

Lifel**in**es



Biology/Allied Health Department

Southern's Ancient DNA Project

The wind was blowing the snow sideways across our camp. This was the third day out of ten that it had been snowing. There had been only one day where the temperature was greater than 40° F. And this was in the middle of July, in the land of the midnight sun! Our jar of olive oil looked more like butter than oil. What were we doing on an island in the Arctic Ocean, surrounded by wolves, caribou, and musk ox? I



Left to right: Heston Williams (SWAU), Lee Spencer and Leslie Ann Schwarzer (SAU).

had to remind myself that it was about the significance of the Ancient DNA Project.

What is the Ancient DNA Project? Through the years, particularly the last 50 years, there has been an increasing amount of evidence presented that seems to support life on earth being very old, far older than the Bible would indicate. Tangible evidence for life being young has been limited. The preservation of ancient DNA may be one of the few lines of evidence unequivocally pointing to a young fossil record. The existence of ancient DNA is not predicted in the “deep time” age-model for life on earth. DNA in museum specimens of modern animals degrades in less than 50 years to short recoverable lengths, and most archaeological sites in warm climates that

are older than a few thousand years, have no recoverable DNA at all.

The catastrophic Biblical Flood model in which the geological record was formed quickly several thousand years ago predicts the preservation of DNA, particularly if the sample was kept cool or frozen. The existence of well preserved DNA in pre-Quaternary (Ice Age) fossils could be a test between the two competing models of earth history. The lack of recoverable DNA would be predicted by the long-age model; the existence of abundant, well preserved DNA would support the young-age model.

We proposed to test the competing models of the age of the earth by attempting to recover ancient DNA from fossils dated by the secular scientific community at about 17 million years before present. Because frozen fossils

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Notes From the Chair

Jeff Kuhlman, medical doctor to the President of the United States, spoke during Southern's alumni weekend last month at the E.O. Grundset lecture series. The lecture series is arranged by the Biology/ Allied Health Department and is named for Edgar Grundset, beloved biology professor who taught over 4,000 students during his 40 years at Southern. In the early 1980's, Jeff was a student in one of Edgar's last general biology classes.

Dr. Kuhlman graduated from Southern when he was 19 years old and then completed his medical degree at Loma Linda University. He proceeded to engage in post-doctoral studies at the Naval Aerospace Medicine Institute and Johns Hopkins. He attained the position of



Keith Snyder

Senior Flight Surgeon and is Board Certified in three medical specialties. In 2001, he became a White House Physician, and in 2007 became the Director of the White House Medical Unit.

Students, alumni and faculty packed Ackerman auditorium on Thursday night and listened to Dr. Kuhlman share tales of his journey from "Foundations of Biology" training from Professor Grundset to his current medical assignment. His unclassified presentation also covered aspects of Chief Executive healthcare, force protection, and integrated protective medicine in today's "post 9/11 world".

Two days later on Sabbath, October 31st, the Biology/Allied Health Department hosted an open

house at 2 p.m. Alumni arrived early to reconnect and reminisce. Biology faculty members gave tours of the origins hallway paintings that demonstrate the complexity of the cell. Continued work is underway on the hallway displays that will help our students and visitors understand the geological column, beauty in nature, irreducible complexity, and moral implications of personal choice from a scientifically strong and Biblically accurate viewpoint.

Open house visitors also learned about extracting DNA from "ancient" spruce cones that were collected from NW Canada this past summer. The event ended with a short slide presentation of current students & pictures of Edgar Grundset. Let us know "What's Your Edgar Grundset Story?" by emailing me at kasnyder@southern.edu.

Alumni News Corner

Barry Howe ('09) arrived in the Kyrgyz Republic on August 26, 2009 to begin a ten-month Fulbright student grant conducting research in the wild walnut forests of Jalalabad province of Kyrgyzstan.



Measuring the diameter of the walnut tree at chest height.

