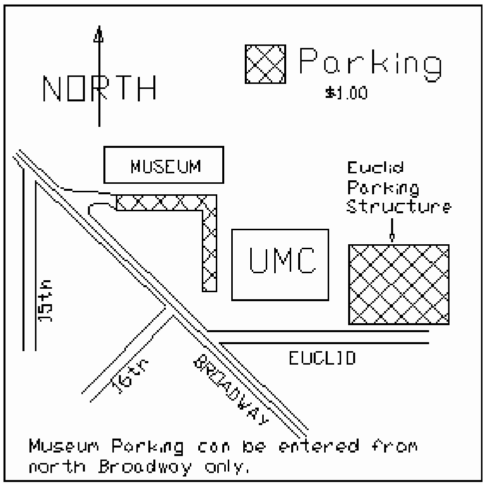
CALUMET

CONSERVATION PRESERVATION
EDUCATION EXPLORATION

Newsletter of the Indian Peaks Chapter of the Colorado Archaeological Society
November, 2001

CALENDAR OF EVENTS

General (lecture) meetings are held in the University of Colorado Museum, Dinosaur Room
Second Thursday of each Month, at 7:00 PM. The public is always welcome.



The following is a situation that will last through next summer:
I'm sure you noticed that our Museum parking lot 208 is off limits to non-permit holders, even at night. So, would you please pass that on to your members? They can park in the Euclid parking structure for $1.25. Euclid parking lot is east of the Museum on Euclid. Just want to avoid tickets and towing.
Thanks, Carol Kliger

After parking in the Euclid Parking Structure, walk west on Euclid to Broadway, follow Broadway on the sidewalk for one block and drop down into the Museum parking lot. It is only a few hundred yards.

November 1 Executive Board - 7:30 PM at Alterra at The Atrium.

November 6 PAAC Class - Fort Collins, Colorado Archaeology (session 5)

November 7 PAAC Class - Archaeological Dating Methods, Boulder Wildlife Center

November 8 IPCAS Presentation - 7 PM in the Dinosaur Room at CU museum. Presenter: Marcel Kornfeld. The topic will be the "Paleo-Indian Prehistory in Middle Park".

November 13 PAAC Class - Fort Collins, Colorado Archaeology (session 6)

November 14 PAAC Class - Archaeological Dating Methods (session 2), Boulder Wildlife Center

Inside This CALUMET

Calendar of Events - Continued

November 20 PAAC Class - Fort Collins, Colorado Archaeology (session 7)

November 28 PAAC Class - Archaeological Dating Methods (session 3), Boulder Wildlife Center

December 4 AIA Lecture - Ms. Lisa M. Capano, Painting Conservator
Paintings Conservation and Restoration

All AIA lectures are co-sponsored with the University of Colorado Natural History Museum and the Department of Classics, free to the public, and presented at 6:30 p.m. at the Museum, which is located at 15th Street and Broadway in Boulder.

December 5 PAAC Class - Archaeological Dating Methods (session 4), Boulder Wildlife Center

December 6 Executive Board - 7:30 PM at Alterra at The Atrium**.**

December 13 Annual Holiday Party - 7:30 PM, location to be announced**.** A great social activity and do not forget the famous "White Mammoth Exchange".

February 5 AIA Lwxture - Dr. Robert C. Bigelow, Egyptian Study Society, DMNS
The King of Ugarit and an Amarna Princess?

March 19 Mr. William F. Spengler, South Asian Historian and Numismatist
Reconstruction of the Bactrian and Indo-Greek Dynasty Through Numismatics

April 16 Prof. Jonathan M. Kenoyer, University of Wisconsin
Ancient Cities of the Indus Valley

Officers and Board Members Needed

Our club needs some candidates for the November election. IPCAS has the following open slots in the slate of candidates:

Vice-President - Performs the President's duties in that officer's absence; Arranges and presents each monthly chapter program; Arranges special events and appoints assistants as necessary; Arranges for PAAC classes with the PAAC Training Coordinator; Collects, deposits, dispenses and reports all moneys connected with special events and makes final written report to the Treasurer and Executive Board**.**

Treasurer - Collects and records all funds, deposits and disburses funds and presents an itemized statement of chapter finances at each Executive Board meeting; Responsible for forms and reports of finances of the chapter to be made to the State C.A.S.

