

NAMS Today

A newsletter for all NAMS Graduates

Volume 8 Issue 1

Fall 2004

Dean's Corner by Dr. Dennis Weiss

I hope you and your family have had a good year since our last issue of NAMS Today. In the past year since writing my last Dean's Corner article, NAMS continues to move forward as it strives to continually deliver the best possible educational opportunities for its students. The College has once again been ranked by U.S. News and World Report as fifth among the nation's public liberal arts colleges. This is the second year for President Herman Saatkamp, Jr. and he has initiated a campus-wide Master Plan process that will transform the College over the next decade. Chemistry Program's Rogers Barlatt and I have been asked by President Saatkamp to serve on the Master Plan Committee which consists of other members of the College community as well as representative from the local area. Rogers serves as co-chair of the Committee. It is anticipated that the final Master Plan document will be issued during the Spring 2005 semester. Last year I reported that we were planning to expand NAMS' teaching and research laboratories by adding two floors above the existing lower F-wing laboratories as well as a

major renovation to those facilities. As we approached the final stages of the pre-design phase of the project it became apparent that a new building was needed to accommodate all programs' requirements and to maintain the academic quality of the existing facilities during the construction phase. The Administration concurred with our recommendation and agreed to fund a space needs study for a new building. This was completed last Spring and resulted in a proposal for the construction of a 150,000 square foot building dedicated to the teaching of science and mathematics as well as to provide appropriate research and office space for the faculty as well as expanded, and much needed, support facilities. The proposed building has become part of the College's Master Plan and its location and construction will hopefully be part of the Plan's final recommendations.

NAMS' present and future faculty continues to undergo change. Peter Straub (Biology) and Carol Slocum (Marine Science) are both on one year sabbaticals. Peter is continuing his work on winter flounders in conjunction with the New Jersey Marine Science Consortium at Fort Hancock on Sandy Hook and Carol is expanding her seal studies to the coast of Maine. Rich Hager (Marine Sciences), postponed to this Fall semester, for health reasons, the spring portion of the sabbatical he was awarded last year. I am happy to report that Rich's health is improving and he has been working on the invertebrate fauna along the Maine coast. Sandy Bierbrauer (Biology), who retired in June 2003, has returned to Stockton this year on a part-time basis. Sandy kindly came back "home" this past September to help the Biology program in the teaching of several plant courses. We welcome her back and appreciate her return for this year.

We have been fortunate this year to have six individuals join the faculty as full time Visiting Assistant Professors for this academic year. They are filling teaching positions and providing class coverage in the absence of Peter Straub, Carol Slocum, and Rich Hager during their sabbaticals, Judith Vogel (Mathematics) who is on family leave following the birth of her daughter Violet, and Ralph Bean (Mathematics), Rudy Arndt (Marine Science) and Dick Colby (Biology) who are teaching half time during their transition to retirement. The six visiting faculty are:

Pamela Beresford (Biology) completed her Ph.D. in the joint City University of New York – American Museum of Natural History program. She was a Postdoctoral Fellow at the University of Cape Town and also taught at the City College of New York before coming to Stockton. At the University of Cape Town, Pamela established a molecular systematics facility and mentored Ph.D. and Masters students.

Rebecca Hoffman (Biology) came to Stockton with over 10 years experience as a researcher at the University of Pennsylvania's School of Medicine. She received her Ph.D. from the University of Pennsylvania and was a Postdoctoral Fellow at Thomas Jefferson University. Rebecca's research at Penn included the development of molecular biology protocols for the analysis of gene expression in human airway smooth muscle as well as designing a molecular strategy for developing a transgenic mouse model of asthma.

