

DEPARTMENT OF

GEOLOGY

Alumni Newsletter | Fall 2011

In Memory of Dr. O.T. Hayward



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DEPARTMENT OF GEOLOGY



August, 2011

Dear Alumni and Friends of Baylor Geology:

The passing of our legendary Professor O.T. Hayward last year, although not entirely unexpected, was nevertheless a very sad event for the Geology Department and we struggle to find words that adequately convey our sorry to his family, as well as to his former faculty colleagues and students. It is our hope that through this special issue of the Baylor Geology Newsletter, and through the planned activities for pre-Homecoming on Thursday, November 3rd, we can honor his memory and celebrate his many contributions to the Department and University! We hope that you will choose to attend one or more of the scheduled special events.

Baylor Geology continues to grow in size, and with the addition of Dr. Bill Hockaday we are now 16 faculty members. Very unexpectedly, Dr. Don Parker announced his retirement from Baylor University in May of 2011 after 33 years of faithful service, and he has been appointed Emeritus Professor of Geology. We will miss his outstanding teaching and research contributions in mineralogy, petrology, volcanology, and field camp; we will be searching for his replacement this fall. An additional faculty hire approved for next year is in applied geophysics. Dan Peppe's new "Thomas T. Goforth Paleomagnetism Laboratory" was finally completed, the magnetometer installed, and a formal dedication is planned for Friday, November 4th.

Our undergraduate program continues to show cyclical fluctuations in the numbers of majors, the majority of which are in the B.S. Geology track. This year (including summer of 2011) we graduated an exceptionally large cohort of over 20 majors, which leaves us with a much smaller number of majors that we need to grow. It is our hope that with the input of Dr. R. Heather Macdonald this October during her visit to the Baylor campus, as a Robert Foster Cherry Teaching Award finalist from the College of William and Mary and nationally known for her "On the Cutting Edge" program for enhancing Geoscience undergraduate education, we will find new ways to grow and improve our undergraduate programs. The graduate program has grown to close to 30 students in residence, about equally divided between Ph.D. and M.S. students. Our graduate students continue to be employed primarily in the energy industry, as well as in environmental and engineering geology, and hydrogeology. The Baylor Geological Society (BGS) and the Baylor Geology American Association of Petroleum Geologists (AAPG) Student Chapter continue to be very active in the life of the Department.

The Baylor Geology Advisory Board, chaired by Jim Bain, with Josh Talbert as Vice Chair, and Ed Jakubowski as Secretary, have been very active in seeking ways in which Board members can work with the Department and the Baylor Development Office to identify specific needs and to initiate and conduct special fund-raising projects. In the accompanying letter Board Chair Bain highlights their current activities.

Letter from Dr. Driese, continued...

Finally, I will conclude by saying that it has been both a rewarding and (at times) a tiring experience serving as Department Chair the past 7 years. During the fall semester of 2010 I was granted a research sabbatical by Baylor University and used the time to catch up on working on funded research and to lead an SEPM-NSF research conference and workshop on paleosols at Petrified Forest National Park in Arizona in September. While I was hiding out during the fall Dr. Stacy Atchley served very ably as acting Chair, for which I am very grateful.

Please be sure to attend our Baylor Geology Homecoming Event on Friday, November 4, 2011 (and described in more detail in this newsletter) – we hope to see you all there!

Best wishes,



Dr. Steven G. Driese
Chairman



Although Dr. O.T. Hayward left us last year, his legend and significant contribution to Baylor Geology lives on. He was well known for humorous sketches he would draw on guidebooks. The cartoons on the cover and presented throughout this newsletter offer a small tribute for his years of dedication at Baylor.

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FROM THE PROFESSORS

Dr. Peter Allen 



Hello to all. It has been a very exciting year. Teaching continues in a similar pattern as I continue to teach 1405 and am continually amazed at the continuing progress of the science and the constant need to update every topic.... keeps it fun for me and I hope the students.

Hydrology continues to

direct my research and teaching at the undergraduate and graduate levels. This spring we visited many locations of continuing interest that many of you traversed in your youth with such illustrious names as "Ash Creek", Brookheen Creek or the mudholes and on the more beautiful Childress, Middle Bosque, Hog Creek and the Brazos... We continue to hold the weekly field trips and memos and work assignments in and out of sun and rain and snow.

On the research end, I have continued working in two general areas over the years and this year was typical, eg. landscape process modeling with the SWAT model and channel erosion. We visited Colorado State University and met with Dr. Aribi on discussion of using the SWAT model on a Google Earth Platform. Then, on to Las Vegas to a session in which I participated on the Submerged Jet Test (stream channel erosion testing device) at the Federal Interagency Hydrology and Sedimentation Conference coordinated by Dr. Greg Hanson. The conference proceedings paper, talk, and abstract were co-authored with Stephanie (Capello) Coffman and Dave Coffman who of course did most of the work. Here I also attended a short course on Stream Restoration Design taught by the NRCS and Dave Rosgen among others. This summer has been spent visiting the Agricultural Research Service Laboratory and Field Station in Tifton, Georgia to visit Dr. David Bosch on riparian zone models and the nearby Okefenokee Swamp which

by the way was burning (157,000 acres of land and a few poached gators). Then onto Portugal and Spain with Peggy and Maggie to the International SWAT (Soil Water Assessment Tool) conference in Toledo, Spain. Here we gave two presentations and papers; one on modeling stream erosion with Balaji Narasimhan of the Indian Technological University as well as Dave and Stephanie Coffman, and another talk and paper on new ways to model sediment transport on hillslopes with Nadia Bonuma of the Federal University of Santa Maria, Brazil, Jeff Arnold of the ARS/USDA and others.

In July, as of this writing, John Dunbar, Joseph White (Biology) and I plan to go to Glacier National Park and be among the first to core these specific glacial lakes (in the park) and survey them with sub-bottom acoustics. Assuming we make it through this venture, we are then off to aid in a study funded by the government to look at water budget issues on Maui. John Dunbar and I are going to assess the problems with irrigation channel and reservoir leakage on groundwater recharge. Maui as many of the islands have experienced a 15% decrease in rainfall over the past 20 years. The project also seeks to model the island water and to assess the potential for biofuel production. Finally, interspersed with these travels, I am working with Gary Stinchcomb, (Ph.D. candidate) on some urban stream restoration studies in Grand Prairie, Texas and with John on a project assessing the stability of the Trinity River for a major pump project which will provide water for a large artificial wetland.

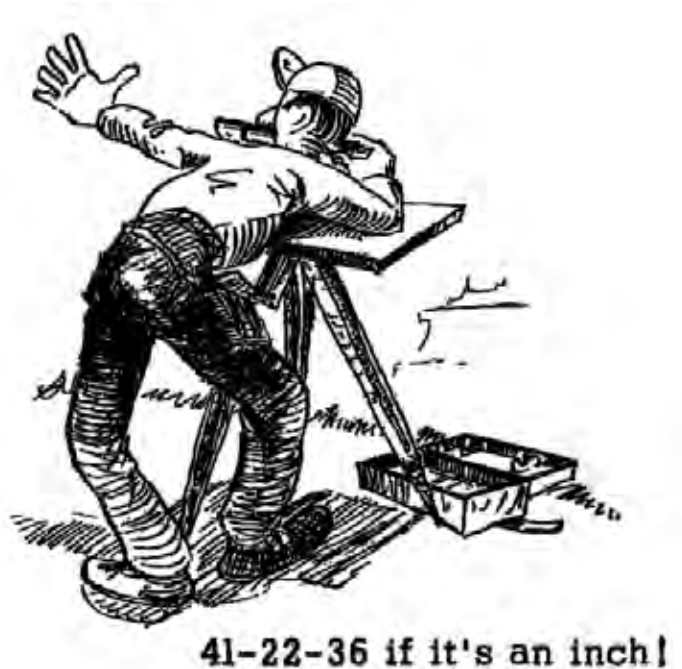
Joseph Sang (Ph.D. candidate) continues to prepare field and laboratory equipment for assessing channel erosion parameters. With the newly acquired Acoustic Doppler Velocity Meter (ACP) Joseph will be able to assess three dimensional flow velocities and turbulence which effect erosion which will form the basis for his research in this area. Based on these tests, John Dunbar is working on numerical models to assess this phenomena. Joseph is also conjointly working on a paper modeling the drought of the 1950's based on John's recent paper in Water Resources Research.

FROM THE PROFESSORS

Dr. Peter Allen (cont.)

We had the 3rd O.T. Hayward Lecture given by Dr. Rod Wittler of the U.S. Bureau of Reclamation. This lectureship, funded by Connie Hudson and Family has brought in some of the top professionals in the field to the University as well as the department. (See Rod Wittler).

So, I hope I make it through this summer to be able to tell you in the next Newsletter how we did on "Peter and John's most perfect adventures". On the home front, Peggy and the girls are all going great with Sarah and family in Dallas, Maggie in San Francisco, and Annabel in Denver...so my best to all and thanks for keeping in touch, the visits and emails are most enjoyed!



FROM THE PROFESSORS

Dr. Stacy Atchley



As I reflect on the happenings of the past year, perhaps the most significant is the passing of Dr. O.T. Hayward. Dr. Hayward was (and will remain) an icon within our department. His legend preceded him when I became

an undergraduate geology major at Baylor in the Fall of 1980. The stories passed down from earlier generations of O.T. students caused me (with great trepidation) to count down the semesters, months, and days until I would be enrolled in HIS stratigraphy class. Once enrolled, the class delivered as anticipated, a seemingly over-reaching workload, a demand for untapped creativity and originality, perfection in written and oral communication, and close bonding between classmates and instructor through shared

adversity... both in the field and classroom. I can say that I gave that class everything I had, and O.T., in return, gave me everything he had. O.T. was a throw-back leader and instructor. He caused us to see (and appreciate) the much bigger geological questions as he perceived to have been viewed by some of the early giants of U.S. geological exploration... e.g., Hayden, Powell, Wheeler, and Gilbert, to name a few. As I reflect, I can suggest that O.T.'s point was not to turn students into excellent stratigraphers, but rather excellent geologists. To instill in students a deep respect and passion for the science, and an ability (and desire) to achieve beyond our perceived capabilities. O.T. did this masterfully. My own students in this same undergraduate stratigraphy class unknowingly benefit from many of the lessons learned from O.T. Thank you O.T. You made (and continue to make) a profound difference.

In regards to personal and professional happenings of the past year, the following are a few noteworthy items. During the Fall 2010 semester I served as Acting Chair while Steve Driese was on sabbatical. To my great satisfaction, the department didn't collapse. We consider this a major victory. The most important lesson learned is a GREAT appreciation for all that Steve Driese has and continues to endure. Steve's job is not easy. Also during the Fall semester

FROM THE PROFESSORS

Dr. Stacy Atchley (cont.)

I participated in a “paleosols” field conference at Petrified Forest National Park (PEFO) that was run by our department and sponsored by the National Science Foundation. The conference was a huge hit to all the participants! Thanks primarily to the hard work of Steve Driese. From our research in the Triassic Chinle Formation at PEFO, Lee Nordt, Steve Dworkin and myself will be submitting our first major papers for publication sometime during the 2011-2012 academic year. We have a great story to tell!



Curtis Barclay and Kelly Jones describing core at the Core Research Centre, Charlie Lake, British Columbia.



Aislyn Trendell looking at Cretaceous marine outcrops along the banks of the Peace River, northern British Columbia.

In addition to our work, Aislyn Trendell (Ph.D. student from Kingston, Ontario) recently submitted her first dissertation paper from related work in the Triassic at PEFO to the AAPG Bulletin. Aislyn's paper has been accepted and should be published about the same time this newsletter is distributed. Congrats to Aislyn! I continue to lead the Applied Petroleum Studies program at Baylor and have sponsorship through Husky Energy (Calgary) for 2010-2011. Husky is sponsoring a regional exploration study involving the Devonian of northern British Columbia. I traveled with four students (Jason Mintz from Philadelphia, Aislyn Trendell from Ontario, Curtis Barclay from Michigan, and Kelly Jones from Alabama) to Fort St. John, British Columbia where we spent two intense weeks describing core. As I write, we're diligently working on finalizing our results in Waco. This has been a great project. Curtis and Kelly will turn aspects of the project into their M.S. thesis.

Jason Mintz describing core at the Core Research Centre, Charlie Lake, British Columbia.



Steve Driese and Aislyn Trendell “holding court” during Fall 2010 NSF PEFO field trip.



The big news on the personal front is the graduation of my oldest daughter Dallas from high school in May of 2011. In celebration of her graduation, Dallas and I are traveling to Tanzania in July of 2011 where we will attempt to climb Mount Kilimanjaro. I should have some interesting stories from this adventure at homecoming. My youngest daughter Audra will be in 8th grade next year at Vanguard College Preparatory School in Waco. She is a good student and enjoys volleyball. Janelle and I celebrate our 25th anniversary this year, and plan on having a 4 day mini-trip sometime next September or October... Location TBD. Janelle continues to work part time within the Department of Geology as a grants accountant.

It seems like the years pass faster and faster and it takes longer to do things than in the past (must be all the paperwork and documentation). The spring count of undergraduate Geology, Geophysics, Geography and Earth Science majors was about 64 but as many as 30-35 of those should graduate in the next several months, so we are looking at a decrease in undergraduates for the first time in several years. Major courses in paleontology and rocks and rock forming minerals have about 10 students each this fall compared to 20 last year. On the other hand, field camp had 18 students going out with Steve Dworkin this summer. Our freshman courses seem to be as large as they have ever been so we may be able to recruit some majors from those classes.

We saw a few of our former students at the GSA meeting Denver last fall (Paulette got to go for the second time and help with the booth). Unfortunately, I do not plan to go the Minneapolis this year because it is in early October when students need to be advised for Spring classes and deficiency reports are due. Adam Damman finished his M.S. thesis this spring on the comparison of the layered Edwards Bioherms with the Bermuda patch reefs and will be graduating in August. A new Ph. D. student, Ryan Morgan, came from Michigan State in January and is working on Dr. Beaver's blastoid collections.



Grizzly Bear from Haines Alaska in the Kroschel Wildlife Center.

I think a new record low water on the Paluxy River has occurred this June. The freshman field trips this summer could actually walk across the river without getting wet at the old River Crossing site and tracks that are usually underwater are well exposed.

Who knows what the rest of the year will bring!

My knee is still bothering me and that limits my fieldwork somewhat, but I did spend 2 weeks in Alaska with my brother and sister-in-law last August and had a great time.

I lost my main agility dog, Lucy, last October and Tess is almost retired, so last year's puppy gets to play when I do agility. He does have his first title and thinks he knows more about agility than I do!