CAS Representative - Attends all quarterly and annual meetings of C.A.S.; Reports to the Executive Board.

Board Member - Attends all Executive Board meetings; Provides advice and guidance; Assists the officers and membership.

Coloradans Before Colorado - The First People of The High Country

Marcel Kornfeld

Middle Park is a high mountain basin 200 kilometers northwest of Denver and just west of the Rocky Mountain National Park, a picturesque upland and alpine environment with a median elevation of 3200 meters. Many snowcapped peaks of the Southern Rocky Mountains surround the park while the continental divide encircles the park on all but its western side. The Colorado River originates in the Front Range of the Southern Rocky Mountains and flows westward through the park, being joined by the Frazer, Williams Fork, Troublesome, Blue, and Muddy, before exiting through the Park range in the west. The lower, open portions of the park are a cold desert dominated by sagebrush, the uplands are covered with pine and fir forests, the intervening elevations mix the two and include aspen groves and various bushes, while the riparian zone next to the rivers sports cottonwood and willows.

The Middle Park Paleo-Indian Project is the first comprehensive and systematic study of the early human occupation of a Rocky Mountain basin. Begun over 10 years ago and remaining a preliminary investigation for much of the time, the project has recorded 80 Paleo-Indian sites containing as many as 95 components, analyzed nearly 400 diagnostic Paleo-Indian artifacts, and more intensively investigated four localities. Folsom components are ubiquitous in the Middle Park, outnumbering sites, components, and diagnostic artifacts of all other Paleo-Indian complexes, a situation encountered in some other Rocky Mountain regions as well. Goshen, Cody, and James Allen complexes are also well represented, hence from 11,000 to 8,000 years before present the region offered early Americans a good livelihood.

Three excellent, primary lithic material sources with plentiful raw material scattered in secondary deposits throughout the park provided virtually unlimited tool making supplies. Game animals currently winter in the low open areas of the park and we suspect they did so at the Pleistocene/Holocene transition as well, providing the necessary winter resources for mountain foragers. At least the Upper Twin Mountain and the Jerry Craig sites contain evidence of bison procurement. Food plants and small game animals must also have been plentiful in the moist Late Pleistocene-Early Holocene, but as usual are not well represented in the archaeological record.

Year round occupation of the park is suggested by seasonality indicators. Middle Park provides a microcosm for Paleo-Indian occupation and lifeways in other mountain and intermountain basins and valleys of the Rocky Mountain chain from Canada to New Mexico. The first Coloradans learned early about the benefits of the mountains and occupied them soon after or even contemporaneously with their occupation of other regions.

Marcel Kornfeld is an Assistant Professor of Anthropology and Director of the George C. Frison Institute of Archaeology and Anthropology at the University of Wyoming. Currently his research focuses on Paleo-Indian occupation of the Rocky Mountains emphasizing the earliest cultural groups in this region.

Since 1973, Marcel has participated in archeological studies from Texas to Montana and from Kansas to California. These studies span the entire prehistory and history of North America from Clovis to Cowboys, and include: shell middens, bison bone beds, pit houses, camp sites, butchering locations, stratified open sites and rockshelters, rock art sites, and other archeological manifestations.

Educated at the University of New Mexico (BA), University of Wyoming (MA), and University of Massachusetts (PhD), he brings diverse theoretical perspectives to his work on prehistoric foraging societies. Some of his research interests include: chipped stone technological organization, site structure and formation, enhancement of archaeological field methods, the archeology of gender, the role of non-big game resources in forager subsistence, and cultural evolution.

Since 1983, Marcel has organized or co-organized a number of major archeological projects in Wyoming and vicinity, including: the McKean Site re-investigation, the Bugas-Holding Site, the Hell Gap Site re-analysis and field re-investigation, the Krmpotich Site and southwest Wyoming Paleo-Indian study, and the Middle Park Paleo-Indian Project.

He has published extensively on Plains and Rocky Mountain prehistory and history, technological organization, settlement and subsistence strategies, and prehistoric gender systems. His works include four edited monographs, over 50 published papers, nearly 100 papers presented at conferences, and numerous technical reports.