Tara Harmer (Biology) completed her Ph.D. at Johns Hopkins University, where she constructed and studied biochemically a series of proteins consisting of two DNA binding domains from the transcriptional regulation protein AraC connected by flexible linkers of varying lengths and composition. She went on to a Postdoctoral

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African Winters, African Bones

By Dr. Margaret Lewis,
Associate Professor of Biology

When I was in high school, I read an article in National Geographic about how anthropologists can reconstruct the occupations and illnesses of people who have been dead for centuries just by studying their bones. I decided right there that I wanted to be some type of anthropologist, despite a lifelong interest in vertebrate paleontology. In a seemingly unrelated decision, I also decided that I wanted to travel in Africa and in Asia sometime during my life. While it might seem obvious in hindsight that I could put these interests together and study human evolution, it took me awhile to realize that all my interests fit together so neatly.

I first traveled to Africa in 1993 for my dissertation research. I have spent almost every summer since then working in Kenya, Ethiopia or South Africa. Rather than study the bones of our ancestors and reconstruct their behavior (a task that I leave to my husband, Mike Lague, who is a paleoanthropologist), I study the bones of the carnivorous mammals (e.g., sabertooth cats) that lived alongside our ancestors during the last seven million years. This may seem like a strange way to study human evolution, but we must understand the ecological context in which our ancestors evolved if we want to know WHY we evolved specific behaviors.

Despite what some of my friends and students think, my life is not a cross between Indiana Jones and Jurassic Park. While I do some occasional fieldwork, I am more interested in studying what the anatomy of the bones can tell me. I reconstruct the “occupations” (locomotion, diet, etc.) of extinct carnivores and study how groups of species have changed through time. It is hard to describe the feeling of holding the bones of an individual animal that lived and died millions of years ago. When you first look at a new specimen, it is like being let in on some breathtaking secret that is almost too much to bear. I always marvel over how our earliest ancestors survived alongside all of the awe-inspiring larger carnivores prior to the invention of stone tools 2.5 million years ago.

My research has demonstrated that life became a little easier for our ancestors when many of the largest carnivores became extinct in Africa some time before the invention of stone tools. For once, humans cannot be blamed for the extinction of potential competitors! Instead, I have hypothesized that the disappearance of some African species of sabertooth cats, leopard-sized otters, bears, giant bone-cracking hyenas, and other intimidating creatures provided ecological “space” for our ancestors to evolve into a fundamentally new type of species that would become increasingly adept at molding the environment to suit itself.

As I am also interested in carnivores for their own sake, I cannot forget that not only have they shaped our evolution, but that we have also played a critical role in shaping theirs. My research, in collaboration with my colleague Dr. Lars Werdelin of the Swedish Museum of Natural History, has shown that the appearance of stone tools has had a profound effect on the evolution of African carnivores. After this event,

specialized carnivores became extinct or attempted to evolve into generalists. Today, the only true specialist, the cheetah, is endangered, while most larger African carnivores (e.g., lions, leopards, spotted hyenas) are generalized enough in behavior to survive many types of environmental perturbation (although they, like all animals, cannot survive being hunted systematically by humans.)

So, I spend part of my summers in Africa during their winter sitting in a room measuring bones. That might not sound all that interesting until I mention that “winter” in Kenya means weather somewhat like our spring. I can look out the window in the Kenya National Museums in Nairobi and see hornbills, bee-eaters, weaver-birds and some rather cute bats. For a few years, there was even a monkey hanging out in the museum complex. I can drive a few minutes outside of the city and see giraffe, lions, and hippos. In Addis Ababa, Ethiopia, my view looks out on the toppled statues of former Emperor Haile Selassie and I can hear the royal lions roaring in the distance. I can take a break to have an amazing coffee (and I don’t even like coffee in the U.S.) in the country that invented coffee. Throughout the country are reminders that Ethiopian culture was flourishing when many cultures around today had yet to be invented. In Cape Town, South Africa, my research window has a view of Table Mountain, where I have often watched the “tablecloth” (a huge cloud formation) drape itself across the flat top of the mountain. A short drive from where I work in Johannesburg or Pretoria leads to big game ranches that also happen to contain the fossil localities where many of our ancestors (and carnivores) were discovered. At night, I can look up and see the Southern Cross and other unfamiliar constellations. There isn’t enough space to describe the many people who have invited me into their lives and introduced me to their families, their cultures and their country.