Currently, he is working with Dr. Almaz Orozumbekov at the Kyrgyz Agrarian University in Bishkek, who is overseeing the walnut projects. Barry's two projects include a study on walnut phylogenetics with Dr. Mali Arardhya from UC Davis and a descriptive ecological survey on the walnut forest with Dr. Kurt Gottschalk, director at the USFS research station in Morgantown WV. Currently, Barry is staying with a host family and he said, "Kyrgyz (have a) sense of humor. They are always laughing, telling funny stories, and jokes. Perhaps the best part for me is that, apparently, even my lame jokes are worth laughing at. We have a grand time, even if my Russian is pitiful and my Kyrgyz even worse. I did manage to master "delicious" and "thank you" in Kyrgyz right away, absolutely necessitated, I thought,



Learning how to use an increment borer to obtain samples from the tree.

by the large amount of delectable food I was served upon my arrival (and ever since)."

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are more likely to preserve ancient DNA, our project focused on polar localities from the Miocene. The best localities with extremely well preserved and diverse plant fossils, preserved in permanently frozen (permafrost) peats, occur in the Miocene Ballast Brook Formation on Banks Island, Canada, in the Beaufort Sea of the Arctic Ocean. We wanted to collect fossil plant samples from this area to process for DNA recovery and PCR amplification, followed by sequencing of the DNA by a commercial lab.

Several challenges faced us before we even left. The air transport to Banks Island we had planned on fell through, and the commercial charter companies charged twice what we had budgeted. It looked like we would not be able to go. Our initial funding came from a grant from the Faith and Science Committee of the General Conference and from Southern. I knew that neither of these groups had the resources for additional money to cover the transportation to the Arctic Ocean. We were sunk. But we trusted God for the outcome, remembering that the cattle on a thousand hills are His and we prayed that if this was His project, He would provide. The week before we were scheduled to go, I received a call out of the blue from the President of the Columbia Union Conference. He had heard of

this General Conference supported project and wondered if he could help. Our prayers were answered in a way we never could have predicted! We were going!

My wife and I loaded our truck to the brim with everything we might need for the expedition. We had two small electric freezers to preserve the collected specimens until we could get them back to our



Fossil Spruce cones.

labs at Southern. We had numerous specimen containers of various sizes, solar panels, car batteries, etc. We had the tents and sleeping bags, clothing, kitchen utensils and food that we would need for the ten-day expedition. When we left Southern for Inuvik, Canada, the northernmost location with road access and where we were to meet the bush plane, we were full! Two weeks later we arrived and met the rest of the field party who had flown to Inuvik.

After a day's delay because of weather, we were off in the twin Otter bush plane. After a four-hour flight, we were dropped off in the wilderness of the island. After the

plane left, we realized our isolation even more. For better or worse, we were here until the plane returned ten days later to pick us up. No grocery store, no hospital, no other people until the plane returned!

That first day, while we were setting up camp in the mixed drizzle and snow, we watched an amazing wildlife encounter. A wolf was trying to catch a sand hill crane that was nesting nearby. The crane would let the wolf get near, and then fly 50 yards off, away from the nest. Then the wolf would try again to catch the crane, who would again fly off a short distance. This happened several times until the wolf got frustrated. It started howling, then the crane, as if to tease the wolf, started honking. Finally the wolf got tired of the whole affair and disappeared into the horizon.

Several other times, caribou or musk ox would come near camp, as if wondering who were these intruders into their domain. This was definitely the wild Arctic!

Through all of the challenges and beauty, we collected the specimens we came for and stowed them in the freezer. We were delayed getting off the island a day because the weather was too bad for the plane to find us, but eventually we made it back to Inuvik. The field party flew home and my wife and I began the drive home. Our truck was never to make it, but through the Lord's providence, the specimens did. But that is another story.