Neanderthal DNA

Mark Rose

For the first time, DNA of a premodern human has been recovered. Svante Pääbo of the University of Munich and colleagues in Germany and the United States successfully extracted the DNA from a right humerus (upper arm bone) of a Neanderthal. Their findings, presented in the July issue of the journal *Cell*, provide important information about when Neanderthals and modern humans diverged from a common ancestor, the nature of interaction between Neanderthals and modern humans, and the ultimate fate of the Neanderthals.

The humerus was found by quarry workers in the Feldhofer Cave, near Dusseldorf, Germany, in 1856, along with the top of a cranium, two femurs (upper leg bones), right radius and ulna (lower arm bones), part of the left ilium (pelvis), and fragments of a shoulder blade and ribs. The Neander Valley, in which the cave was located, later gave its name to the early human represented by these and other remains. The Feldhofer fossils are believed to date from between 40,000 and 50,000 years ago. They are now in the Rheinisches Landesmuseum in Bonn, which permitted removal of a 3.5-gram sample from the humerus for analysis.

As an initial test, amino acids from the bone were examined to determine whether or not DNA might be preserved in the sample. Degradation of amino acids and DNA is caused by the same factors, including water and temperature. Thus the condition of amino acids in bone, which is easily determined, can be used as a guide to the condition of any DNA preserved in the sample. The results were encouraging, and the scientists decided to attempt recovering and replicating DNA from the bone. To be certain of the results, each step in the analysis was repeated in Pääbo's lab and the findings were then duplicated independently by Mark Stoneking and Anne Stone at Pennsylvania State University.

The researchers focused on DNA from the mitochondria, organelles within cells, rather than from the nucleus. Mitochondrial DNA is more abundant than nuclear DNA, and is thus more likely to be recovered in sufficient amounts to allow replication. In addition, mitochondrial DNA is transmitted only from the mother so that changes from generation to generation result from mutation alone rather than recombination of the mother and father's DNA. The scientists obtained a sequence of 379 amino acid base pairs by replicating shorter, overlapping segments.

They identified 27 differences between the Neandertal DNA and a modern reference DNA sample over the replicated sequence. By contrast, DNA from a random sample of a modern population might vary from the reference DNA in five to eight places.

DNA dating is based on the assumption (debated by geneticists) that mutations occur at a constant rate. The accumulated mutations in DNA can be measured, and the time necessary for them to occur calculated. The amount of difference between Neandertal and human DNA suggests that our common ancestor existed about 550,000 to 690,000 years ago. Although this date must be qualified (it is based on one specimen only, and the DNA clock may or may not be as accurate as we assume), it is in accord with the fossil record. Osteological characteristics of the 300,000-year-old remains from the Sima de los Huesos in northern Spain and the 400,000- to 500,000-year-old jaw from Mauer, Germany, indicate that these humans, generally classified as *Homo heidelbergensis*, are ancestral to Neandertals. This suggests the split between the ancestors of modern humans and Neandertals had occurred somewhat earlier, about the time indicated by the new DNA date.

The relationship between Neandertals and modern humans, who are thought to have arisen in Africa some 120,000 to 150,000 years ago, and the demise of the Neandertals are intertwined. The two coexisted in Southwest Asia for a long period (see "The Peopling of Eurasia," ARCHAEOLOGY, January/February 1996). Excavations at sites in Israel have yielded remains of modern humans at Skhul and Qafzeh caves dated from as early as 120,000 to 90,000 years ago, and Neandertal remains at Kebara Cave dated from 60,000 years ago and Amud Cave dated from 40,000 to 50,000 years ago. In western Europe, Neandertals persisted until 30,000 years ago and possibly somewhat later. The question arises: To what extent did the two interact in terms of cultural exchange or trade and interbreeding? Were the Neandertals out-competed by modern humans or killed off by them, or were they absorbed into the population and genetically swamped? At Arcy-sur-Cure, in France, stone tools and personal ornaments similar to those associated elsewhere with modern humans have been found with 34,000-year-old Neandertal remains, suggesting trade between the two groups. Despite this evidence for cultural exchange, a study of temporal bones from Arcy-sur-Cure and other sites indicates significant differences between Neandertals and modern humans, suggesting interbreeding did not.