So, what advice do I have for recent graduates still looking for a career? - that it really is possible to do what you love and love what you do and get paid for it. The key is to figure out what you enjoy. As for me, there are a lot of fossil carnivores in China waiting to be studied....

Contact Professor Lewis via email at lewism@stockton.edu or by phone: (609) 652-4686



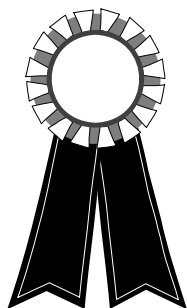
The Lion of Judah Statue in Addis Ababa, Ethiopia, Africa

Undergraduate Research

The Spring 2004 Biannual NAMS Symposium of undergraduate research posters was organized this year by Professors Linda Smith and Ralph Werner of the Biology Department.

The symposium took place in the Upper A-wing gallery on April 28 from 12:00 to 5:30 PM. A total of fourteen posters on display were judged by a team of faculty and staff.

The first three prizes awarded by Dean Weiss are described below.



First Prize:

Planktonic Foraminiferal Turnover Paleontographic Change across Aptian-Albian Boundary in the Subtropical North Atlantic by Nancy Price (Biology Faculty Advisor: Dr. Margaret Lewis)

Second Prize

The Occurrence of Breeding Songbirds: Using Data from the Survey, Monitoring Avian Productivity and Survivorship (MAPS), to Test Hypothesis about Vegetation and Edge Effects by Kristen Boccumini (Biology Faculty Advisor: Dr. Linda Smith)

Antibacterial Properties of Native Plant Species by William Errickson (Biology Faculty Advisor: Dr. Kathy Sedia)

Third Prize

Using Stream Insects on Woody Debris to Access Water Quality in the New Jersey Pinelands by Lynn K. Maun and Julie Ackers (Environmental Studies Faculty Advisor: Dr. William J. Cromartie)

The Effects of Lymph Dilution in Diamondback Terrapins by Leia Lindley (Biology Faculty Advisor: Dr. Ralph Werner)

(Dean's Corner continues from page 1)

Fellowship at Harvard University before arriving at Stockton. Tara's research at Harvard included applying molecular techniques to the study of the chemoautotrophic symbionts of hydrothermal vent metazoans.

Austin Francis (Marine Science) received his Ph.D. from the Florida Institute of Technology. He went on to a Postdoctoral Fellowship at Villanova University and taught last year at St. Joseph's University. Austin's research has involved the study of flounders.

Brian Wysor (Marine Science) was the Director of the Keller Bloom Program at the Bigelow Laboratory for Ocean Sciences in Maine. He received his Ph.D. from the University of Louisiana at Lafayette. Brian's research has been in the area of algal systematics, diversity and biogeography as well as marine biodiversity.

Wesley Cross (Mathematics) completed his Ph.D. at the University of Pittsburgh this past August. His thesis was "Topics in Motives Integration."

This past September NAMS was authorized by the College to search for six new faculty members to be appointed with the start of the next (2005 – 2006) academic year in September. Three of these positions represent replacements and three are brand new additional faculty. The areas we are searching for are:

Cell Biology - Molecular Systematics - Conservation Biology - Mathematics with a specialty in Calculus - **Applied Mathematics - Meteorology** with a specialty in severe coastal storms.

Full descriptions for these positions can be found on Stockton's website. Anyone meeting the requirements is encouraged to apply. In addition, if you know someone who may be interested in teaching at your Alma Mater, please refer them to the website.