With my brother and his wife at Mendenhall Glacier near Juneau, Alaska



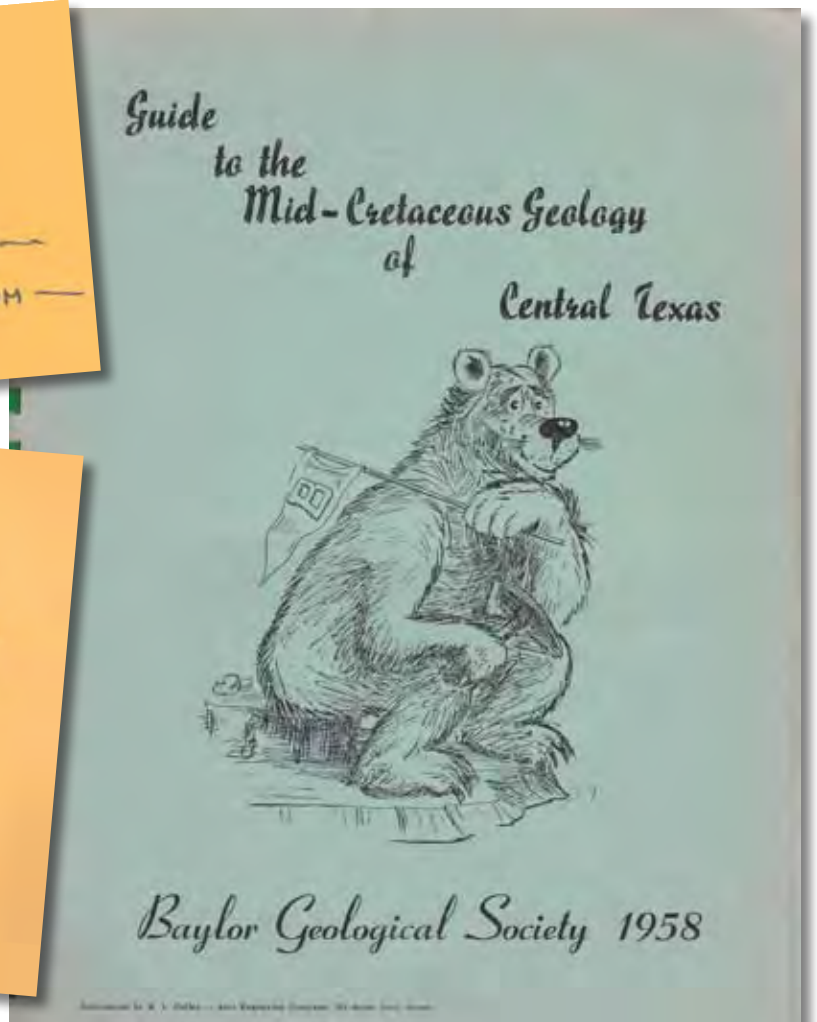
FROM THE PROFESSORS

Dr. Rena Bonem (cont.)

As always, I look forward to seeing those who have not been around Baylor lately and hope that all of you will be able to come and visit us soon.



Spotting Humpback whales outside Juneau, Alaska. They are blowing a bubble net to catch fish.





FROM THE PROFESSORS

Sharon Browning

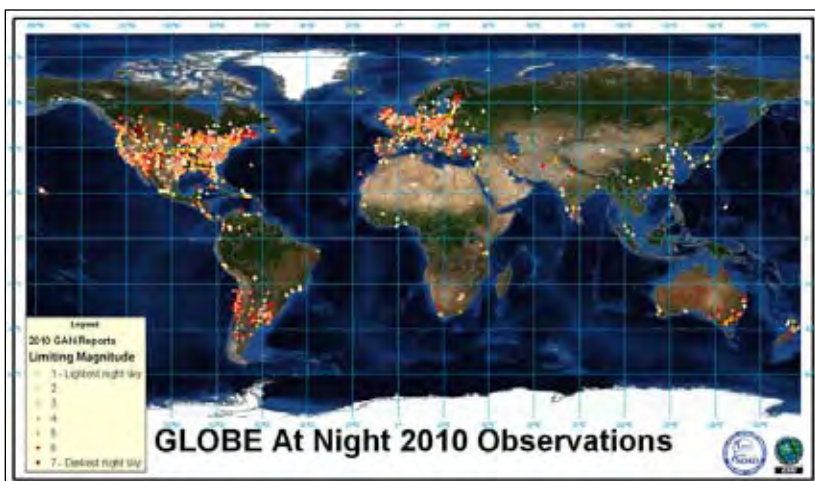


It seems amazing to me that this June is the end of my 4th year at Baylor; the time has passed so quickly. I continue to enjoy trying to bring our freshmen students the best experience they can have with us here. One thing we have done is to introduce our students to being citizen scientists, participating in astronomy observations that measure the darkness of the local sky through the Great Worldwide Star Count Program in the fall semester, and the Globe at Night Program in the spring semester. The students' observations are used to generate a global map of light pollution. This also gives us a



chance to bring out the 8 inch reflecting telescope here in our department, and showcase many celestial objects to our students. This past spring, we were fortunate to observe sunspots for the first time in 2 years, a new experience for most of our students.

My plan for this year is to continue to reach out to non-science majors, as well as middle and high school students through programs like Earth Science Week and the two mentioned above, in order to attract others to the wonders of Geology and Earth science. We have had success in the past with these efforts, and will continue our efforts into the future.



FROM THE PROFESSORS

Dr. Vince Cronin



My wife Cindy (Cindy Ellis, Baylor M.S. Geology in 1990) is still putting up with our family menagerie and me. We spend most of our time supporting our descendants and improving/maintaining our not-so-vast estate.

Our daughter Kelly is a sophomore at the University of Notre Dame, majoring in economics and political science. It would be difficult to describe or overstate how much she loves Notre Dame. Kelly was selected to be one of the managers for the Notre Dame football team, so she will be working on the sidelines for most if not all ND home games. And she now knows all of the secrets about how ND helmets get their gold color, because that is part of her job. She interned with the local US Congressman, Bill Flores, in the summer of 2011.

Our son Connor is a sophomore at Reicher Catholic High School. As a freshman, he was the starting goalie on his high school's varsity soccer team, which won more games last year than in the previous five. Connor is still growing, and is now over 6'

1" tall with size 14 feet, so you can't knock him over or kick a ball over his head into the goal. He also competed on the varsity tennis team, where his serve is pretty impressive. He chose not to play baseball this spring for the first time in 10 years, even though he was a key player on his Texas Teenage Baseball team that placed 3rd in the state of Texas last summer. Stories vary about why he chose tennis over baseball, but a leading theory is based on the fact that a group of attractive young women compose more than half of the tennis team. As I write this in mid-June, Connor and I are getting ready for a week-long trip to Sea Base on Big Munson Island in the Florida Keys, with the Boy Scouts.

We have started our search for a college/university for Connor. We visited 29 schools with Kelly, and spent the week of this past spring break touring 6 schools in Oregon and Washington with Connor. His initial criteria include proximity to mountains and water (skiing, hiking, climbing, kayaking, etc.), in western states that are not fiendishly hot. We have told him that we are trying to find the right college -- not selecting a vacation resort. He seems to be subcontracting the academic part of the college search to his parents for now.

Dan Lancaster and Stephen Secrest successfully defended their respective M.S. theses in the

spring of 2011, and I am working with a draft of Ryan Lindsay's thesis as of June 2011. B.S. Geology student Brandon Swain also completed an internship with Abraxas Petroleum Corporation, with some editorial help from Dr. Bonem and me. Dan will be working for Pioneer Oil & Gas, and both Stephen and Ryan will be working with Samson Resources in Oklahoma. I have no new or continuing graduate students in the fall of 2011.

Dan Lancaster applied the seismo-lineament analysis method in an attempt to determine the faults responsible for the four largest earthquakes recorded in northern Arizona and southern Utah, in the Kanab-Fredonia area. These events occurred in the transition zone between the Colorado Plateau and the Basin and Range Province, in the Northern Arizona Seismic Belt. Although the uncertainties are substantial, he established a tentative spatial correlation between an M5.75 event in 1959 with either the West Kaibab or Big Springs faults, or a geomorphic lineament on the Kaibab Plateau that might have been developed along a previously-unmapped fault. An M4.4 event in 1962 spatially correlates with geomorphic lineaments that extend through Zion National Park, including at least one previously mapped fault in Zion that had not been recognized as an active fault. Dan established a strong spatial correlation between

an M4.0 event from 1991 and the West Kaibab fault, and a slightly weaker correlation with the adjacent Big Springs fault. The next step will be to work with the better data generated by the EarthScope Transportable Array to see if further correlations between earthquakes and faults can be established in this area.

Stephen Secrest mapped and described five of the most prominent normal faults exposed in the walls and floor of the Lehigh Portland Cement Quarry near Waco, which is a popular field-trip stop for students and petroleum geoscientists interested in the Austin Chalk. The Lehigh Quarry faults are within the Balcones Trend, but strike mostly oblique to the trend as they pass through the quarry. Stephen looked at the structural stratigraphy of the Austin Chalk along the faults in the quarry, and noted how the difference between the strong chalk layers and the weaker marl (argillaceous chalk) layers was reflected in the different macroscopic deformational features in the quarry. He analyzed the calcite-rich interior zones of several of the faults, and established a method for determining the sense of slip using the vein/chalk-lithon fabric that exists at a scale that is small enough to be sampled in well cores. Stephen also performed analyses of carbon and oxygen stable isotopes in 174 samples to constrain the

temperature of crystallization of the calcite precipitated in the fault (48°-110°C) and established that the water from which the calcite precipitated was formation water rather than meteoric water. A petrographic analysis of calcite twins in the fault rock also constrained deformation temperature to less than 170°C.

Ryan Lindsay has been using the seismo-lineament analysis method to correlate earthquakes with the faults that generated them in the North Tahoe area of east-central California and west-central Nevada. No earthquake in his study area had ever been correlated with the causative fault. He has analyzed focal mechanism solutions from more than two dozen earthquakes, and has spatially correlated one or more earthquake with faults that were known to have had Quaternary displacement, but not known to have had Holocene displacement. In several cases, more than one earthquake has been tentatively correlated with the same fault. One of the faults Ryan has correlated an earthquake with is the newly discovered (2009) Polaris fault near Truckee, California, which is now thought to be capable of producing an M7 earthquake based on its length. The Polaris fault zone extends under or beside the Martis Creek dam structure, and is mapped from the Mohawk Valley fault zone to the northern edge of Lake Tahoe as an apparent part of the

northern Walker Lane trend. Lauren Seidman (Baylor MS 2007) is now Lauren Robinson, having married her long-time squeeze in June 2010. She is doing well as a geologist with Hess in Houston, having spent several years working for EOG Resources, and can be reached at lerobinson@hess.com. Information about my other MS students/grads at Baylor is posted at http://bearspace.baylor.edu/Vince_Cronin/www/GradStudents.html

As for me, well, I'm still here. I plan to offer a new course next spring (2012) on the kinematics of lithospheric plates and the continental crust, based in part on the GPS data that are now so abundantly available via the Plate Boundary Observatory and other online datasets. Friends and former students can contact me at Vince_Cronin@baylor.edu or (254) 710-2174 to chat. I would like to hear what you are up to. My home page is http://bearspace.baylor.edu/Vince_Cronin/www/

Information for folks interested in pursuing an M.S. degree in structural geology with me at Baylor is available at http://bearspace.baylor.edu/Vince_Cronin/www/Structure/index.html including my basic admission requirements listed at http://bearspace.baylor.edu/Vince_Cronin/www/MS_StructureGradStandards.html



WELL- IT WAS
HARD TO FIND A
CARTOON TO FILL THIS
SPACE!

FROM THE PROFESSORS

Dr. Steve Driese



My third 3-year term as Chair began in 2010, and after 7 years I can say that I will be definitely “passing the baton” to a new Chair of the Geology Department within the next two years. After a very welcome respite from my Chair duties during the fall semester of 2010, courtesy of a research sabbatical provided by Baylor University, and the very able management of the GEO Department by Associate Chair Stacy Atchley and Office Manager Paulette Penney, I returned ready for new challenges. This sabbatical allowed me time to manage three different NSF research grants, write a paper on a 2.7 Ga paleoweathering surface in northern MN (now published in *Precambrian Research*), and lead an SEPM-NSF Paleosols Research Conference and Workshop in late September of 2010 at Petrified Forest National Park in Arizona, assisted by Baylor colleagues Stacy Atchley, Steve Dworkin, Dan Peppe and Lee Nordt. The Workshop was attended by 27 Ph.D. professionals, 15 graduate students, NSF Sedimentary Geology and Paleobiology Program Director Rich Lane, and 2 National Park Service staff.

The spring semester of 2011, in addition to the normal faculty evaluations and budget preparations, saw my unexpected assignment by Dean Nordt to draft a strategic plan for Baylor University representing the views of the Science Departments,

which was very challenging, but also very important in laying the groundwork for the next 10-year plan for Baylor University.

In the fall semester of 2010, I was on sabbatical and therefore did not teach, and I thank Jay Pulliam for stepping in and teaching the graduate 5V90 course “Seminar on Grant Proposal-Writing”. In the spring semester of 2011, I taught the GEO 43C1 Senior Capstone Colloquium course, which had 9 students, and each prepared a poster display for the annual Undergraduate Research Scholars Day (URSA) event held in the Ken and Celia Carlile Atrium of the Baylor Sciences Building. Though normally a fall semester course, I also taught 3 students (+ 2 audits) in GEO 5340 Paleopedology in the spring.



Dr. Lee Nordt (handling tape) and Baylor Ph.D. students Holly Meier and Steve Ahr (ball cap), along with Texas A & M pedologist Tom Hallmark (Aggie shirt) examining pre-Clovis deposits in geoarchaeological trench excavated in late Pleistocene to Holocene deposits along Buttermilk Creek in Salado, TX during the summer of 2007. See publication by Waters et al. (2011) in Science, v. 331, p. 1599-1603.



I am currently supervising three Ph.D. students and one B.S. Senior Thesis student in residence at Baylor University. Ph.D. student Jason Mintz, after publishing his second paper on pedogenic carbonate formation in Vertisols at Dance Bayou, Brazoria County, TX, in the *Journal of Sedimentary Research*, defended his dissertation on Middle Devonian forested paleosols in upstate New York, and this fall is headed for employment with Anadarko in Houston. This summer I will be visiting Ph.D. student Lauren Michel's research site at Rusinga Island in Kenya, where she is examining paleosols in Miocene strata; Lauren is co-advised by Dan Peppe. Ph.D. student Gary Stinchcomb's dissertation research in the upper Delaware Water Gap region in PA and NJ, integrating paleosol, geomorphic, and

geoarchaeological approaches to reconstruct latest Pleistocene to Holocene climate change and land use in this region, is nearing completion; Gary is co-advised by Lee Nordt. Gary had his first paper published in *Geology* in which he proposed that agricultural practices of Native Americans actually impacted sedimentation rates before the arrival of European settlers. Tyler Landers completed his B.S. Geology Senior Thesis investigations on floodplain deposits at Williams Creek near Axtell, TX, seeking evidence for changes in sedimentation associated with latest Holocene climate changes (Medieval Warm Period and Little Ice Age); Tyler's research was co-directed by Gary Stinchcomb.

Three new graduate students are joining my Paleoclimatology research group this fall. Emily Beverly is a new Ph.D. student who is completing her M.S. Thesis research under the direction of Gail Ashley at Rutgers University on early Pleistocene paleosols in Olduvai Gorge, Tanzania; I currently serve as an adjunct member of her M.S. committee. Amos Culbertson is a new M.S. student from Fort Lewis

College in Durango, CO. And Lyndsay DiPietro, a B.S. graduate of Baylor University with a double major in Geology and Anthropology, will probably be co-advised by me and Dan Peppe.