If Neandertals made a significant genetic contribution to modern humans, similarities should exist between DNA of Neandertals and that of people from Europe, where the Neandertals persisted the longest. Pääbo and his colleagues compared the Neandertal DNA to that from five modern populations, but it proved no closer to DNA from modern Europeans than to that from four other groups. While this does not rule out the possibility of Neandertal and modern human mixing, it suggests that the Neandertal genetic contribution to modern gene pools, if any, was small.

Setting aside the particulars of this new study, the fact that it was possible to recover Neandertal DNA is a breakthrough itself and opens many possibilities for similar investigations. Mammoth remains preserved in the Siberian permafrost have yielded DNA from 50,000 to 100,000 years ago, but preservation of DNA more than 100,000 years old is thought to be unlikely. While DNA from a pre-Neandertal form, like the *Homo heidelbergensis* from Atapuerca, will probably never be recovered, it would be interesting to compare DNA from early *Homo sapiens* and Neandertals from Southwest Asia where the two coexisted for such a long period. Another intriguing possibility would be to compare later *Homo sapiens* and the last of the Neandertals, those from 30,000 years ago, found at western European sites like Zafarraya Cave in southern Spain. The fossils from Feldhofer belong somewhere in the middle period of Neandertals. Would DNA from different regions and periods confirm the results obtained from this study, or would they suggest other degrees of interaction? The recent claim that *Homo erectus* was alive in Southeast Asia as recently as 53,000 to 27,000 years ago, makes it conceivable that DNA from this species could also be recovered.

Ancient DNA: Neanderthal Population Genetics

Matthais Hoss

Authenticity is all in research on ancient DNA. Experience has taught us that even the most exciting claims of the retrieval of ancient DNA are not worth much if they cannot be independently reproduced. Ovchinnikov describes the extraction, amplification and sequencing of DNA from 29,000-year-old archaeological bone material of a Neanderthal recovered from the Mezmaiskaya Cave in the northern Caucasus. This is the second time that such a claim has been made, the first being in 1997. The paper by Ovchinnikov is probably the more important of the two, for it provides invaluable corroboration for the authenticity of Neanderthal DNA sequences. Moreover, sequences of the DNA from a second Neanderthal offer more detailed insight into the contentious evolutionary relationship between Neanderthals and modern humans.

Research into ancient DNA enjoys high publicity. It is perhaps the combination of modern molecular techniques and 'old-fashioned' archaeology that catches the interest of the scientific community and general public alike. This fascination sometimes clouds critical judgement. But this area of research, like all others, must meet with standards that ensure the authenticity and reproducibility of any given result. This has not always been so. Several of the most spectacular claims — such as the retrieval of DNA sequences from 15-million-year-old plant compression fossils, from 80-million-year-old bones of putative dinosaur origin and from insects of up to 130 million years in age trapped in amber — could not be reproduced in any other than the original laboratories, and so are of limited value.

The relationship between Neanderthals and humans remains enigmatic, so the retrieval of Neanderthal DNA has been one of the major goals of researchers in the field of ancient DNA. The age of later Neanderthal populations is well within the range compatible with reliable retrieval of ancient DNA (such retrieval is possible from samples up to 100,000 years old). However, it appeared from several studies that the work done with ancient human remains was close to the technological limit of what is possible. This is mainly because of the difficulty of distinguishing target sequences from contaminating modern, in this case human, DNA.

So it came as no surprise that the publication of the first successful retrieval of DNA from a Neanderthal, from the Feldhofer Cave in Germany, was greeted with caution. Although the paper was widely regarded as being of technically high quality, the remote possibility remained that the published sequence was an artifact or the result of contamination. The need for DNA sequences from a second, unrelated Neanderthal specimen was clear, as echoed in most reviews of that paper. And this is where the importance of the work of Ovchinnikov lies.

Ovchinnikov and colleagues sequenced Neanderthal mitochondrial DNA and found that it is closely related, but not identical, to that described previously. Like the first paper, the study of Ovchinnikov *et al*. is convincing in itself. The authors used all the state-of-the-art controls to monitor artifacts and contamination, including having the sequences verified by another laboratory. However, only the combination of the papers allows us to appreciate fully their individual worth. The identification of two Neanderthal DNA sequences, from different specimens found in locations far apart, that are closely related but not identical, rules out the possibility that either sequence is an artifact or the product of contamination. By verifying each other, the two papers provide the most reliable proof so far of the authenticity of ancient DNA sequences.