The success of NAMS faculty in acquiring grants and contracts is still going very strong. Peter Straub was awarded a prestigious grant from the National Research Council to maintain his research on winter flounder. Brian Rogerson received a National Science Foundation Major Research Instrument (MRI) grant that will allow him to continue research at Stockton he normally has done during the summer at the Trudeau Institute in Saranac Lake, New York. Tait Chirenje is the Principal Investigator with several NAMS faculty that is studying the effects of urbanization on Lake Hammon. Lastly, Stew Farrell continues to gather contracts for new and continued beach studies with local municipalities, New Jersey's Department of Environmental Protection, and the United States Army Corps of Engineers. In closing, I am proud to report that Linda Smith (Biology) and Ralph Werner (Biology) were granted tenure and promoted to Associate Professor effective this past September. Similar laudatory words of praise can also be applied to Brian Rogerson (BCMB) who was promoted to the rank of Associate Professor as of last September.

Thank you for your continued interest in Stockton and especially NAMS, have another happy and healthy year, and I look forward to reporting continued good news in next year's NAMS Today.

Design and Performance Evaluation of A 64-Pixel Dual-Layer Positron-Sensitive Surgical Probe

By Dr. Fang Liu, Assistant Professor of Physics

The general aim of this research work is to design and evaluate the performance of a 64-pixel dual-layer positron-sensitive imaging probe with the ability to reject gamma background. Due to their small geometry and reduced distance from the survey area small surgical probes have higher sensitivity and resolution than conventional large gamma cameras and whole body positron emission tomography (PET) scanners. The special advantages of the positron-sensitive surgical probe show that it can be used to ensure more selective tissue removal and more complete tumor dissection during surgical procedures. The potential applications are: 1) Examination of the resected tumor cavity for any remaining cancer cells (e.g. prostate cancer, brain cancer); 2) Localization of the involved lymph nodes in breast cancer, melanoma, head/neck, and colorectal cancer. These applications have great potential in assisting the staging of cancer treatment and in planning a patient's therapy.

The first application being investigated in collaboration with researchers at the University of Pennsylvania and the Hospital of the University of Pennsylvania is sentinel lymph node (SLN) surgery. The SLNs concept is that during the spread of melanoma or breast cancer, the metastases pass down the lymphatic system and deposit some cells in the first or 'sentinel' lymph node. If this node can be located, it can be biopsied. Then the spread or lack of the spread of cancer can be determined. During the current SLN surgery procedure the SLNs (average of 18 per patient) are located, excised and later sent to pathologists for biopsy. It usually takes up to weeks to obtain the test results and the patient must return for a second surgery to remove the whole lymphatic system if the pathology results are positive. It would be valuable to know at the time of the first surgery whether to perform a dissection, thereby saving money, time, and surgical risks to the patient. Furthermore, the only option for a positive SLN is a complete dissection. It would be valuable to be able to be more selective in what is removed.

Taking advantage of the high tumor-to-background uptake ratio of ^{18}F -2-fluoro-2-deoxyglucose (^{18}F -FDG) and the short interaction length (~ 2 mm) of the positrons from ^{18}F -FDG in tissue, we proposed to introduce ^{18}F -FDG by systemically injecting ^{18}F -FDG before the SLN surgery, which is illustrated in Figure 1.

We have built a 64-pixel dual-layer positron-sensitive imaging device to identify in real-time the location of SLNs that have high ^{18}F -FDG uptake, which may indicate metastases. This imaging device will be able to distinguish positrons from the background gammas, which in the SLN surgery situation consist of both 511 keV gammas from positron annihilation in the body and 140 keV gammas from $^{99\text{m}}\text{Tc}$ used to identify the SLNs.