Finishing Adam's God-given Job

Research. When I consider that word, I immediately think of the process of discovery. But what is it that needs to be discovered? The created world is filled with so many fascinating organisms interacting in complex ways, and most humans go through an average day without even noticing most of the details. Even a curious person who diligently examines the outward features of an organism is likely to miss all the intricate processes happening inside that created vessel. Noticed or not by unaided human eyes, DNA strands duplicate, cells divide, action potentials generate and propagate, materials translocate, structures assemble, and the list of microscopic activities goes on and on.

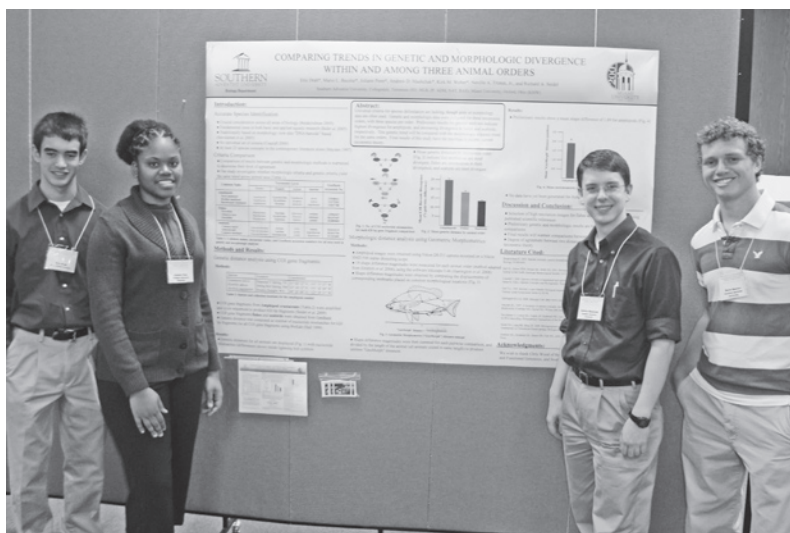
Observations on details like these compel biologists to explore further and search deeper for greater understanding. Millennia before anyone lived and worked with the job title “biologist,” God invited Adam to set his hands and mind to a job. In Genesis 2:19, right after God brought living things into existence, He brought them to Adam to see what he would name them. He then named the livestock, the birds of the air, and the beasts of the field. For a moment, imagine Adam's demeanor as his mind takes in the beauty and the biotic diversity around him in the garden. Think of Adam's sharp eyes considering the characteristics of each organism before him, and imagine his joy in peeking behind leaves and branches, searching under stones, and parting foliage to be sure that he considers every unique

kind. Ponder Adam's steadfast concentration as his sinless mind filters the complex information entering his eyes, ears, and other senses.

Today in the 21st century, some of us are still lucky enough to continue the charge given to Adam—to investigate nature, to understand and name the created works, and to know the Designer better in the process. The act of doing research is how modern scientists come to better understand the organisms, the

God that advanced science shall be taught in our schools as preparation for the work that is to precede the closing scenes of Earth's history.” (*What Shall We Teach?*, p. 25) I believe that science should lead us to a better understanding of God and His actions in the universe.

If Adam were alive today and still completing his Divinely-directed early assignment, he would be called a taxonomist. Biologists involved in modern taxonomy essentially classify and group living things according to quantifiable similarity. Our Adventist worldview allows us to interpret common body plans as evidence for a Common Designer, while scientists with other worldviews might interpret such commonalities as support for a common ancestor. Here at Southern, a fellow biology professor (Dr. Tony



Southern students Eric Drab, Joliann Penn, Andrew Mashchak, and Mario Bacelar stand by their research poster.

processes, and at least some of the mysteries that curious minds notice around us. As Adventist scientists, what a privilege and thrill we have to formulate questions and engage our students in the process of understanding some of the mysteries that enshroud God's creation.

Mrs. White made some powerful statements about science, the theme of which continues to provide important guidance. As an Adventist scientist leading students in research, one of my favorite passages reads, “Science opens new wonders to our view; she soars high, and explores new depths.” (*The Faith I Live By*, p. 321) Mrs. White also said, “A knowledge of science of all kinds is power, and it is in the purpose of

Trimm) and I are working with interested students to see how well modern morphological taxonomy (grouping and naming organisms based on external anatomy) lines up with highly resolved information from DNA in those same organisms. Recognizing that a Common Designer would engineer His created works using a common instructional language (DNA), we are curious about the closeness of agreement between groupings based on the “DNA barcode” region of the mitochondrial genome and previous groupings of organisms based on morphology.