Can we learn anything from this new Neanderthal DNA sequence about the relationship between modern humans and Neanderthals? The new sequence shares with the Feldhofer one the same surprising feature - it is no more closely related to DNA from modern European populations than to sequences from any other modern human population. This argues against the idea that modern Europeans are at least partly of Neanderthal origin. Although the two sequences were taken from specimens at geographically distant locations, the number of differences between the sequences indicates that these two individuals were from a single gene pool. Furthermore, the variation between the two Neanderthal sequences is similar to that among modern humans.

Details of the Mezmaiskaya sequence also support the suggestion[2] that there was no contribution of the Neanderthals to the pool of mitochondrial genes in modern human populations. However, this does not exclude the possibility of a contribution of nuclear Neanderthal genes. Approximate quantification of the number of mitochondrial DNA molecules found in the Feldhofer Neanderthal ruled out any hope of recovering nuclear DNA from this specimen, but the apparently excellently preserved Mezmaiskaya specimen might yield values compatible with retrieval of nuclear DNA.

Having achieved DNA sequencing from members of geographically distant Neanderthal populations, it would be interesting to do the same for populations that are far apart on the time-scale. A specimen dated closer to the upper time limit of Neanderthal distribution (about 230,000 years ago) would be a tempting choice for DNA retrieval.

The quality of the molecular data retrieved so far from Neanderthal specimens is compelling. If this is how research on ancient DNA is going to proceed, then we are truly on our way to Neanderthal population genetics.

DNA from Ancient Australians

Kate Wong

The study of modern human origins has traditionally relied on fossil and archaeological data, and genetic studies of living populations. But in recent years researchers have succeeded in retrieving ancient DNA from fossils, adding a compelling new data set to the mix. So far, scientists have focused on DNA from Neanderthals, a population of archaic humans who inhabited Europe and western Asia. The sample size is small (DNA from three specimens has been analyzed), but the results indicate that Neanderthal DNA—at least the DNA from the cell's energy-producing organs, the mitochondria—differed from our own. As a result, a number of researchers concluded that Neanderthals must therefore have been a separate species.

Critics, however, have charged that without mitochondrial DNA (mtDNA) data from anatomically modern humans of similar antiquity for comparison, such differences are virtually meaningless. Now new research published today in the *Proceedings of the National Academy of Sciences* is filling in that gap, and the results may force some scholars to reconsider the evolutionary position of the Neanderthals.

Gregory J. Adcock of the Australian National University and his colleagues retrieved and studied mtDNA from the fossilized remains of 10 ancient but anatomically modern Australians, including a 60,000-year-old specimen known as Lake Mungo 3 (LM3). Intriguingly, like the Neanderthal mtDNA studies, analysis of the LM3 sequence revealed a mtDNA lineage that no longer exists as such in living humans.

"If the mtDNA present in a modern human (LM3) can become extinct, then perhaps something similar happened to the mtDNA of Neanderthals," population geneticist John H. Relethford of the State University of New York at Oneonta writes in a commentary accompanying the *PNAS* report. "If so, then the absence of Neanderthal mtDNA in living humans does not reject the possibility of *some* genetic continuity with modern humans." That is, the much maligned Neanderthals may well be among our ancestors.

Signs of Malaria in a Roman Child
BBC News

Signs of malaria have been found in the skeleton of a child buried in a Roman cemetery. British researchers say it is the earliest genetic evidence that the disease plagued the classical civilizations of Rome and Greece. The child was buried at a site north of Rome more than 1,500 years ago. Analysis of DNA extracted from the infant's bones reveals signs of infection with the parasite that causes human malaria.

The DNA evidence provides support for the theory that a lethal outbreak of malaria in AD 5 contributed to the downfall of the Roman Empire. "We can be fairly sure that the child died of malaria," said Dr Robert Sallares, of the University of Manchester Institute of Science and Technology (Umist), UK, who led the research. "Ancient DNA research is a new way of investigating the history of disease," he told BBC News Online. "If we can do the same sort of work on material from older sites, we can determine when malaria entered Europe."