My own research continues to focus on interdisciplinary paleoclimate and paleolandscape reconstructions using fossil soils, or paleosols, as well as conducting studies of modern soil systems (especially Vertisols) to develop climate proxies and analogs of ancient soils. In 2010, I published 4 refereed journal articles and have 9 peer-reviewed journal articles published, accepted or in press for 2011. In 2010-2011, I gave 5 first-authored professional presentations and was co-author on an additional 12 presentations. A project that involves measurements of soil CO₂ in Vertisols in Texas to calibrate the soil carbonate paleobarometer for estimating paleoatmospheric pCO₂ is yielding unexpected results showing very high soil CO₂ associated with times of water surplus and release of CO₂ during times of soil cracking; this research is collaborative with Lee Nordt and University of Texas-Austin colleague Dan Breecker. My work on a collaborative

project with Lee Nordt, Texas A&M University colleague Mike Waters, and University of Illinois-Chicago colleague Steve Forman on an archaeological site near Salado, TX culminated with our publication in 2011 in *Science* that attracted considerable scientific and media attention because it provided evidence for the earliest humans in the Americas over 15,500 years ago. I am co-editing an SEPM Special Publications Volume on "New Frontiers in Paleopedology and Terrestrial Paleoclimatology, which is an outgrowth of the SEPM-NSF Workshop held in September, 2010 at Petrified Forest National Park. And I continue to serve my profession by reviewing submitted manuscripts for many of the sedimentary geology and soils journals, for grant agencies, and am still an Associate Editor for the journal *PALAIOS*.

My wife Marylaine and I enjoyed a fabulous 2-week vacation last summer to Italy, taking in the sites and foods of Rome, Sorrento and Florence, with a side-trip to the ruins at Pompeii. Marylaine continues her part-time job as archivist for McLennan Community College, and finished her term editor/publisher of the



SEPM-NSF Workshop group photo taken at Visitor's Center at Petrified Forest National Park in Holbrook, AZ, which was the site of a Baylor-led Paleosols Research Conference and Workshop in September of 2010.

Dr. Steve Driese (cont.)

Quarterly Bulletin of the Central Texas Genealogical Society. Mary Catherine had an exciting first year as a freshman at UT-Austin, majoring in Latin American studies and playing on the women's water polo club at UT; after a year in the dorms she is ready to move to an apartment just off campus. Our oldest son Nathan completed his Ph.D. dissertation on Hume for the Philosophy Department at the University of Kansas, and plans to pursue an academic career.

Our other son Trevor still lives in Knoxville and works for a mortgage company; he became a new home-owner for the first time, acquiring a lovely "fixer-upper" in old North Knoxville! Marylaine and I continue make frequent trips back to the southeast (Tennessee and Georgia) to visit family and friends. This summer we plan a family vacation to Yellowstone National Park; I was last there while enrolled in summer field camp in 1976, and I look forward to revisiting many of the famous sites!

Peer-Reviewed Journal Publications:

Driese, S.G., Jirsa, M.A., Ren, M., Brantley, S.L., Sheldon, N.D., Parker, D., and Schmitz, M., 2011, Neoproterozoic paleoweathering of tonalite and metabasalt: implications for reconstructions of 2.69 Ga early terrestrial ecosystems and paleoatmospheric chemistry: Precambrian Research; doi:10.1016/j.precamres.2011.04.003.

Driese, S.G., Ludvigson, G.A., Roberts, J.A., Fowle, D.A., González, L.A., Smith, J.J., Vulava, V.M., and McKay, L.D., 2010, Micromorphology and stable-isotope geochemistry of historical pedogenic siderite formed in PAH-contaminated alluvial clay soils, Tennessee, USA: Journal of Sedimentary Research, v. 80, p. 943-954.

Driese, S.G., Schultz, B.S., and McKay, L.D., 2011, Genesis of clay-rich soils from carbonate bedrock on upland surfaces in the Valley and Ridge Province, eastern Tennessee, USA: Southeastern Geology, v. 48, p. 1-22.

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- Mintz, J.S., Driese, S.G., Ludvigson, G.A., and Breecker, D.O., 2011, Seasonal influence of changing hydrology on pedogenic calcite precipitation in Vertisols, Dance Bayou, Brazoria County, TX: Implications for estimating paleoatmospheric pCO_2 : *Journal of Sedimentary Research*; doi: 10.2110/jsr.2011.36.
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- Southard, R.J., Driese, S.G., and Nordt, L.C., in press, Vertisols: Chapter E5.7, in *Handbook of Soil Science*, P. Huang (ed.), CRC Press, Boca Raton, Florida.
- Stinchcomb, G.E., Messner, T.C., Driese, S.G., Nordt, L.C., and Stewart, R.M., 2011, Pre-colonial (A.D. 1,100-1,600) sedimentation related to prehistoric maize agriculture and climate change in eastern North America: *Geology*, v. 39, p. 363-366.

Waters, M.R., Forman, S.L., Jennings, T.A., Nordt, L.C., Driese, S.G., Feinberg, J.M., Keene, J.L., Halligan, J., Lindquist, A., Pierson, J., Hallmark, C.T., Collins, M.B., and Wiederhold, J.E., 2011, The Debra L. Friedkin Site, Texas and the origins of Clovis: *Science*, v. 331, p. 1599-1603.

Presentations:

Driese, S.G., and Nordt, L.C., 2010, Abundance of paleo-Vertisols in the Phanerozoic rock record: Product of preservation, recognition, or paleoclimate?: SEPM-NSF Workshop on Paleosols and Soil Surface analog Systems, Petrified Forest National Park, Arizona, September 21-25, 2010.

Driese, S.G., 2010, "Soil CO₂ measurements in modern Vertisols and implications for estimations of paleoatmospheric CO₂ from pedogenic carbonates": talk presented at Department of Geography and Earth and Planetary sciences combined colloquium at University of Tennessee-Knoxville, October 15, 2010.

Driese, S.G., 2010, "Multi-proxy approaches to interpreting climate and time in the geologic record using soils": talk presented at the University of Texas at Austin, Department of Geosciences, November 8, 2010).

Driese, S.G., 2010, "New research opportunities in "deep-time" paleopedology": (talk presented at 48th Annual Soil Survey and Land Resource Workshop in College Station, TX, on February 3, 2011).

Driese, S.G., 2010, "New research opportunities in studies of "deep-time" using paleosols and proposed interface with NSF Critical Zone studies": (talk presented to NSF Earth Sciences Directorate in Arlington, VA, by Dr. Steven G. Driese and Dr. Gail M. Ashley on March 31, 2011.)

Driese, S.G., Jirsa, M.A., Ren, M., Schmitz, M.D., and Parker, D.F., 2010, Neoarchean paleoweathering of tonalite and metabasalt: implications for reconstructions of 2.69 Ga early soil ecosystems and paleoatmospheric chemistry: presented at GSA Annual Meeting in Denver, CO, October 2010 (GSA Abstracts with Programs Vol. 42, No. 5).

Beverly, E.J., Ashley, G.M., Driese, S.G., and Sikes, N.S., 2010, New insights into spatial variability of rift basin paleosols using sedimentology,

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Breecker, D.O., Michel, L.A., Mintz, J.S., Driese, S.G., and Nordt, L.C., 2010, Soil CO₂ measurements in modern Vertisols and implications for estimations of paleoatmospheric CO₂ from pedogenic carbonates: presented at GSA Annual Meeting in Denver, CO, October 2010 (GSA Abstracts with Programs Vol. 42, No. 5).

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Mintz, J.S., Driese, S.G., Harlow, R.H., and Wright, T.C., 2010, Strong seasonality during early forestation on tectonically influenced landscapes in the Middle Devonian, Appalachian Basin, New York: presented at GSA Annual Meeting in Denver, CO, October 2010 (GSA Abstracts with Programs Vol. 42, No. 5).

Dr. Steve Driese (cont.)

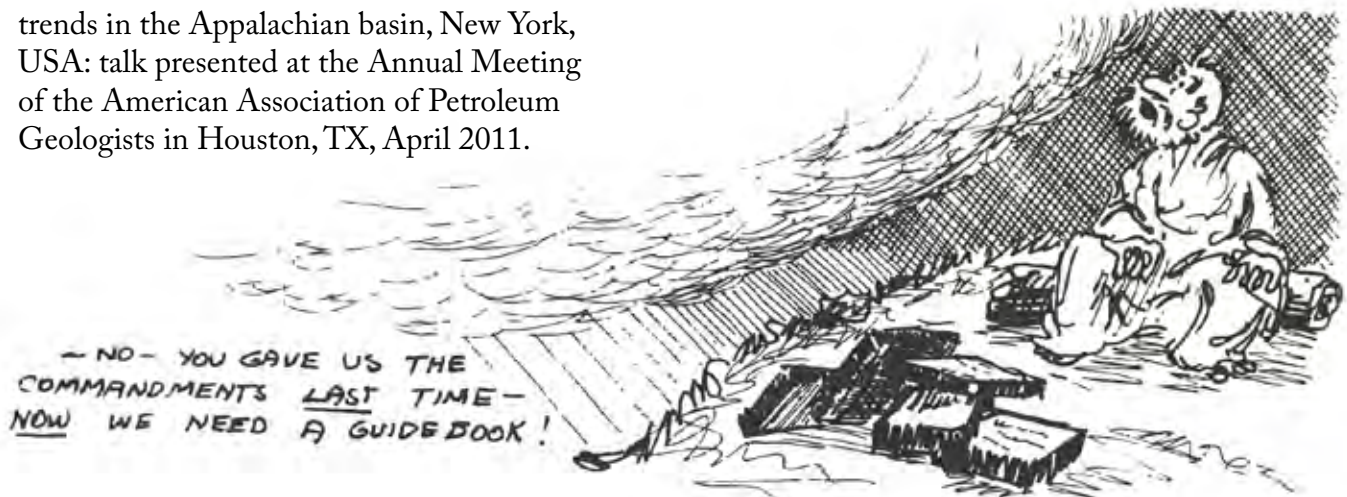
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Mintz, J.S., Driese, S.G., Harlow, R.H., Wright, T.C., and Atchley, S.C., 2011, Middle Devonian landscapes, climates and the correlation of continental strata in the northern Appalachian basin: talk presented at the Northeastern Section GSA Meeting in Pittsburg, PA, in March, 2011.

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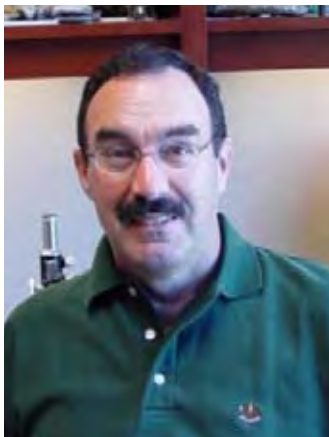
Nordt, L., and Driese, S., 2010, Pedosystem science approach to characterizing and interpreting the fossil record of soils: SEPM-NSF Workshop on Paleosols and Soil Surface Analog Systems, Petrified Forest National Park, Arizona, September 21-25, 2010.

Stinchcomb, G.E., Driese, S.G., and Nordt, L.C., 2010, Soil geomorphology and stratigraphy reveal mid- to late Holocene channel instability along the Delaware River, USA: presented at GSA Annual Meeting in Denver, CO, October 2010 (GSA Abstracts with Programs Vol. 42, No. 5).



FROM THE PROFESSORS

Dr. John Dunbar



2011 is the final year of John Dunbar's seafloor methane hydrate project. In this project John is using the electrical resistivity method to map the hydrate distribution beneath Woolsey Mound in Mississippi Canyon Block 118, Gulf of Mexico. Working with his industrial partners, John has modified a standard engineering-scale resistivity system for use on the deep seafloor. The system includes a resistivity instrument in a pressure housing, an electrically isolated signal pre-amplifier in a second pressure housing, and a 500 meter long electrode array. During surveys the instrument is attached to a deep-sea vehicle and towed a few meters above the seafloor, with the electrode array trailing behind. In a 2009 reconnaissance survey of the mound, John found 100 Ohm-m resistivity anomalies, indicative of hydrate deposits, along deep-seated normal faults beneath the mound.



This past summer John returned to Woolsey Mound to collect a high-resolution, 3D data set centered on the anomalous areas identified in 2009. This fall he is processing the data with the goal of producing a 3D resistivity volume model that shows the distribution of hydrate at the site.

In other work, this past summer John teamed with Peter Allen

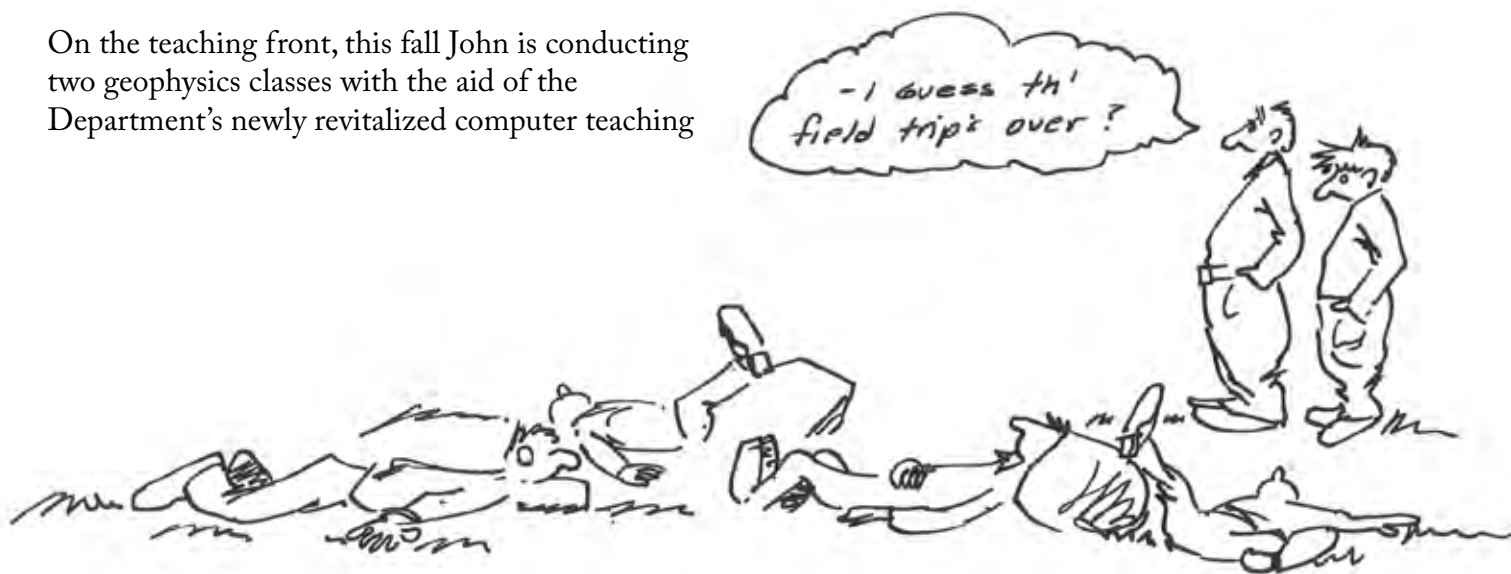
and Joseph White (Biology) to collect acoustic profiles and sediment cores in Lake McDonald and Lake Saint Mary, in Glacier National Park, MT. The goal is to assess trends in sedimentation in this alpine setting in response to possible climate change over the last few hundred years. John is also working with Peter Allen on a resistivity survey of an agricultural irrigation system on Maui. This will be an on-going project over the next three years. For some reason, an unprecedented number of graduate students, other faculty, and Department staff have volunteered to help with this project.

On the teaching front, this fall John is conducting two geophysics classes with the aid of the Department's newly revitalized computer teaching

lab. We have replaced the old single-processor, 32-bit computers and dual 17 inch CRT monitors with new six-processor, 64-bit computers with dual 24 inch flat screen monitors. The lab also has dual 46 inch monitors for the instructor's computer. We will no longer be crowding around the 17 inch monitors for demonstrations. This fall John will use the lab to teach his popular 3D seismic interpretation class using Kingdom Suite™ software and a new geodynamics modeling class using a combination of home-grown and open-source modeling software.