In phantom studies in the laboratory simulating

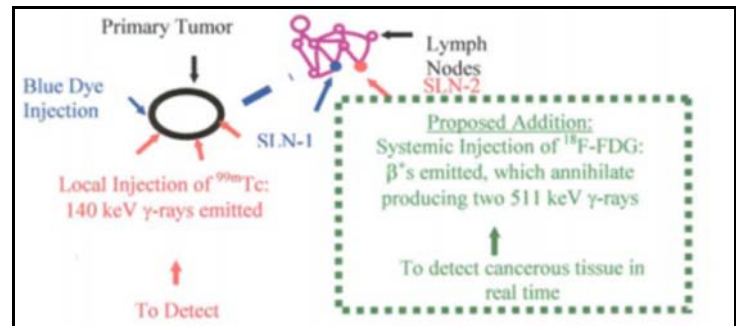


Figure 1. Current procedure for SLN surgery. The 64-pixel positron-sensitive surgical imaging device will be used to identify in real time SLNs with FDG uptake, which might indicate metastasis.

the SLN surgical environment, the performance evaluation of this device has given very promising results. For example, it is able to identify in 10 seconds a ~ 4 mm diameter lesion with a good image contrast (4:1). Currently the device is housed in a light-tight black box, and is not yet portable (Figure 2).

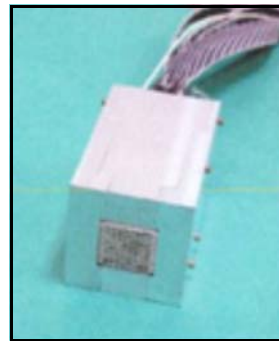


Figure 2. A photo showing the current state of the 64-pixel imaging device. Effective detector area is ~ 1.8 cm \times 1.8 cm. This detector was housed in a light tight black box when the performance evaluation was done.

The optimized operating parameters of the imaging device, however, need to be validated in the clinical setting. Therefore, the detector needs to be moved out of the black box and repackaged to be suitable for use in the operating room. The most recent research work involve repackaging a prototype 64-pixel positron-sensitive imaging device for use in the operating room, and testing its efficacy in identifying cancerous sentinel lymph nodes (SLNs). Initially, the repackaged instrument can operate as a bench-top stationary detector to image excised SLNs in order to characterize its performance with actual tissue samples. Its sensitivity and specificity will be assessed by comparison to pathology evaluation. The professional personnel involved, including Dr. Joel S. Karp, Director of PET Center and of Physics & Instrumentation Group of the University of Pennsylvania, and Dr. Emily Conant, Chief of Breast Imaging Section of the Hospital of the University of Pennsylvania, have experience with design and testing of surgical probes and imaging with the ^{18}F -FDG radiopharmaceutical.

At the department of Radiology of the Hospital of University of Pennsylvania surgeons have expressed great interest in participating in the testing of this imaging device.

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Diving in Support of Science: Stockton Joins the AAUS

By Steve Evert, Field Station Manager

The Richard Stockton College of New Jersey is among the newest organizational members of the American Academy of Underwater Scientists (AAUS). The AAUS was chartered in 1983 to provide standards and oversight to underwater scientific activities and to allow members to operate under an exemption from the Occupational Health & Safety Administration's (OSHA) commercial diving regulations.

As an AAUS organizational member, Stockton now operates under a set of standards that is recognized as the "standard of practice" within the scientific diving community. Adherence to the AAUS training standards also allows for reciprocity among AAUS members. Reciprocity provides Stockton researchers and students with the ability to participate in scientific work at a large number of Universities, Marine Stations and Biological Laboratories that adhere to AAUS standards. Likewise, Stockton now may offer scientific diving activities to visiting researchers and new faculty.

Stockton's dive safety program is laid out in the AAUS approved Stockton Dive Manual and overseen by the Stockton Dive Control Board (DCB) and Stockton's Dive Safety Officer (DSO). The DSO is Dr. Peter Straub (Figure 1) of the Biology Program who is a scuba diving instructor with the Professional Association of Diving Instructors (PADI), an Emergency First Response/ CPR instructor and a Divers Alert Network (DAN) oxygen in diving first aid instructor.