Terry Brown, head of the department of Biomolecular Sciences, where the study was carried out, said archaeological and ancient historians had argued for some time about whether malaria was a significant factor in the classical civilizations of Rome and Greece.

"We know that communities in Greece and Rome suddenly died out. There's argument over whether some of these communities were wiped out by malaria," he told BBC News Online. Genetic analysis had documented cases of malaria in medieval times, said Professor Brown. But the study, due to be published in the journal Ancient Biomolecules, is believed to be the first DNA evidence for malaria as far back in history as late Roman times.

The name malaria is derived from the Italian, (mal-aria) or "bad air". It was also known as Roman fever. It is a very old disease - indeed, prehistoric man is thought to have suffered from malaria.

Each year, 300-500 million people become ill with malaria and several million die, mainly in Africa, India, South East Asia and South America.

Ancient DNA

Biomolecular archaeology refers to the study of biochemical material retrieved from archaeological specimens. These molecules include blood proteins (Cattaneo et al. 1993), collagen fibres (Bocherens et al. 1991), resins, fats and oils (Evershed 1993) or even Deoxyribose Nucleic Acid (DNA). DNA encodes the genetic information of an organism and is housed within the nucleus and mitochondria of the cell. DNA is translated into protein molecules, which constitute the structural building blocks and biochemical catalysts of the cell.

The routine techniques of DNA analysis, such as Southern blotting (Southern 1975), polymerase chain reaction (PCR) amplification (Mullis and Faloona 1987) and DNA sequencing (Maxam and Gilbert 1977) have now been applied to ancient remains to investigate past populations.

Over the last ten years, "Ancient DNA" has been exhumed from Egyptian mummies (Paabo 1985), extinct species (Higuchi et al. 1984, Thomas et al. 1989) and even DNA preserved in amber for millions of years (De Salle et al. 1992, Cano et al. 1993). However, the field remains highly contentious (Lindahl 1993) because of the problems of DNA survival, contamination from modern sources and reproducibility.

General reviews about ancient DNA have been written by Brown and Brown (1992), Richards et al. (1993), and Paabo (1993). They highlight the use of ancient DNA in areas as diverse as human evolution, population migration, the inheritance and spread of disease, family and gender issues in prehistory, burial customs and the rate and route of crop and animal domestication.

DNA Possibilities

DNA can be used to understand the evolution of modern humans, trace migrations of people, identify individuals, and determine the origins of domestic plants and animals. DNA analysis, as one scholar put it, is "the greatest archaeological excavation of all time." Because ancient DNA molecules are normally so few and fragmented, and preserved soft tissues so rare, scientists had little hope of finding and analyzing it. But two breakthroughs have made this possible: the polymerase chain reaction (PCR), a method for copying any fragment of DNA, and the successful recovery of DNA from preserved hard tissues, bones and teeth, that are durable and relatively abundant.

DNA analysis traced human ancestry back to an African "Eve," setting off debate about how modern humans evolved. While there was general agreement that *Homo erectus* dispersed from Africa across Asia between 1 and 2 million years ago, what happened next remained a question. The "out-of-Africa" hypothesis contended that modern humans developed in Africa and migrated from there recently, driving *H. erectus* into extinction. Proponents of a "multi-regional" hypothesis held that *H. erectus* populations evolved into modern humans in many regions, and that these groups later bred with each other and with groups that emigrated from Africa. The Eve study examined mitochondrial DNA (mtDNA), which is passed only by mothers to their offspring. The researchers, Rebecca Cann, Mark Stoneking, and the late Allan Wilson, estimated that the ancestor of all surviving mt DNA types lived between 140,000 and 290,000 years ago. When did the migrations from Africa take place? They dated the oldest cluster of mtDNA types with no modern African representation to between 90,000 and 180,000 years ago. These populations might have left Africa at about that time, but the mtDNA data could not determine exactly when.

Geneticist Alan Templeton pointed out statistical and sampling flaws in the study. Its results, he argued, were in part dictated by the order in which the data were fed into the computer. Others questioned the reliability of "molecular clocks" and the rate of mutation in the human mtDNA used in calculating Eve's date. The genetic diversity of African populations was confirmed by later studies and is now generally accepted, but, according to Templeton, proponents of the out-of-Africa hypothesis assumed that genetic diversity reflected only the age of a population rather than population size. He contends that Africa has greater genetic diversity because its prehistoric population was probably larger than elsewhere. Recently John Relethford and Henry Harpending have argued that differences in ancient population size could mimic a recent African origin of modern humans. The data reflect population dynamics, they say, and do not support one model of modern human origins over another.