John's wife Anna continues to work as the Regional Director of the Texas Commission on Environmental Quality, in the Waco regional office. As with all Texas state agencies, the challenges in the past year and in the next biennium are the decreased budget, staff and resources. Unfortunately, Texas continues to feel the effects of the drought and challenges in securing water resources for Texas' growing population. As a result of the drought, water rights issues in the Brazos River Basin have gotten increased attention.

Their daughter Tamura graduated from Vanguard College Preparatory School in May 2011. Family came from West Virginia to help celebrate! In the summer, she is working with Dr. Donna Hamilton from Texas Tech at the Lake Waco Wetlands. She is assisting in catching dragon flies for a special study at the wetlands. In the fall, she will attend Trinity University in San Antonio where she plans to study Biology.





FROM THE PROFESSORS

Dr. Steve Dworkin



This was the year of knee replacements – not for me but for Sandy. She had the first knee replaced last July and the second over the Christmas break. The surgeries went really well and we are now back to walking the dogs over a mile a day. Sandy won't be attending field camp this year as it seems prudent to let the healing process continue a bit longer, but I am looking forward to her coming next year. Speaking of field camp, this summer will be one of the largest camps we have had in a long time. Nineteen students are signed up to attend and I am busy taking care of last minute logistics. Because of Don Parker's retirement, I will be teaching the entire field camp this summer although I will have a graduate student teaching assistant with me the whole time.



Sandy and Steve

Scott Douglas defended his master's thesis this past year; he did a wonderful job on the stratigraphy and petrography of the Norphlet Formation in the deep Gulf of Mexico. My other master's student, Garrett Felda is camping out in the field as I write. His research involves a stratigraphic and geochemical study of the upper part of the Chinle Formation in the Petrified Forest National Park. He had to get pack horses to get him out to his field area because his outcrops are seven miles away from the nearest road. I heard from him a few days ago (he has cell coverage and charges his phone with solar panels) as he was being pelted by a huge rain storm that chased him out of the field. I have four senior thesis students right now: Stephanie LeBlanc and Jennifer Lowery are characterizing the mineralogy of paleosols in the Chinle Formation using x-ray diffraction, Blake Taylor is doing a petrographic study of lacustrine limestones from the top of the Chinle, and Jake Gasaway is studying the abundance and character of organic matter in cores taken from local reservoirs.



Garrett Felda and Jennifer Lowery at PEFO

This year was busy and exciting. I attended and contributed to the Baylor run field trip out at Petrified Forest National Park in September. I returned to the Petrified Forest during Spring Break for field work and enjoyed the snow fall that lost us a day of field work. The mass spectrometer laboratory has been processing thousands of samples but the instrument is finicky and needs constant attention. Our lab manager, Dr. Ren Zang, has been doing a good job and we have been able to fix most of the breakdowns. My role as graduate program director keeps me very busy in the spring semester and we have will have eight new graduate students joining the department next year.





FROM THE PROFESSORS

Dr. Don Greene

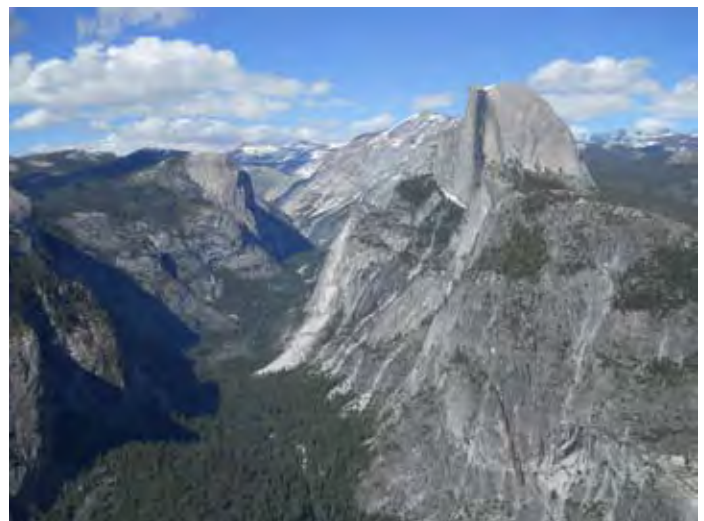


Don and Alison completed two trips to the west coast this year. The summer vacation included the classic family camping trip that included Sequoia and Yosemite National Parks. It is unnecessary to report to a geology audience the merits of a visit to Yosemite, so I have included a photo of half-dome instead.

Don and Alison took full advantage of another trip to the west coast when the Association of American Geographers held their annual convention in Seattle. While Don attended the meeting, Alison explored Seattle and ate fresh sea food at every opportunity. Don particularly enjoyed a field trip to Everett, Washington where he observed the airplane manufacturing process for Boeing's new 787 Dreamliner. Boeing has outsourced all airplane



Family trips to Sequoia (above) and Yosemite (below)



Dr. Don Greene (cont.)

parts worldwide, with fuselage sections, wings, and engines shipped to the factory for a 3-day final assembly. Surprisingly, the manufacturing bottleneck for the 787 includes seven coats of paint. For this reason, a new paint facility is under construction in the Dallas area to bring the 787 to completion. The Aviation Meteorology class enjoyed Don's presentation upon his return to class.

Their daughters, Adriel and Meredith are engaged in their professional careers. Adriel is the Education Coordinator for Baylor's Martin Museum of Art. Actively involved in bringing art education to the community, Adriel recently hosted the Baylor Staff Appreciation Day in honor of the service provided by the Baylor community.

Meredith is a research scientist at the Texas Transportation Institute; a member of the Texas A&M University system. Her research in "transit mobility" is a natural extension of her previous work with TxDot and Capital Metro. Although TTI is headquartered at Texas A&M, research personnel are distributed among seven urban offices. While living in Austin, Meredith is often engaged in virtual meetings across Texas, with occasional trips to Houston and Las Vegas.



An opportunity to see the assembly of Boeing's new 787 Dreamliner on a trip to Washington.



FROM THE PROFESSORS

Dr. William (Bill) Hockaday



My first year as a Baylor Geology professor began with a frenetic pace that has carried on into the summer. It has been a very exciting year with much news to share.

Teaching News: I have never learned so much in one year as I did this year while developing and teaching my first college courses. At the introductory level, I taught a second section of Dr. Bonem's successful 'World Oceans' course. Forty-four undergraduate students enrolled, and reviews of the course were good. My first graduate-level course in Organic Geochemistry involved 5 students. The geology seminar series that I organized also went very well. In spring 2011, I will develop a new course in biogeochemical cycles. The seminar series had a geochemistry emphasis, and we had 8 excellent speakers. All of the speakers were visiting Baylor for the first time, and research collaborations are developing between several of these speakers and Baylor faculty members.

Lab Construction News: The Paul Marchand organic geochemistry lab is nearing completion. The lab is outfitted with fume hoods for the safe handling of strong acids and organic solvents that are used for isolating and extracting organic molecules from geomedial. There is also a specialized acid cabinet for the digestion of large soil and sediment samples. The workhorse of the lab will be a nuclear magnetic resonance (NMR) spectrometer for studying the molecular structure of solid samples. A solid state NMR spectrometer is currently being commissioned by Bruker Biospin and should arrive on campus in October. This will be a very unique lab. Thanks in part to the generosity of Ken and Celia Carlile, the Baylor Geology NMR lab will be the only lab of its kind in the USA. We already have many requests from collaborators (at Texas A&M, Penn State, Oklahoma State, Michigan Tech, University of Hawaii, and the USDA forest service) who are anxiously waiting to visit our lab to conduct analyses with us.

New Lab Members: The most important part of the lab will be the new students arriving this fall. Justin VonBargen will be working on a Master's degree in Geology. Justin has a B.S. from The Ohio State University, and has extensive research experience and currently works at the Byrd Polar Research Center in Columbus. Zack Valdez will pursue an interdisciplinary Ph.D. with The Institute of Ecological, Earth, and Environmental Sciences (TIEEES). Zack has B.S. degrees in physics and engineering from St. Mary's University in

San Antonio. Zack will study alternative energy. His first 2 years of research will evaluate carbon cycling in switchgrass bioenergy cropping systems.

Research News: I was very fortunate to have one of my first research proposals as a Baylor professor funded by the USDA. This grant will support Zack Valdez's research on the effects of agricultural management practices on the biochemistry of biofuel crops and soil carbon storage. I travelled to the Agriculture Experiment station at the University of Tennessee in April to begin collecting soil cores for this study.

An exciting opportunity arose this spring as I was contacted by the City of Austin to help them meet the very aggressive goal of achieving carbon neutrality in the operation of the city's public works by the year 2020. I was invited to lead a workshop at the Horsby Bend wastewater treatment plant, and conducted an on-site demonstration on carbon sequestration. This is a groundbreaking initiative and I hope that it will evolve into opportunities for student-led research on the grand challenges facing society (water, energy, and climate).

Collaborations with Dr. Lau's lab have resulted in the submission of 3 research proposals to study the chemical and physical mechanisms of interaction between nano-sized minerals and aquatic organic matter. I am looking forward to our continued collaboration.

Personal notes: After a year, Waco has begun to feel like

home for Mary and I. We have completed a number of home improvement projects at our place in Robinson, and enjoyed exploring Central Texas during camping trips throughout the hill country. Mary will be teaching 4th grade in WISD again next year, despite much uncertainty with the public school funding. Mary has enjoyed playing in Waco's adult soccer league, and has become good friends with her team mates. We have enjoyed supporting the Baylor sports teams and look forward to cheering for the Bears again this fall.

Research Papers Published:

D. Li, W.C. Hockaday, C.A.

Masiello, P.M. Alvarez, Earthworm avoidance of biochar can be mitigated by wetting, submitted to *Soil Biology and Biochemistry*, in press.

J. Lehmann, M. Rillig, J. Thies, C.A. Masiello, W.C.

Hockaday, Biochar effects on soil biota – a review, submitted to *Soil Biology and Biochemistry*, in press.

M. Gallagher, W.C. Hockaday, C. Masiello, S. Snapp, C. McSweeney, J. Baldock, , Biochemical Suitability of crop residues for cellulosic ethanol: Disincentives to nitrogen fertilization in corn agriculture, *Environmental Science & Technology*, 2011, 45, 2013 – 2020.

F.-W. Zeng, C. Masiello, W.C.

Hockaday, Controls on the cycling of dissolved inorganic carbon in the Brazos River, Texas, *Biogeochemistry*, 2011, DOI 10.1007/s10533-010-9501-y

FROM THE PROFESSORS

Dr. Boris Lau

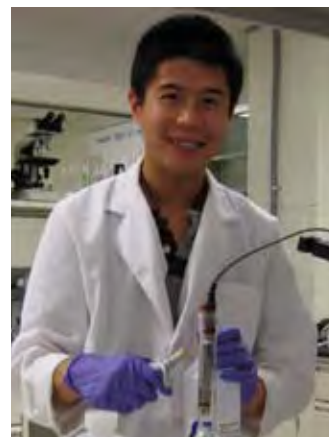


Greetings from Copenhagen, Denmark! As some of you might know, I am very grateful to receive the Marie Curie Fellowship that provides support for a collaborative study with my colleagues in Denmark. The Marie Curie Fellowship program is part of a series of European Union research funded actions that supports the on-going training, research and mobility of scientists within Europe and the rest of the world.

This award allows me to investigate the role of microbial metabolites in metal sorption on mineral surfaces at the nano-scale. I will spend two-thirds of the next three years conducting research at the University of Copenhagen (KU) in Denmark, an international leader in geochemistry. With a unique collection of expertise and facilities, the Nano-Science Center at KU provides a strong backdrop for the implementation of this project.

This study will create leverage for long-term collaborations between Baylor and KU. Baylor's support through the C. Gus Glasscock, Jr. Endowed Fund for Excellence in Environmental Sciences enables doctoral students in my lab to spend a month at KU for the enhancement of their dissertation research by learning cutting edge techniques and interacting with world-class scientists.

I look forward to chatting with you when I am back in Waco during the fall and spring semesters. In the mean time, if you are interested to follow the exciting research activities at the Lau lab, please visit http://www.baylor.edu/boris_lau



RARELY DO WE APPRECIATE THE IMPACT OF GEOLOGY -

FROM THE PROFESSORS

Dr. Lee Nordt

Holly Meir and Steve Ahr continue their dissertations research efforts. Holly is also working with Dr. Brit Bousman from Texas State University on a geoarchaeological project from South Africa. I am assisting with Aislyn Trendell's research at Petrified Forest National Park (with Stacy Atchley) and with Gary Stinchcomb's late Holocene fluvial work in Pennsylvania (with Steve Driese).

We were pleased with Steve Driese's leadership of the paleosol conference held at Petrified Forest National Park in September of 2010. It brought much national and international recognition to the Department of Geology and Baylor University. The forthcoming edited volume will be a major contribution.

Stacy Atchley, Steve Dworkin and I are still working at Petrified Forest on paleoenvironments along a continuous vertical section of over 1200 feet for the late Triassic. We are finally compiling stratigraphic and geochemical data for environmental interpretations. Preliminary results show interesting trends in atmospheric pCO_2 , MAP, and MAT.

I am serving on an NSF steering committee for the Sedimentary Geology and Paleobiology Division. It has been quite an experience summarizing all NSF reports submitted during the past decade into one cohesive document (hopefully). This work

will continue into next year. In May, Garrison graduated from Mary Hardin Baylor University with a B.S. in Business Administration and minor in Business Management. His Senior year he achieved one of the Top Ten grade point averages among UMHB Senior Student Athletes. This past year he served as a student assistant golf coach at UMHB. He is now employed as an assistant pro at Berry Creek Country Club in Georgetown, Texas.

Kaylee graduated from Midway High School in June. She was a Heart of Texas Fair and Rodeo Sweetheart dedicating many hours to community service. She was Executive Secretary of Midway Student Council. She was a member of Link Crew helping with freshman orientation, Diamond Darlings (spirit group for baseball and softball), and the Art Club. Her artwork was chosen to be displayed in the Rehabilitation Center at Hillcrest Hospital. Kaylee will be attending Baylor in the fall. She has been investigating a wide array of possible majors: Interior Design, Graphic Design, Speech Pathology, and Psychology.

Kathy continues working part time as outpatient surgery admitting nurse at Providence Hospital. She has been very busy this year planning graduation parties for Kaylee and Garrison. Pablo, a young man attending UMHB from Spain, lived with us for about 6



weeks as we became his "American Family" prior to him returning home for the summer. We hope to visit Spain in the near future.

We took a family vacation to Charleston, South Carolina. The "girls" especially enjoyed the beach and shopping while the "boys" (Garrison) played golf. We all enjoyed the guided historical horse carriage ride around the city. Kathy was able to attend the AMQUA conference with me in Laramie, Wyoming. We enjoyed our drive up into the mountains and visiting the territorial prison state historical site. And as always Kathy enjoyed shopping!!

I look forward to seeing you all during homecoming weekend!



Dr. Lee Nordt (cont.)