Figure 1. Professor Straub shown in a dive off Mordecai Island in Little Egg Harbor Bay, near Beach Haven.

The Chief Administrator of the dive program is Mr. Steven Evert, manager of Stockton's Marine and Environmental Science Field Station in Port Republic. In addition to Straub and Evert, the DCB includes from the Marine Science Program, Dr. Mathew Landau (chair) Dr. Carol Slocum, and Dr. William Phoel. Additionally, Mr. Joseph Dobarro, DSO of Rutgers University serves as an outside member.

To prepare future scientific divers, Dr. Straub has

developed coursework beginning with BIOL 2175 "Scientific Diving" which covers the physics, physiology, engineering and biology of diving science. Students are also trained in emergency first aid and oxygen administration for diving accidents. In addition to coursework, practical research skills are developed in exercises using the Stockton pool, local quarries and under the direction of Mr. Evert, the facilities and research vessels of the Marine and Environmental Science Field Station.

Dr. William Phoel's classroom-based course "Underwater Archaeology" MARS 3360 also covers underwater research methodologies.

During the summer sessions students may also use their dive skills to participate with Dr. Mathew Landau's "Tropical Marine Biology" MARS 3416 which explores underwater field sites in the Florida Keys.

Additional opportunities for student underwater research are also available and encouraged through independent study.

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...And What Are They Doing Now?

After the Fall 2003 NAMS Today was issued we received the following messages:



Lisa (Oberholtzer) Serfling ('88) is currently a 9th grade Earth Science teacher at Lakewood High School, after a break from the professional world of 7 years to be a Stay-At-Home mom. Before that Lisa worked for 8 years at the Bureau of Site Management, NJDEP, in Trenton, NJ.

Dan Spinogatti ('91) is Vice President of EBI Consulting in Phoenix, Arizona. EBI is a nationwide environmental and engineering management company, and specializes in real estate due diligence. Dan is responsible for management and business development in the Western region. Dan and his wife Melissa have been living in Arizona since 1999. His e-mail address is dspino@ebiconsulting.com.

We love to hear from you. Let us know where you are and what are you doing now. Also please indicate if it is OK to post your e-mail in this section.

Geoarchaeology in Oaxaca, Mexico

By Dr. Raymond Mueller, Professor of Environmental Studies

I became involved in research with archaeologists by way of a series of serendipitous events and chance meetings with individuals. My research lies within the general field of Geoarchaeology, where geoscience knowledge and techniques are used to assist archaeologists in interpreting field and laboratory data. More specifically, I assist them in paleo-environmental reconstructions. Using soil science, geomorphology, and geochemistry I develop a picture of the landscape as it existed hundreds or thousands of years in the past. This helps the archaeologists to explain the reasons for the location of the settlement, how the inhabitants modified the landscape, and what geological processes buried and preserved the site.

While working on a site in New Jersey I met Dr. Arthur Joyce, then at Rutgers University. In 1988 he invited me, to his site along the lower Rio Verde valley located in coastal Oaxaca, Mexico. This began a long collaborative relationship with Dr. Joyce, who is now at the University of Colorado. Oaxaca is located in southern Mexico on the Pacific coast approximately midway between Acapulco and Guatemala. The time period in which we were primarily interested was the Formative Period, roughly 4000 to 1700 years before the present (YBP). The people of the region belonged to the Zapotec civilization, who lived in Oaxaca earlier than the more widely known Aztec and Mayan civilizations of the Valley of Mexico and Yucatan peninsula.

Art was perplexed because he found that many of his valley sites were in the 'wrong' location. That is, they were not located near the present river. Proximity to water, because of its importance to human life, was an important predictor of site location. An additional problem was that there were very few older sites. Given the proximity of the area to the Pacific Ocean we thought that changes in sea-level were the most likely explanation of the problem. Initial surface reconnaissance and test pits quickly forced us to change our hypothesis.