Scientists are also studying DNA from the Y chromosome, which is passed only from father to son and is not recombined with the mother's genes. Because changes in the Y chromosome are caused only by mutations, as in mtDNA, it may be used as a clock. Assuming that all living humans share a common male ancestor, it should be possible to estimate when he lived. According to geneticist Robert Dorit, the first modern human male lived some 270,000 years ago. The most recent research on modern human origins, by John Armour, examined nuclear DNA of populations from around the world. Armour and his colleagues conclude that the evidence fits with the development of modern humans in Africa and an emigration by a small number of them that became the basis for non-African populations. These observations, they say, are more difficult to reconcile with a multi-regional model for the origin of modern humans.

New DNA studies by Bryan Sykes have challenged the leading theory about the spread of agriculture into Europe. In 1984, Albert Ammerman and geneticist Luigi Luca Cavalli-Sforza of Stanford University proposed that it was people practicing agriculture who spread into Europe, rather than the idea of agriculture. They argued that agricultural productivity led to population growth, and that, as the population grew, early farmers gradually moved into new land inhabited by fewer hunter-gatherers.

Thus the practitioners of agriculture spread from Anatolia, beginning about 7000 BC, to Greece and across all of Europe, ending in Britain and Scandinavia about 4000 BC.

2001 IPCAS Officers, Board Members, and major functions

President	Michael Landem	(303) 499-9877	mlandem@prodigy.net
Vice-President	Open		
Secretary	Kristine Holien	(970) 586-8982	kris_holien@nps.gov
Treasurer	Cheryl Damon	(303) 678-8076	cherdam@cs.com
Professional Advisor	Dr. Robert Brunswig	(970) 351-2138	rhbruns@bentley.univnorthco.edu
PAAC Coordinator	Morey/Janet Stinson (temporary)	(303) 530-7727	moreyg@peoplepc.com
Internet Manager	Cindy Miller	(303) 546-0720	cmiller@sni.net
Internet Manager	Piper Prillaman	(303) 988-0814	dyggum@hotmail.com
Calumet Editor	Tom Cree	(303) 776-7004	tomcree@earthlink.net
CAS Representative	Open		
Volunteer Coord.	Tom Cree	(303) 776-7004	tomcree@earthlink.net
Board Member	Michael Braitberg	(303) 443-7190	mbrait@sugarloaf.net
Board Member	Jeff Ferguson	(720) 890-2708	fergusonjeff@hotmail.com
Board Member	Pete Gleichman	(303) 459-0856	
Board Member	Jim Morrell	(303) 652-2874	jmorrell@gateway.net
Board Member	Rick Pitre	(303) 673-0272	rpitre@kryos.colorado.edu
Board Member	Bill Rosquist	(303) 664-5634	cuinco@attglobal.net
Board Member	Donna Shay	(303) 443-3273	
Board Member	Russell Smith	(303) 776-5503	rdsmith@lanminds.net

Please check the chapter web-site at: **http//www.indianpeaksarchaeology.org**

MEMBERSHIP APPLICATION - INDIAN PEAKS CHAPTER

____ **Individual** $25 / Year ____ **New** __________ **Date**
____ **Family** $28 / Year ____ **Renewal**
____ **Student** $12.50 / Year, with Calumet delivery by e-mail

NAME ____________________________ **TELEPHONE (____)__________**

ADDRESS ________________________ **E-MAIL** ____________________

CITY ______________________________ **STATE** ______ **ZIP**___________

Please make check payable to: Indian Peaks Chapter, CAS
Mail to: PO Box 18301
Boulder, 80308-1301

When you join or renew you will receive the ***Calumet***, our monthly newsletter, and ***Southwestern Lore***, the quarterly publication of the Colorado Archaeological Society. And you will have opened the door to Colorado Archaeology.

CALUMET

Newsletter of the Indian Peaks Chapter
of the Colorado Archaeological Society
P.O. Box 18301
Boulder, 80308-1301