Publications:

- Nordt, L.C.**, Collins, M., Monger, H., and Fanning, D. (in press). Entisols. 2nd Edition. In *Handbook of Soil Science*, P. Huang (ed.), CRC Press, Boca Raton, Florida.
- Southard, R., Driese, S., and **Nordt, L.** (in press). Vertisols. 2nd Edition. In *Handbook of Soil Science*, P. Huang (ed.), CRC Press, Boca Raton, Florida.
- Nordt, L.C.**, Dworkin, S.I., and Atchely, S.C. (2011). Ecosystem response to soil biogeochemical behavior during the Late Cretaceous and early Paleocene within the western Interior of North America. *Geological Society of America Bulletin* 123: 1745-1762.
- Waters, M.R., Forman, S.L., Jennings, T.A., **Nordt, L.C.**, Driese, S.G., Feinberg, J.M., Keene, J.L., Halligan, J., Lindquist, A., Pierson, J., Hallmark, C.T., Collins, M.B., Wiederhold, J.E. (2011). The Buttermilk Creek Complex and the Origins of Clovis at the Debra L. Friedkin Site, Texas. *Science* 331 (6024): 1599-1603. doi:10.1126/science.1201855.
- Stinchcomb, G.E., Messner, T.C., Driese, S.G., **Nordt, L.C.**, and Stewart, R.M. (2011). Pre-colonial (A.D. 1100-1600) sedimentation related to prehistoric maize agriculture and climate change in eastern North America. *Geology* 39:363-366.

Presentations, Lectures, and Other Scholarly/Creative Activities:

- Nordt, L.**, Dworkin, S., and Atchley, S. (2010). Characterization of paleosols across the K-T boundary using pedotransfer functions: A case study from Big Bend National Park, U.S.A. integrating biogeochemical and climate controls on evolving terrestrial ecosystems. Geological Society of America Abstracts with Programs, v. 42. Denver.
- Breecker, S., Michel, L., Mintz, J., Driese, S., and **Nordt, L.** (2010). Soil CO₂ measurements in modern vertisols and implications for estimations of paleoatmospheric CO₂ from pedogenic carbonates. Geological Society of America Abstracts with Programs, v. 42. Denver.

- Meier, H., **Nordt, L.**, Driese, S., and Forman, S. (2010). Late Quaternary alluvial history of the owl creek drainage basin: A geomorphic response to environmental change. Geological Society of America Abstracts with Programs, v. 42. Denver.
- Stinchcomb, G., Driese, S. G., **Nordt, L. C.**, 2010, Soil geomorphology and stratigraphy reveal channel instability along the Delaware River Valley, USA: Geological Society of America Abstracts with Programs, v. 42.
- Nordt, L.** and Driese, S. (2010). Pedosystem science approach to characterizing and interpreting the fossil record of soils. SEPM-NSF Workshop on Paleosols and Soil Surface analog Systems. Petrified Forest National Park, Arizona. September.
- Stinchcomb, G., Driese, S., and **Nordt, L.** (2010). Floodplain response to rapid climate change in the humid-temperate Mid-Atlantic, USA. SEPM-NSF Workshop on Paleosols and Soil Surface analog Systems. Petrified Forest National Park, Arizona. September.
- Driese, S. and **Nordt, L.** (2010). Abundance of paleo-Vertisols in the Phanerozoic rock record: Product of preservation, recognition, or paleoclimate? SEPM-NSF Workshop on Paleosols and Soil Surface analog Systems. Petrified Forest National Park, Arizona. September.

Grants, Contracts, Patents, Software Copyrights:

- Breecker, D., Driese, S., and **Nordt, L.**, Co-Principal Investigators (2009). Collaborative Research: Calibrating the paleosol carbonate CO₂ barometer for vertic paleosols by monitoring soil CO₂ in modern Vertisols. National Science Foundation, Geobiology and Low-Temperature Geochemistry program (FUNDED \$292,550; Baylor \$94,395)





BAYLOR GEOLOGY – LATE '70S AND '80S

Origins

I first became aware of the Baylor Geology Department through Bob Belcher, who had come to study for a Ph.D. at UT Austin after finishing his M.S. at Baylor. Bob shared a graduate office on the fourth floor with Steve McLean and myself, and was very proud of his Baylor history. Bob had published his M.S. thesis on the geomorphic history of the Rio Grande in the Baylor Geology Studies series, which was edited by Jean Spencer and O.T. Hayward. This series did a lot of good for our Department, as it was well done, slightly oversized so you could not ignore it, and concerned topics of regional interest.

Later, after I had taken a job at Fort Hays State University in Kansas, I used to travel frequently up and down I35. On these trips, I would often stop at the McDonald's across from the Baylor campus. From there, one could gaze at the handsome Baylor buildings and large oak trees and imagine what it would be like to work there.

I got the opportunity to visit Baylor in spring 1978, when I interviewed for the position opening after Jim Dixon's retirement. Faculty at that time included Harold Beaver (chair), O.T., Gustavo Morales, Roberto Font, Jerry Namy, and Mrs. Spencer (she was always referred to as Mrs. Spencer). I liked Harold and thought that the Department would grow with him as chair. The students were hard working, obviously in love with geology, and fun (they took me out

to George's one evening). I had to make a second trip to meet the administration (Judge McCall and Herbert Reynolds), who inquired about my Baptist upbringing and what had gone wrong with it.

After teaching field camp in July 1978, Becky and I arrived in August. As new faculty, we were joined by Peter Allen and Bob Grayson. Bob was Jerry Namy's replacement as Jerry had resigned to take an oil company job. Mrs. Spencer was also gone, having moved to Canada with her husband. We were immediately tasked to redo the freshman field trips into a new format that incorporated "reaches" as well as stops, the reaches serving to describe the geology and other things of interest in between stops. The resulting guidebooks (Day in the Cretaceous, Waco Urban, Landscape and Land Use, Paluxy Basin) were used for many years.

Sid Richardson

The Department was housed in Sid Richardson Science Building, which, at that time, was ten years old, but seemed much older. The halls were dark, as they were lined with dark tile and half the lights were extinguished to conserve electricity. Viola Shivers, however, brightened up the office, as administrative assistant. We taught three, or sometimes four, classes a semester. Then, as now, we were largely a service department on campus, running large numbers of students through introductory classes to meet their science requirements. Gustavo's historical and Roberto's

*O.T. Hayward**Bob Grayson*

Don and Sid Richardson circa 1985



physical classes were especially popular, as was O.T.'s audio-tutorial ("AT") class, which was taught with slide shows accompanied by taped O.T. lectures. We ran so many students through the intro classes that some of the labs had to be held in our upper division classrooms, which interfered with instruction in those rooms. The large lecture sections were held in SR 226. We always wondered why students had trouble finding room 226. Then one day I noticed that it said ("100") above the door. Another famous room sign switch occurred during a football game at Baylor stadium, where someone took the sign off one of the two doors to the Men's restroom and replaced it with the sign of one of the two

doors to the Women's restroom. This led to an interesting mixture of sexes during the first half, one that happened with less trouble than you would expect.

The Energy and Personnel Crisis

We continued to lose faculty; Gustavo left and Roberto Font joined a petroleum company. This dropped us in 1981 down to five geologists and Don Greene (geography), the latter having joined up in 1979. Rena Bonem replaced Morales and Bill Brown replaced Font. Rena came from Hope College, where she had been teaching, and Bill from Chevron, where he had worked in Denver for a number of years. Bill was asked to complete a Ph.D., which he accomplished in a few years through classes at Texas A&M and the University of Alaska. We also hired our first geophysicist, Kerr Thompson, who after a few years moved on to William Jennings Bryan College in Dayton, Tennessee. Kerr was replaced by future chair, Thomas Goforth in 1987. Joe Yelderman came to Baylor in 1983 and stayed to help with our water resources program.

The Annex

None of the personnel changes affected the severe shortage of

space in Sid Richardson building. Harold helped solve this problem by doing an "end run" around the campus planning committee by getting Dr. Reynolds' permission to construct a research annex alongside Waco Creek. This was accomplished in about six weeks during the summer, and, when classes resumed in the fall, the building was a fait accompli. The construction was aided through the generous help of the Carlile family.

The annex featured a large cartography area, a rock preparation room, storage and several specialized labs. It was next to the soccer field, and frequently, you could hear athletes up on the roof retrieving balls. You should ask me sometime about the death that occurred outside the building, the strange noises from the soccer restroom, or the ghost of the big black dog believed to have inhabited the building. The roof served as a water storage reservoir and periodically released a flood of water through the labs. A rumor maintains that the music faculty released a horde of termites that eventually led to the destruction of the building, but this has not been verified. They claimed the building blocked their view of Waco Creek.

The Upshot

Well, you probably know about the new Science Building with the new Carlile annex attached as the "thumb," and you probably know about most of the other changes that have occurred. These will have to be discussed at a later date. For now, I would like to thank all the teaching assistants that made my 33 years at Baylor

*Carlile
Geology
Annex,
mid 1980s*



much easier, and, especially, those teaching assistants that helped me teach mineralogy and petrology classes. I will attempt to name the latter, roughly in chronological order:

Sue Lynn Bishop, Heidi Burke, Karen Stapleton, Steve Hoy, Gary Henderson, Jonathan Price, Greg Holt, Ayati Ghosh, Minghua Ren, Michael Mitchener, Cynthia Mitchener, John White, Edgardo Covarrubias, David Adams, Anna Perry, Daniel Wegert, and Hallie Mintz.

If I have omitted a name, please forgive me. And, of course, there were many more T.A.s in the introductory classes. Thanks to you, also.



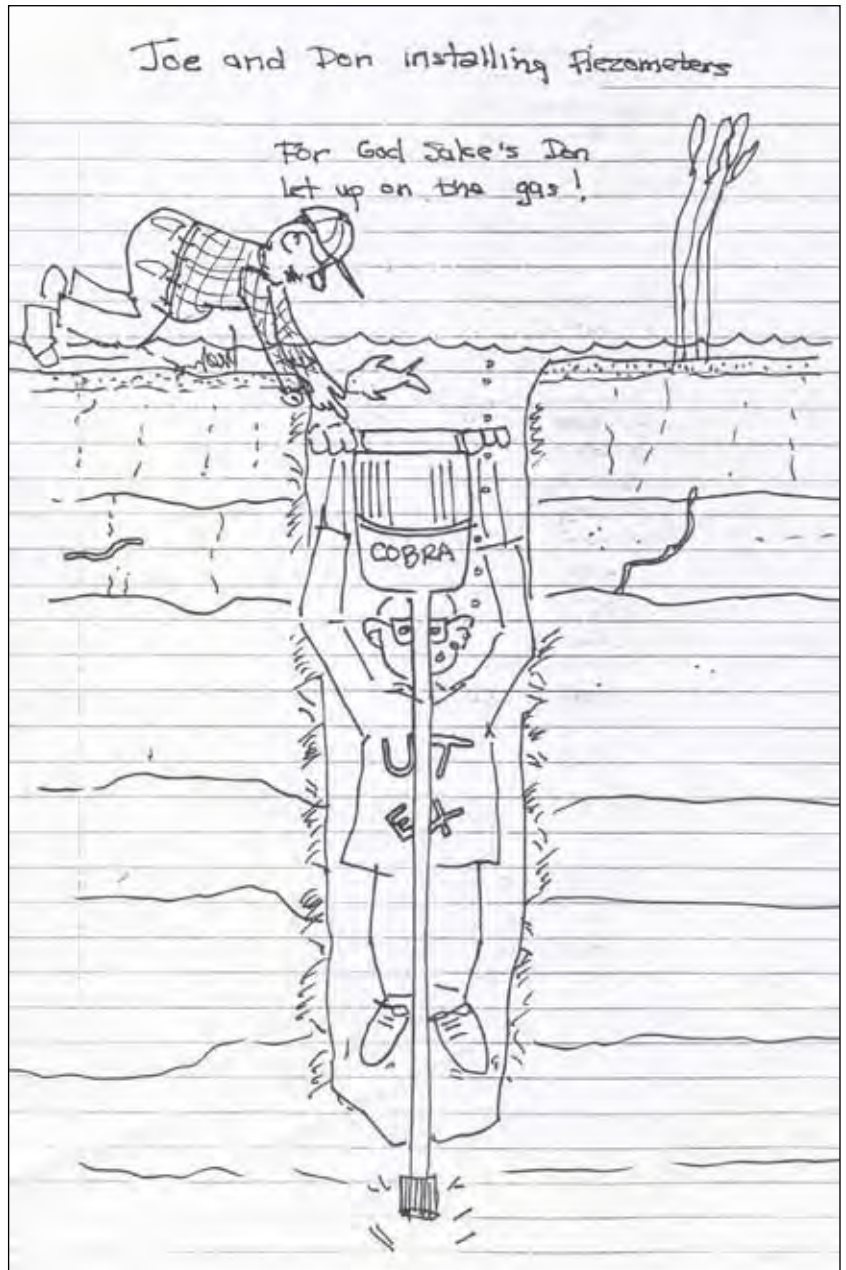
Rena Bonem



Don Greene circa 1987



*Congratulations to Dr. Don Parker
who retired last spring after 33 years
with the Geology department.*



FROM THE PROFESSORS

Dr. Daniel Peppe



This past year, my second at Baylor, has been a great one. My lab is finally finished and the magnetometer has arrived! Additionally, I've also traveled to Kenya and to a few different places in the U.S. to conduct research and to present our findings, one of my projects in Kenya was funded by NSF for two years, and I recently received an internal Baylor grant to conduct research focused on the relationships between leaf traits and climate in several institutions in Central and South America, the U.S., Africa, and Asia.

This past year in addition to teaching my graduate seminar "Climate Change: Past, Present, and Future" I taught two new classes: (1) the evolutionary history of plants and (2) techniques in paleomagnetism. I really enjoyed teaching both courses and received positive comments from the students enrolled in both. I look forward to teaching both again in the future.

In addition to teaching, my research program continues to expand. Most recently my

colleagues and I published a paper in *New Phytologist* that focused on the relationships between the size and shape of leaves and climate. Since I began the research as a post-doc at Wesleyan University, it was great to see all of our hard work pay off. The paper was very well received, *New Phytologist* published a commentary on our work, it was highlighted on the cover of the issue, and we received some national media attention for the paper.

Right now we are working to expand the project by examining some questions that came up during the project. In particular, we noted that evergreen species (leaf life span > 12 months) have somewhat different leaf trait-climate relationships than deciduous taxa (leaf life span < 12 months). However, our dataset is pretty heavily weighted towards sites that are primarily comprised of deciduous taxa and for that reason, we are planning to expand our dataset to include more sites from the tropics, which are typically dominated by species with long leaf life spans. Another reason for interest in tropical forests is that they probably better reflect climatic conditions, and thus leaf trait-climate relationships, during periods of earth history that were warmer than at present. To continue this research I applied for and was recently awarded a Baylor University Young Investigator Development Program grant that was funded by the Office of

the Vice Provost for Research to expand our project to include more sites from tropical regions. This summer I will be traveling to Belize, Kenya, Uganda, Thailand, and Indonesia to work at different institutions to expand our research. Hopefully by next year I'll have new interesting results to report.

My ongoing research projects in Kenya also continue to go very well. Three of my students, Lauren Michel, Alex Van Plantinga, and Lyndsay DiPietro joined me in the field last summer. Lauren and Lyndsay worked on a project focused on interpreting the paleoecology of Miocene fossil assemblages (~15-20 ma).



Magnetometer and SQUID electronics, donated by Dr. Ken Carlile, in place inside the magnetically shielded room in the Thomas T. Goforth Paleomagnetism Laboratory.