By examining sediment particle-size and the physical characteristics of soils forming in them, we can determine the environment in which they were deposited. For example, active and abandoned stream channels, backswamps, general floodplain, and upland locations all have unique characteristics. By digging many pits and deep auger holes in an area we can reconstruct the landscape of the past. What we discovered was that about 2000 YBP a major change in the river and its environment occurred.

Our excavations revealed a series of old stream channels now buried beneath modern floodplain deposits. The oldest channel (based on radiocarbon dates of organic-rich sediments) had hugged one side of the valley and was a relatively narrow but deep meandering stream. The presence of this stream, now hidden from view, explained the location of many of the sites. Additional streams between the old and modern positions of the stream explained other site locations (See Figure 1). Unlike the old river, the modern river is sediment choked, wide, and shallow. As it shifted across the val-

ley the river had also deposited large quantities of sediment such that the modern channel is now up to 5 meters higher than the old channel.



Figure 1. The line marked C.1 is the trace of the old channel. The wide, shaded band is the modern channel of Rio Verde.

We could now explain the location of the archaeological sites – at the time of their occupation they were in fact located adjacent to rivers, but the river had shifted. As is often the case in science, finding the answer to one question led to new questions. Something had caused the river's sediment supply to change so radically that the very form of the river had changed and shifted. But, why had this change occurred?

There were no explanations that we could identify in the immediate area. Research led us to the upper portion of the drainage basin. As we work our way upstream from the site, sixty kilometers from the coast the Rio Verde enters a narrow, deep canyon cut into the 4000 meter high Sierra Madre del Sur. Once through this coastal mountain chain the river flows in wide valleys lying at about 2000 meters in elevation and surrounded by additional mountains. Monte Alban, the center of Zapotec civilization, is located where several rivers join to form the main stream (imagine the Stockton 'tree' logo). Sediments exposed in stream cutbanks (as much as 40 meters tall) revealed a sequence of buried dark organic-rich soils separated by light colored stream deposits. The buried soils represent times of landscape stability while the sediments between them represent periods of high erosion with deposition occurring faster than soils could form.

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(Geoarchaeology... continues from page 6)

Conventional wisdom states that the high rate of erosion seen in the Mexican highlands was the result of overgrazing brought on by Spanish conquest, settlement, and introduction of grazing animals. We were doubtful that this was correct. Over the course of several field seasons I, and various Stockton students, walked many, many kilometers of stream channels tracing the exposures of buried soils. We mapped these soils and collected samples for physical and chemical analysis. Organic matter in soils can be radiocarbon dated. While not giving as precise an age as wood or bone (for soils the age is called mean residence time) it still gives a measure of when the soil was buried (See Figure 2). We presently have 47 radiocarbon dates for these buried soils. As suspected the majority of the erosion and deposition happened well before the Spanish arrived.



Figure 2. Buried Soils with Radiocarbon Dates

A little over 2000 YBP the Oaxacan Highlands went through a period of population growth, urbanization, and agricultural intensification. Increased need for wood and additional farmland led to deforestation of the mountainous hillsides. Lacking the vegetation to hold the soil in place the torrential precipitation of the rainy season resulted in massive erosion. Terraces built to halt this erosion are still evident on the hillsides. Some of this eroded soil was deposited in the highland valleys, burying soils of the valley floor. However, much of the sediment was transported out of the valleys. The Rio Verde has a very steep gradient, dropping over 3000 meters in less than 250 kilometers and is capable of transporting large quantities of sediment. Once out of the highland valleys sediment had no place to be deposited as the river cut through the Sierra Madre in a narrow canyon. Only when the river reached the flat valley near the coast did the stream slow leading to sediment deposition, which choked the stream channel causing it to shift and change form.

Dates of the stream shift in the lower valley match dates of major erosion in the highland valleys. We concluded that environmental damage in the highlands had produced severe soil erosion, a major portion of which was deposited in the

lower valley, altering the environment in that area and causing a shift in population centers as the river migrated across the valley floor.