About 11 years ago when I first began teaching biology, I can remember preparing an activity

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for students to help teach different strategies in grouping things. For various reasons, people are driven to group things whether those items are fruits and vegetables together in a supermarket produce section, shirts and pants together in a children's apparel aisle, or bicycles and basketballs together in a sporting goods department. My early instructional activity involved having students consider various paper clips, tacks, pens, document clamps, pencils, stick pins, and rubber bands—with each type present in the same four colors. Now over a decade later, I

still distinctly remember how several students completed the activity by making groups of blue, red, yellow, and green objects. Several other students assembled groups of office supplies that keep papers organized, other groups with instruments used for writing, and still other groups for items used on bulletin boards. It turns out that when humans group things, the identity of those groups can shift a bit, depending on the grouping criterion in use.

Since modern biologists use morphology, and now DNA, to group living things to understand them better, we are working with students

to investigate the results produced by these modern methods. Even though modern biologists certainly lack “perfect eyes” like Adam possessed in a world before sin, we are working with our students using spatial mathematics and gene-sequence analysis to “see” the beautiful details which God left for us to find, appreciate, and understand if we have the patience to learn.

We are going to God's book of nature in order to “study and show ourselves approved.” (2 Tim. 2:15), and hoping to glimpse a bit of the Designer by looking carefully at His work. *Rick Seidel*

Pre-Dent Club

Dentistry is a word that scares away most people, but this is just the opposite for the 25 students in the Pre-Dent Club. The year started off great with a welcome back convocation. The members were able to get to know each other over popcorn and icebreakers. The club members were able to discuss plans for the year and give suggestions of things they would like to see happen.

This school year started by members participating in a program called Halloween Candy Buy Back. The goal of this project was to bring awareness as to the effects of candy on teeth to elementary school students at Spalding Elementary, while still being fun. We were able to encourage students to sell back their

candy rather than eat it. This was to prevent the students from eating the candy and having the negative effects of sugar on their teeth. The candy was bought from the students for \$1 per pound. The Pre-Dent Club collected around 60 pounds of candy in three days and will send it to troops overseas.

Recently, we had our annual club vespers at the Im's home. We were welcomed by a wonderful dinner prepared by Mrs. Im. The night was filled with more fun times as we moved outside to continue our evening. We enjoyed songs around a bonfire and encouraging words from Dr. Im. Those who were able to attend were blessed by all the evening's activities.

The fall colors have put the camping bug in many of us, and we are excited about

an upcoming combined camping trip with the Pre-Med and Tri-Beta Clubs. This will be a neat opportunity for the clubs to interact and build close friendships while exploring God's nature. This will take place at Dr. Spencer's home and will be the weekend of November 20 and 21.

Pre-Dent Club members will be more involved in Remote Area Medical Clinics (RAM) this semester. This will provide an opportunity for members to get involved in community outreach. These clinics take place in different locations around the states of Tennessee and Kentucky. The clinics provide free health care, dental, eye care, and veterinary services. Some of our club members had the opportunity to participate last year and found it very rewarding. We are blessed to be able to participate in such an active mission.

We are also looking forward to the upcoming weeks, offering different activities of all types. Whether these include studying for the DAT, rafting down the river, or participating in a health clinic, our goal is to provide activities that will strengthen us academically, socially, and spiritually as a club.



From left to right: Jon Stewart, Erica Becker, Lori Foust, Laura Clark, Emily Hwang, and Dr. Patrick Im.

Snapshots



Joliann Penn and Mario Bacelar align COI gene fragments for analysis.

Eric Drab prepping an invertebrate specimen for magnified image capture.



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