Lauren Michel, Lyndsay DiPietro, and Alex Van Plantinga examining at Miocene paleosol on Rusinga Island, Kenya



The results of the work that we conducted were presented at several conferences, and Lyndsay recently defended her senior thesis based on her summer research with Lauren. Lauren will be joining me again this summer, along with Steve Driese, to complete her dissertation field research.

In addition to the Miocene project, I have been working on a project in collaboration with an archeologist from New York University and a geochemist from the University of Minnesota focused on reconstructing the paleoenvironment of the late Pleistocene in the Lake Victoria area of East Africa that was funded by NSF last September. Alex Van Plantinga conducted his M.S. research with us last summer working to correlate various important fossil and artifact bearing horizons. He is expected to defend his M.S. late this summer and will begin working for his Ph.D. at Texas A&M in Fall 2011.

In addition to a expanding my field research program, I'm happy to report that my lab group continues to grow. Casee Lemons started her M.S. thesis work with me in Fall 2010 working on a project focused on exploring the relationship between leaf size and shape and climate in ferns. This summer she will be

Part of the Rusinga Island research team (l – r): Alex Van Plantinga, Kirsten Jenkins, Sheila Nightingale, Dan Peppe, Stephen Longwe, Christian Tryon, Eli, Tyler Faith



going to Australia and New Zealand on an NSF East Asia and Pacific Summer Institute for U.S. graduate students fellowship to continue her research, and in the fall she will be working at the Smithsonian on a Smithsonian Fellowship! In Fall 2011 two M.S. students will be joining my group, Rick Bartlett and Lyndsay DiPietro. Rick will be working with me and Joe Ferraro, a faculty member in the Anthropology Department, on a project in Kenya. Lyndsay will likely work with me and Steve Driese on a project still to be determined. I'm looking forward to working with both of them starting this fall.

Overall, it's been a great year. I hope to meet more of you during our upcoming alumni events and at the dedication for my paleomagnetism lab this fall.

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Dr. Daniel Peppe (cont.)

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- Presentations:
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FROM THE PROFESSORS

Dr. Jay Pulliam



The past year was another intensive year for fieldwork. John Dunbar and I launched GUMBO (Gulf of Mexico Basin Opening),

a collaboration with scientists at UT Austin and Texas Tech, in Summer 2010 and installed twenty-one broadband seismic stations from Matagorda Island to Johnson City in June and July, then followed up with service runs to check the stations and download data during the Fall, and an intense week-long effort to collect seismic refraction data in conjunction with an offshore survey conducted by our UT Austin collaborators. We also demobilized the SIEDCAR (Seismic Investigation of Edge-Driven Convection Associated with the Rio Grand Rift) deployment: 71 seismographs in southeastern New Mexico and west Texas that we had deployed in 2008. Baylor students featured prominently in these efforts and I received numerous compliments from collaborators concerning the mature and responsible nature of our students and their competency in the field. These comments were all the more striking because most of our students had not engaged in such fieldwork previously and four undergraduates were involved, as well as seven graduate students. We are now churning SIEDCAR and GUMBO data inside computers in the Baylor Geophysics Lab. As if those weren't enough data, I also retrieved data from stations in the Dominican Republic, including one I installed in 2003 and have maintained, with Dominican and Puerto Rican colleagues, since that date. The data volumes we have collected in the past several years, plus the data recorded by EarthScope's Transportable Array as it rolled through Texas (<http://www.earthscope.org>), will keep us busy for quite some time.

Fortunately, gathering data was not our sole activity. Baylor students succeeded in making sense of some of it, as well. Carrie Rockett, an M.S. student,

Baylor undergraduate Geophysics Majors Ben Phrampus (left) and Jon Brown (right) installing station a GUMBO broadband near Gonzales, TX.



presented her research, entitled “Seismic Tomographic Imaging of an Upper Mantle Anomaly beneath the Rio Grande Rift”, at the biennial EarthScope National Meeting in May and is poised to defend her thesis over the summer. Her images reveal a large anomaly in the upper mantle beneath the eastern flank of the Rio Grande Rift that we interpret to be a fragment eroded from the Great Plains lithosphere. Mark Speckien, was the lead author on a poster presentation at the same meeting: “Orogeny, deformation, rifting, and sediment burial on the Texas Gulf Coast: An EarthScope target”, which essentially laid out the goals of the GUMBO project and summarized our attempts to resolve outstanding issues. Two undergraduate students, Tia Barrington (“Seismic anisotropy of the Rio Grande Rift and surrounding regions”) and Ben Phrampus (“Analysis of Broadband Seismic Station Coverage for a Seismic Survey Across the Texas Gulf Coast”), presented research results at Baylor’s URSA Scholar’s Week in April. Ben wrote and successfully defended a senior thesis on the same topic as his URSA presentation and Tia’s senior thesis is still in progress.

Ph.D. student Hallie Mintz is carrying the banner for our long-standing interests in the Northeast Caribbean with her research on the region’s seismicity and tectonics using unique ocean bottom seismograph data, which included a presentation at last fall’s AGU meeting. However, I also presented two invited lectures in the Dominican Republic in the past year: “The 2010 Haiti earthquake: Lessons learned to help

Dr. Jay Pulliam (cont.)

in planning for future earthquakes in Hispaniola and the Northeast Caribbean” (Santo Domingo, DR, 12 July 2010) and “Improving the Resilience of Municipalities of the Dominican Republic to Disasters and Natural Hazards”, organized by the Municipal Institute of Risk Management (IGER), Santiago de los Caballeros, DR, 18 March 2011. The most significant event came in October 2010, when the workshop entitled “Geophysical Hazards and Plate Boundary Processes in Central America, Mexico and the Caribbean: Efforts to Build Seismological Collaboration and Capacity” finally came to pass in San Jose, Costa Rica. This workshop was the result of two years’ of planning, which succeeded in raising funds from NSF’s Office of International Science and Education, the U.S. Agency for International Development/Office of Foreign Disaster Assistance, and the American Geophysical Union to bring representatives of institutions and individuals who engage in seismological studies and/or monitoring in the region together to share expertise and data and plan future projects.

In other international work, we finally shipped off seismometers to Africa for installation in, and expansion of, AfricaArray, a continent-wide research, monitoring, and educational resource sponsored by the U.S. National Science Foundation, the South African Council of Geoscience, and a consortium of oil companies. AfricaArray has a joint mandate to monitor seismicity on the African continent and serve as a resource for public education and outreach concerning earth science and natural resources. In education and outreach closer to home, our fledgling “Seismology in Schools” program, in which middle and high school science teachers operate seismographs in their classrooms, now includes teachers (and seismographs) in El Paso, Coppell, Katy, Dallas, Eagle Pass, Lubbock, Austin, Brownsville, Weslaco. These teachers and their seismographs are linked together in a Texas regional seismic network and have the means to share seismic data with each other and with other school-based seismograph operators. In December 2010 we hosted a field trip by the Eagle Pass Middle School “Seismology Team” (station EPTX) in which we discussed earthquakes, seismology and tectonics in the classroom, carried out hands-on activities, and visited a GUMBO broadband station near San Marcos, TX.



Baylor graduate student Mark Speckien (seated) and undergraduate Ben Phrampus (standing, with shovel) installing the digitizer/recorder at a GUMBO station.



Members of the Eagle Pass Middle School “Seismology Team”, whose station is named “EPTX”, with teacher Michael Brunt, Baylor Prof. Jay Pulliam, and Dallas ISD teacher David Boyd (operator of station “ECTX”).



From left, Baylor graduate student Lauren Michel, Holly Meier, Ryan Dhillon, and Alex Van Plantinga (with hat) making plans with Prof. Jay Pulliam for deploying 425 short-period geophones on the Gulf Coast as part of the GUMBO active-source refraction survey near Seadrift, TX in November 2010.

In addition to the ones previously mentioned, my students or I made presentations at the 2010 Fall Meeting of the American Geophysical Union (San Francisco, CA), the 2011 European Geophysical Union General Assembly (Vienna, Austria), the 2011 GSA South-Central Section annual meeting (New Orleans, LA), the 19th Caribbean Geological Conference (Guadeloupe, France), Texas Undergraduate Research Day at the Capitol: Transforming Texas Through Undergraduate Research (Austin, TX), the 2011 Annual Meeting of the Seismological Society of America (Memphis, TN), and the 2010 Monitoring Research Review (Orlando, FL), in addition to several workshops, in-house presentations, and lectures at universities.

We gratefully acknowledge support for our research efforts from the National Science Foundation, ExxonMobil, the Norman Hackerman Advanced Research Program of the Texas Higher Education Coordinating Board, the Gulf Coast Association of Geological Societies, and Baylor's Undergraduate Research and Scholarly Activities (URSA) Program. A new project, Seismic Velocity Estimation from Multiple Waveform Functionals: P & S Receiver Functions, Waveform Fitting, and Surface Wave Dispersion was funded by the Department of Energy's National Nuclear Security Agency, will support two new graduate students in Fall 2011. In all, three new geophysics graduate students will start in August 2011, so we look forward to more results, presentations, and publications soon.



Several boxes of Reftek "Texan" recorders after prepping for deployment in the GUMBO active-source refraction survey from Matagorda Island to Cuero, TX in November 2010.

STOP 1



AS I RECALL, HE GOT LOST LAST TIME TOO —

FROM THE PROFESSORS

Dr. Joe Yelderman



A year of excellence! The Baylor Hydrogeology Program was designated one of the **top 100 programs in North America**. M.S. student Stephanie Wong won another Farvolden Award for one of the best student papers at the National Groundwater Summit in Baltimore

compliments on their work and their presentations, learned a lot, made new contacts and had a great time. M. S. student, Laura Foss has chosen to study the water budget at the East Fork Trinity Wetland Project which will get underway this summer. Michelle Diehl served as the first intern with the Southern Trinity Groundwater Conservation District in Waco and will make recommendation to the District from her thesis regarding the management of their portion of the Trinity aquifer. Dr. Joe also welcomes new graduate student David Ju who arrived this fall from the University of Wisconsin at Oshkosh.

(her second in a row) and the GSA Hydrogeology Division 2011 Birdsall Dreiss Distinguished Lecturer, Dr. Jeffrey McDonald, visited the Department in February. Former student, Brian Clark (MS-00), was honored as Outstanding Young Alumni by the Baylor Alumni Association and spoke to the groundwater modeling class about his work with the USG. In addition, Baylor hosted the Groundwater Management Area 8 stakeholder meeting for the potential regional groundwater management model for the northern Trinity aquifer. What a great year!

The Baylor Wastewater Research Program (BWRP) is “flush” with funds as Dr Joe received another grant from the Texas Onsite Wastewater Treatment Research Council for approximately \$90,000. This study will focus on new evaluation procedures for different dosing techniques. Graduate student, Amy Price is incorporating her thesis with data generated from the grant.

Dr. Joe took a strong contingent of students to the NGWA groundwater summit in Baltimore where M.S. students Michelle Diehl and Stephanie Wong delivered oral presentations and undergraduate Ryan Danielson presented a poster. It was a most successful meeting as all the students received numerous

Dr. Joe is serving as chair for the search committee for a new professor to be hired in the department as part of the Center for Reservoir and Aquatic Systems Research (CRASR). He is also serving as graduate director for the Institute of Ecological, Earth and Environmental Sciences (TIEES). Dr. Joe advised incoming freshmen again this past summer and continues to help Dr. Bonem advise undergraduate geology majors.



Grad student Amy Price at Wastewater site



Stephanie Wong and Michelle Diehl look at horizontal pipeline



Just a minute Joe, and I'll get my foot off your shoulder.



Dr. Joe and Diane with granddaughter Madison

The Yeldermans still live at 706 Woodland West, Woodway, Texas and visitors are always welcome. Dr. Joe continues to teach Sunday School at Columbus Avenue Baptist Church but this year began teaching with Diane, his loving wife of 36 years. Diane also continues to teach Kindergarten at North Waco Elementary. Logan (son #2) finished his B.A. degree with a double major in Speech Communication Specialist and Psychology. Cal (son #1) who received his M.A. in English - Creative Writing from New Mexico Highlands University, taught both writing and literature at NMHU this past year. Cal has recently moved back

to Texas. Married daughter, Abigail White, lives in Houston with her husband, Jared, where she works as an assistant to the Young Marrieds Pastor at Second Baptist Church and Jared works as a residuals analyst for British Petroleum. Abbi and Jared have a beautiful daughter, Madison, and are expecting their second child around Thanksgiving. Diane and Dr. Joe adore Madison but Papa Joe and Granna also eagerly await the new addition.



Ryan Danielson (blue shirt) discussing his thesis at the Groundwater Summit (published in the NGWA newsletter).



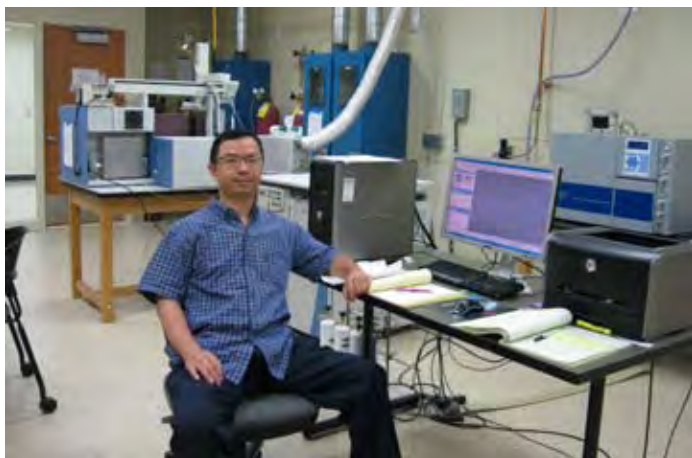
FROM THE PROFESSORS

Dr. Ren Zhang



I was quite happy when I moved here from Winnipeg in May 2010 because I can eventually stay away from the extremely cold and long winter in Canada. I still remember the day when I first got here for the job interview in December 2009, and the temperature at Waco Airport was 23°C, whereas the temperature when I left Winnipeg Airport was -46°C. After a year, I tell myself: life is fair and now I have to get used to the extremely hot summer in Waco. Now I understand why people always like moderates. As a newcomer, I was quite busy last year: there were too many things to be learned here, including how to convert Degrees Fahrenheit to Degrees Celsius, how to convert feet and inches to centimeters, how to convert gallons to liters, etc.

As an Instrumentation Specialist working at the Stable Isotope Geochemistry Laboratory, I was quite busy as well. I have learned quite a lot on how to operate the Isotope Ratio Mass Spectrometer (IRMS) and its peripherals from Dr. Steve Dworkin, my direct supervisor at the Department of Geology. Most of my time was devoted to analyzing stable isotope composition of different geological and biological solid samples. The whole analysis process is really time-consuming and includes cleaning lab wares, weighing and packing samples and reference materials, running samples on the IRMS via different peripherals, evaluating and normalizing raw data, and filing analysis reports. My goal is to provide high-quality stable isotope analysis and other services to both internal and external users. For the past year,



I have finished **3677** analyses of C/N/O isotopes in solid samples with very good precision, which greatly supported ongoing research programs that include geology, biology, and environmental sciences.



In addition, I have made some modifications at my lab to make instruments work more efficiently, or make new service available, or to save money. For example, I have installed a 5-way valve to the inlet system of the Gas Bench II, which allows us to be able to use the equilibration method to analyze water samples without switching to a different inlet tubing. The most important innovation I have made so far for this lab is the sample pellet maker, which I designed and can help students make perfect sample pellets that can fit well within the auto-sampler and can freely drop into the combustion reactor. Before, irregularly shaped large samples would often get caught in the auto-sampler and couldn't drop into the combustion tube, causing serious problems in stable isotope analysis. After I introduced the sample pellet maker to my lab, I have never had the same problem again.