In an interesting twist it appears that human-induced soil erosion and environmental degradation in the highlands led to increased productivity, population growth, and at least indirectly social change in the Lower Rio Verde valley. The increased sedimentation in the lower valley increased the agriculturally productive size of the floodplain allowing for population growth.

Additional research completed this past year, in collaboration with Dr. Michelle Goman of Cornell University, shows that the sediment being moved by the river led to other environmental changes and increased resource productivity. The southern Pacific coast of Mexico is exposed to large swells rolling across the long reach of the Pacific Ocean. Nearby Puerto Escondido is a world-renowned surfing resort. Given the exposed nature of the shore there was little use of marine food resources by the old inhabitants of the region.

Faunal and particle-size analysis of deep cores taken from nearby coastal lagoons showed that sediment transported to the ocean was picked up by the longshore current and closed off a wave swept bay. In the protected waters of this bay barrier lagoons, mangrove swamps, marshes, and salt flats formed. This led to additional and increased food supply from resources such as quiet water fishing, shellfish, shrimp, and waterfowl. Evidence for utilization of these food sources does not appear in the archaeological excavations until about 2000 YBP.

Thus, we attribute the paucity of early sites to limited food resources. An increased sediment supply caused the river to change its form and location, resulting in the relocation of the settlements. Increased sediment supply also led to an increase in food supply as the local environment was modified to allow for more agricultural land and modified to include a wider range of food sources.

I find Geoarchaeology and paleoenvironmental reconstruction to be an interesting and exciting way to conduct interdisciplinary research and to show the wide -ranging effects of environmental change.

I'd like to thank the following Stockton Alumni for help in fieldwork and laboratory analysis: Nancy Kocher, JaneAnn Armbruster, Billianna Metiva, Linda Panetta, Anna Bern, Donna Murphy, Chris Noeveler, and Amy Lassen.

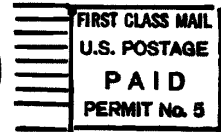
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Let us know your thoughts about this newsletter and any information you'd like us to include in our next issue. Send correspondence to the attention of Dr. Maria Moyer, Science Laboratories, Stockton College, PO Box 195, Pomona, NJ 08240

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Greetings from the Alumni Office!

This is an exciting time to be a Stockton College graduate. The college is currently nationally ranked in the top five public liberal arts colleges by *U.S. News & World Report*, and we continue to grow and expand to meet the needs of our college community.

One example of this growth is the introduction of the **President's Newsletter** and the **Alumni Office Newsletter**. Both are excellent resources for current events taking place on and off campus.

Visit our website at www.stockton.edu/alumni or email us at alumni@stockton.edu to sign up for our online newsletters. The Office of Alumni Relations will continue to publish a print version of our newsletter once a year. To receive more frequent and detailed information regarding events and news on campus, please subscribe now. We look forward to hearing from you soon.

Annual Fund Contributions

Please remember to contribute generously to this fund when you receive the Annual Giving Program solicitation letter sent by the College Foundation. Your Annual Fund contribution will support continuing needs such as student scholarships, academic excellence, technology and facility improvements.

NATURAL SCIENCES AND MATHEMATICS

Dean: Dennis Weiss

Director Academic Laboratories and Field Facilities: Maria Moyer

Assistant to the Dean: Cheryl Vaughn-Jones

Coordinators 2004-2005

Biology: Ralph Werner

Chemistry: Louise Sowers

Biochemistry/Molecular Biology: Kelly Keenan

Environmental Studies/Geology: Michael Geller

Marine Science: Mathew Landau

Mathematics: Renganathan Iyer

Physics: Lynn Stiles

Engineering Science: Monir Sharobeam

Pre Medical and Pre Health: Ralph Werner

More on NAMS in our website: www.stockton.edu/academics/undergraduate/natural_and_math_science