordered too late for mail delivery will be held at the Nobel Conference registration desk in Lund Center. For more information, contact the Office of College Relations, 507.933.7520, or e-mail collegerelations@gustavus.edu.

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