Finally, to ensure optimal daily performance and maintenance of the IRMS and its three peripherals, I have worked closely with the Department and Baylor University to set up our own service charges for stable isotope analysis. For C/N analyses on EA, the current price is \$8.00 per sample for internal users and \$9.00 per sample for external users. For carbonate analysis on Gas Bench, the approved service fee is \$10.00 per sample for internal users and \$11.00 per sample for external users. These lab fees are quite competitive when compared with other labs, and new internal and external users are welcome to use facilities at this lab. In addition to basic analytical services, we can also provide a short training course for both undergraduate and graduate students on how to use IRMS to analyze isotopic compositions of geological and biological materials.



to the bathless ones,



the field geologists,



this book



is gratefully dedicated.



GEOMORPHIC EVOLUTION OF OUR LIVES

Suzanne Dahl

We all start off as a simple pediplain

A broad sloping surface

We are initially shaped by the landscape that we were born from

Highly erosive beginnings may make us have sharp edges early on

Or smooth beginnings may give a gentle rolling shape

As life happens to us it shapes us more and more

Great events in our life may uplift a portion of the plain - creating formidable mountains in our beings

Or other events may cut deep canyons in our souls

We may long to be that simple plain of our youth - unmarred - unscathed

But that landscape is from long ago



Road log compiled and edited by.....Keith Davis

Jan Dixon
Boyd Dreyer
Connie Hudson
Jean Kettler
Janis Moore
Sam Pole IV
Gary Don Roberson
Dana Shumard
Ed Tarrant
Ronny Thomas

Baylor Geological Society Sponsor.....

Dr. O. T. Hayward



DR. O.T. HAYWARD

September 26, 1921 – November 16, 2010

Dr. Hayward earned his Ph.D. from the University of Wisconsin in 1957, his M.S. from Stanford University in 1951 and his B.S. from the University of Kansas in 1945. He began his career as a professor of Geology at Baylor in 1955, with Jim Dixon and others and established the Geology Department in the “White House”.

He brought singular insights and teaching techniques, as well as a few humorous sketches, to more than 6,000 students through his geology courses. He established the roving summer field course in vans to the western United States with the idea of the best geologist is the one who has seen the most geology...the logic being to establish geologic models of environments and structures in your head instead of out of some book or professor's slides or power points. With the small department he taught about every course under the sun including Geophysics, Geochemistry, Stratigraphy, and Geomorphology and of course History of Geology. His novel teaching methods in the undergraduate area included “Audio-tutorial Geology” Here the participant would go into booths, anytime during the week, and look at slides and listen to O.T. on tape He took the students on a virtual field trip into the geological sciences with questions and anecdotes. There was a lab instructor there at all times who could give a test whenever the unit was completed. Lab was

incorporated with the tapes. O.T. ran about 200 students a semester through this course for decades.

He was known as the Father of Central Texas Geology (with due reverence to R.T. Hill) in that he covered most of the Cretaceous Units with his Stratigraphy marathons. Here the student would go to the field from 1 to dark-thirty and then have to hand in an assigned memo each week. In addition, the student was also responsible to give several hour long lectures on subjects O.T. chose during the semester, depending on class size...O.T. did not lecture. He would patiently give you back your memo in a manila folder with a tape for your tape recorder of selected quotes from O.T. including references to your mother's kin, to your writing style, to your neanderthal genes and lack of dendrites in your brain and abundant references to the almighty, after all, he would say, this is a Baptist school. This was probably the first “Survival Course” many took. It equipped many for the armed services as he taught through several wars. References to MaryAnn McCarthy who went out to gather clams was often heard coming out of his office. No one to my knowledge ever met Mary Ann. O.T.'s Geomorphology, as well as Stratigraphy was also taught by the students with O.T. guiding them through the American West from Texas to New Mexico, and Oklahoma to Houston. He often quoted



that all geologists eventually become geomorphologists. His love here was the big picture and he instigated studies on the geomorphic history of major river systems including the Pecos, Rio Grande, and Canadian, to name a few.

O.T. established the SASGAS. This was the Student Organization of State Geological Societies. Here O.T. coordinated field trips with his establishment of the BGS (Baylor Geological Society), lead by students on various topics of principally Texas Geology. These were professional trips, with up to 200 or more participants, complete with guidebooks, talks, catered food, and logistics on the level of a major crusade. The trip would end with a banquet in which a major professor or other professional would give a talk.

He established the Lunar Society of Waco after the lunar Society of Binghamton in England. Here he would invite speakers to Baylor and then, after the speaker was done he would get the students,

Dr. O.T. Hayward, cont.

(with no professors allowed) to take him or her to the local watering hole and quiz them on geology without the interference of the professors.

O.T. established the Baylor Geological Bulletins which he and others edited. He published theses over principally Texas geology. This publication was sent all over the world and at one time had over 3600 readers. In this publication, he fostered perhaps one of the earliest Urban Geology Studies in the US in the mid 1960's. In this series, he published maps of the greater Waco area, the geology, soils, engineering properties, groundwater, and also a bulletin on medical geology.

O.T.'s love was empowering the student to think for themselves, by giving them too much to do in too little time, with no incentives, no money, no pretty please. You did it because you wanted to, because he made you believe that this was the best thing in the world to do and why the heck would you want to do anything else but study geology?

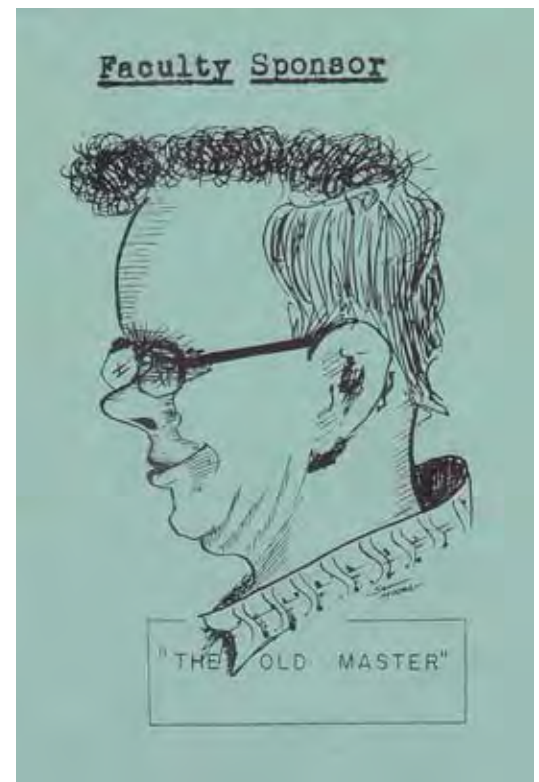
O.T. published in his own way, through dozens of guidebooks, and by spreading geological knowledge over the State, not by articles but by field trips. He ran field trips for the Geological Society of America, the National AAPG, the National American Planning Association, the National Association of Engineering Geologists, the International Clay Conference to name a few.

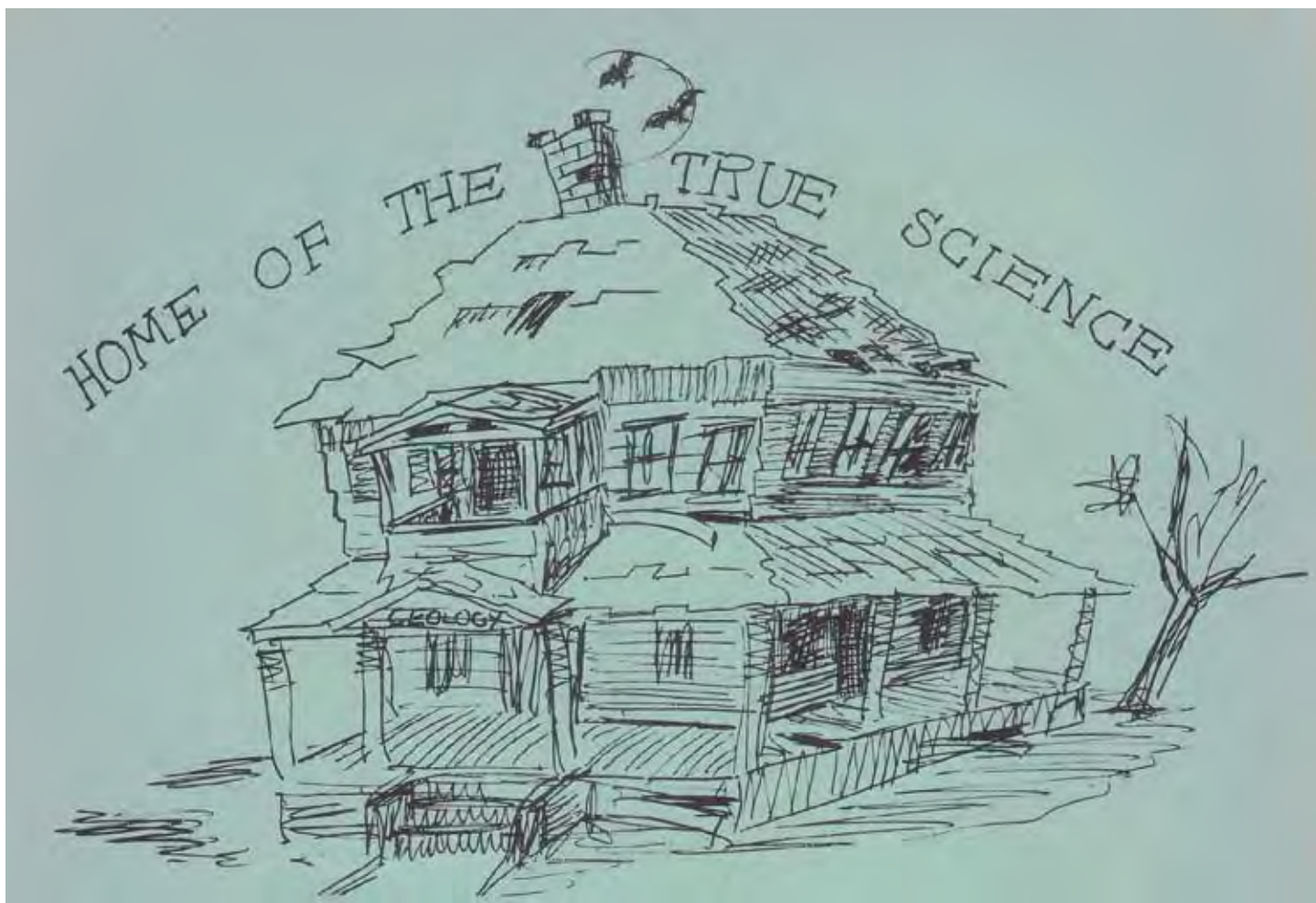
O.T.'s love of Geology and related fieldwork has been passed on to generations of students who will not soon forget how he taught them how to think, solve problems, and express their opinions in written and oral form. His insight and enthusiasm were the glue behind these efforts cited; his legacy is in the grins, smirks and chuckles of those who lived through his teachings. Dr. Hayward retired in 1992 as Professor Emeritus. While at Baylor, he received recognition as Outstanding Faculty Member in 1983 and the Retired Faculty Award in 1994.

Most recently, when Connie Hudson asked what O.T. would really like, he said he would like to invite speakers to the University, ones that could perhaps give it a good kick in the butt every so often, ones that could instill a new thought or two about geology, as everything is geology and they should know it. So Connie established the O.T. Hayward lectureship...and so, we will have a way to keep O.T. around for a long time...beyond the sunsets on the Cut Plain.



O.T. with Dr. Peter Allen





Please join us for a memorial dinner to commemorate and celebrate the career and impact of Dr. O.T. Hayward on the Baylor Geology department.

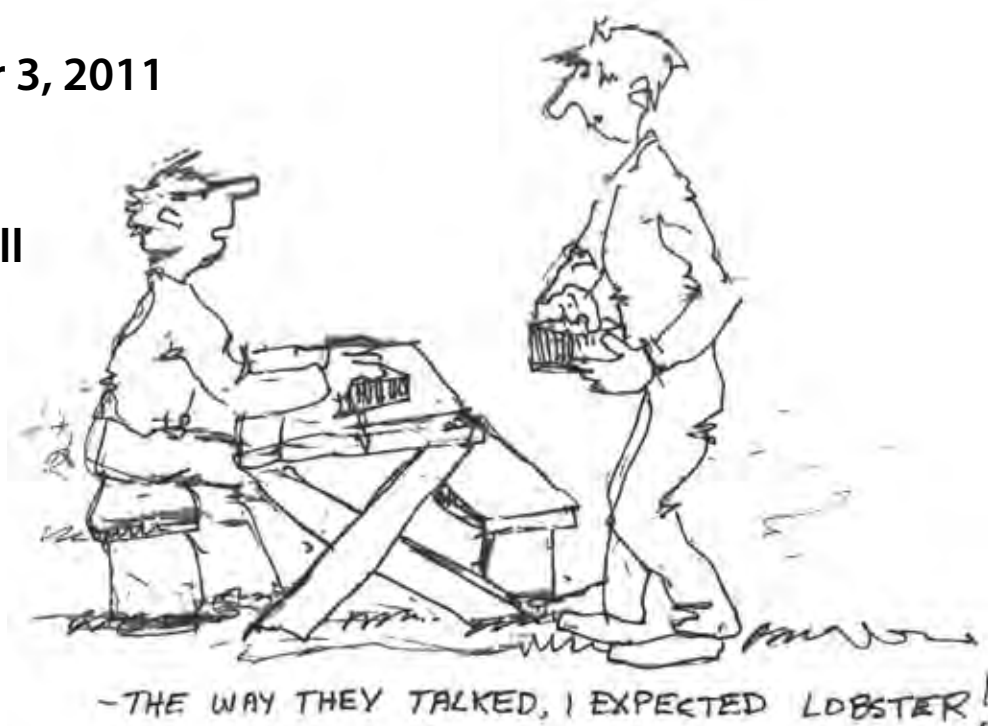
Thursday, November 3, 2011

6:00–9:00 pm

Nelson's Banquet Hall

414 Franklin Ave.

Waco, TX 76701



O.T. HAYWARD DISTINGUISHED LECTURE 2010

Adaptive Management in Ecohydraulics

Presented by: Dr. Rodney Wittler, Ph.D., P.E.

Dr. Rodney Wittler gave the **Third O.T. Hayward Lecture** titled "*Adaptive Management in Ecohydraulics*" on November 15, 2010. His talk illustrated the tightrope between the physical and biological sciences and politics. Dr. Wittler's career at the U.S. Department of Interior, US Bureau of Reclamation, has been incredibly varied from co directing work on the Trinity River Reclamation project in northern California, numerous multidisciplinary ecohydraulic

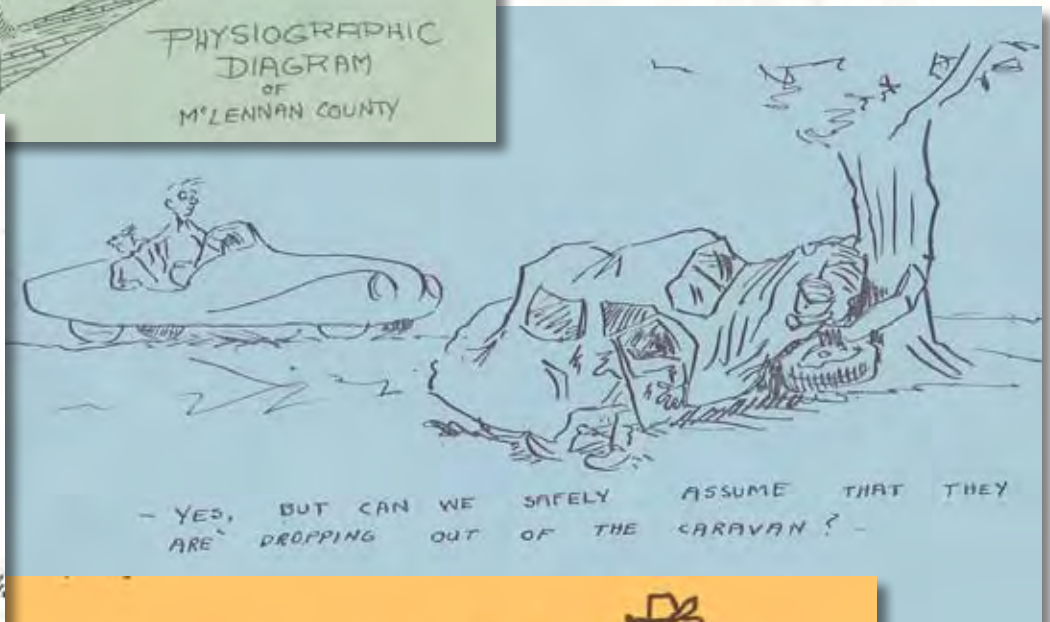
and geomorphology studies on streams in the western United States to research on rock erosion, and dam safety in the Bureau's Research Hydraulics lab.

His current position is Regional Science Liaison, Mid Pacific Region where he advises the Director of the Bureau on science issues related to impacts of operations and climate change on restoration of aquatic ecosystems.



NO—I AM THE MINISTER — BUT THE STOVE IS POT-BELLIED TOO!

THERE'S A BEAUTIFUL SPOT — LET'S STICK A HIGHWAY THRU IT—





BAYLOR UNIVERSITY

DEPARTMENT OF GEOLOGY

Dear Baylor Geologists:

The Baylor Geology Advisory Board commends the faculty, staff and students for the remarkable progress and accomplishments of the Department, so much of which is presented in this publication. We are looking forward to the next academic year, with anticipation of even greater milestones met and surpassed. The events of the next year will be impressive, however, with augmentations of experience, skills, professionalism, entrepreneurship and financial from the geology alumni it would be a far more dynamic. As would several years into the future. The Board was created as an avenue to help provide these contributions to the Department and the students. I am using this note to invite every Baylor geologist to become more active in your support of the students and the Department by joining with the Board in our efforts.

I believe the most valuable asset of any university are the students. Upon graduation we became alumni. I do not think that our value diminishes when we moved into this status. On the contrary, post-baccalaureate is the time of demonstrating the value of the education (formal and informal) we each received at Baylor. Having observed the professional, and personal, lives of numerous Baylor geology alumni for the past 40++ years I feel justified in stating that I am most fortunate to have been associated with these individuals. I take a great deal of pride in being able to feel that I am an associate – colleague of people who have accomplished so much and advanced the geosciences.

The Baylor Geology Advisory Board was started in 1998. In the intervening years it has had successes and made contributions to the students and the Department. Of the considerable number of geologists reading this Alumni Newsletter there are relatively few actively attending board meetings and working to promote the interests of Baylor Geology. Therefore, I am issuing this call to bring your talents, your ideas, your experience and join in to make Baylor Geology even better than it is.

The Board is working with the Department on an evening of memorial activities for Dr. O. T. Hayward. (See previous article for details.) The various functions will take place on November 3rd. This is the Thursday of Homecoming weekend. O.T. had a significant impact on the lives and careers of many of us; this will be a compelling day of remembrances. Alumni are especially invited to attend and participate.

Plans are also under consideration for a spring 2012 BGS field trip in honor of O.T. Come to the Homecoming Board Meeting and learn more.

And “keep pluggin.”

Jim Bain
Chairman, Baylor Geology Advisory Board



GEOLOGY EVENTS

BGS Field Trip 2010

Last October the Baylor Geological Society led a Field trip for students, faculty and alumni titled: **The Lampasas cutplain and beyond: An Excursion into the Quaternary of Central Texas.**

Stop one was at Rattlesnake Butte and the Leon River Valley. Here the group ascended a Pecten and Texigryphaea-rich outcrop of Cretaceous Comanche Peak limestone to examine the Lampasas Cutplain and paid tribute to Professor O. T. Hayward's research. They also briefly discussed the underfit nature and significance of the Leon River (based on Lewand, 1969).

The second stop looked at the stratigraphy and paleoenvironment of the Red Bluff section along Owl Creek, Ft. Hood. Red Bluff is well known for its exposure of late Quaternary fluvial deposits, and Holly Meier discussed results from her ongoing investigations of the stratigraphy, sedimentology, and paleopedology at this site.

Stop three examined the Late Holocene climate change and land-use along Williams Creek, near Axtell, Texas. This stop highlighted results from near-surface geophysics, stratigraphy and paleopedology along a cut bank of Williams Creek, near Axtell, Texas. Here, the group was shown evidence of regionally extensive late Holocene landscape stability (~600 calendar years B.P.) and



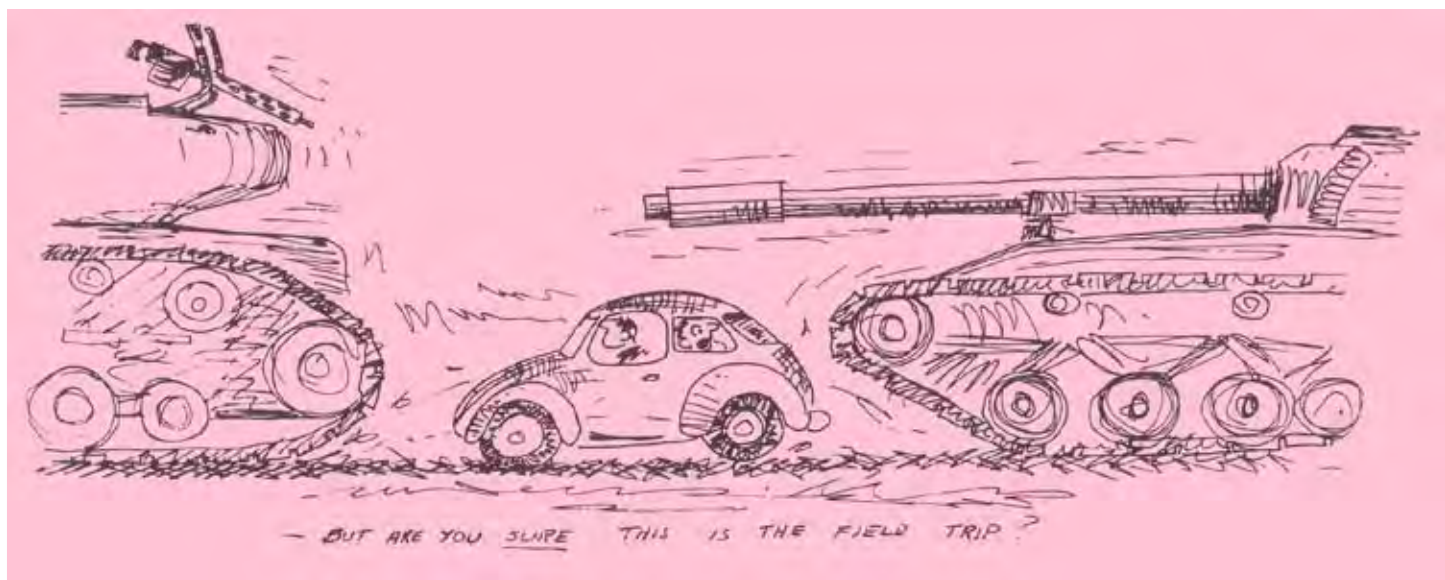
subsequent alluviation and discussed possible forcing mechanisms (e.g. climate and land-use).

The final stop was at the Waco Mammoth site. Here the trip leaders discussed the depositional environment, fluvial geomorphology, and timing and possible causes of death for the largest non-human, single mammoth herd death assemblage known in the world.

For more information on the next field trip, please visit the Baylor Geology website.



Red Bluff Section, Owl Creek, Ft. Hood, Texas





Baylor Geological Society 2010



Graduate students, Alex Huang and Joseph Sang, discussing the features of the outcrop



Graduate student, Ryan Lindsay, and undergraduate student, John McFadden



Doctoral student, Holly Meier, pointing out features in the rock



Doctoral student, Gary Stinchcomb, talking to the group at Rattlesnake Butte



Graduate student, Laura Foss, looking closer



GEOLOGY EVENTS

BGS Field Trip, cont.



The group at Owl Creek, Ft. Hood listening to Holly Meier talk about her research at the site.

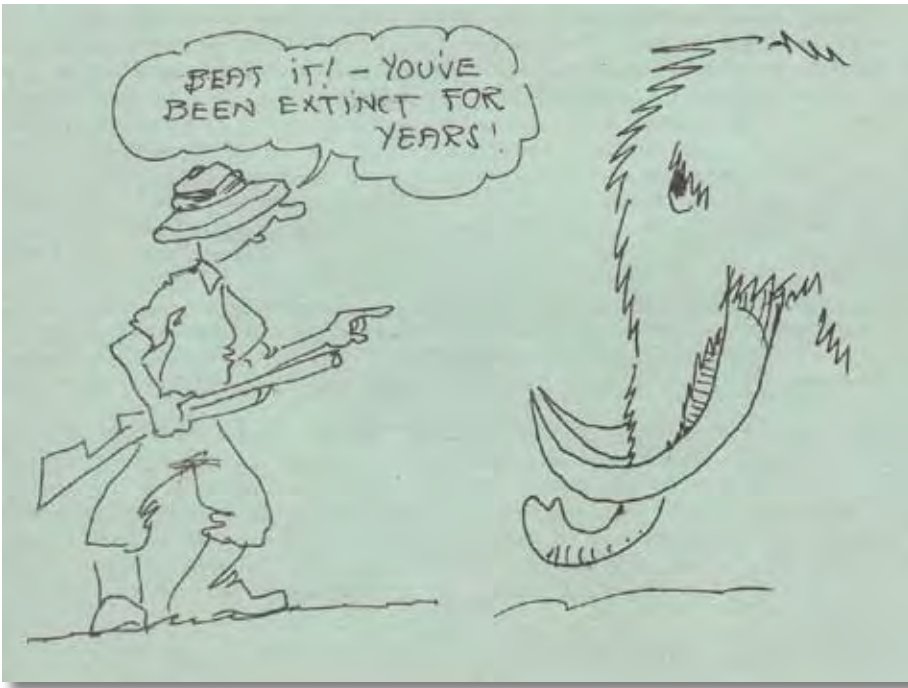


Students enjoying the views along the way



GEOLOGY EVENTS

BGS Field Trip, cont.



The field trip group at the Waco Mammoth Site

GEOLOGY EVENTS

Summer Field Camp 2011



Last day of field camp. Departure from Molas Lake Colorado at 5 AM.



Kim Kuijper, Erin Rinando, Lyndsay DiPietro, and Stephanie LeBlanc making dinner at Cloudcroft, New Mexico. We had to stay at an RV park because the National Forests were closed due to fire danger.



Alex Dale, Keith McVey, Cody Welch, and Josh Helms making burgers.



Measuring the angle of repose on dune slip faces at White Sands, New Mexico; group photo below



After a scorching Day at White Sands, we returned to camp to find that a hail storm had wreaked havoc on our tents!



— Rafe, are all geology field trips this rough?



GEOLOGY EVENTS

Field Camp 2011, cont.



Teaching Assistant Gary Stinchcomb instructs Lyndsay and Kim on cooking.



Jennifer Lowery found her camp chair after a bit of searching.



Mapping Red Rock canyon in Nevada



Resting at the bottom of the Grand Canyon



Gregory Sprengel, Ryan Danielson, and Savannah Soileau on the long hike out of the Grand Canyon



More students describing the section at the Grand Canyon

GEOLOGY EVENTS

Summer Field Camp 2011



The final few steps out of the Grand Canyon



Drafting up mapping projects in Utah



Drafting up mapping projects in Utah



Drafting up mapping projects in Utah



Sandy and Steve Dworkin on the south side of Mount St. Helen



Gary climbing through a tree cast Mount St. Helen



GEOLOGY EVENTS

Field Camp 2011, cont.



Water chemistry project at Yellowstone National Park



Field work at Dinosaur National Monument



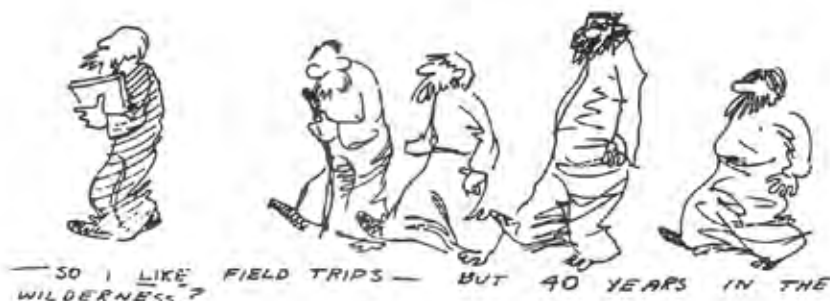
Erin Rinando and Chris Mehta at Dinosaur National Monument



Taking strike and dip measurements



Bad weather didn't stop the mapping project at Molas Lake





BUTTERMILK CREEK

Baylor, Texas A&M Researchers Find Earliest People to Inhabit the Americas

Study proves people inhabited the Americas earlier than previously believed.

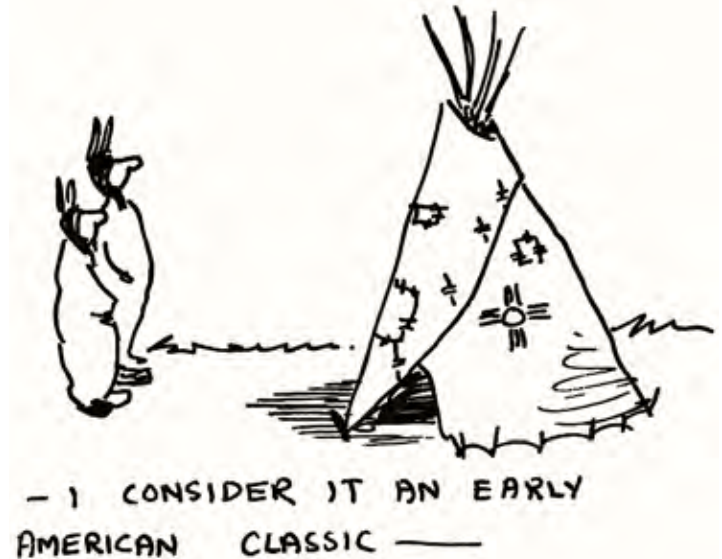
Baylor University geology researchers, along with scientists from Texas A&M University and around the country, have found the oldest archaeological evidence of human occupation in the Americas at a Central Texas archaeological site located about 40 miles northwest of Austin.

“This find really rewrites history, so to speak, and changes our collective thought on the early colonization of North, Central and South America,” said Dr. Lee Nordt, professor of geology at Baylor and dean of the College of Arts and Sciences, who is an author on the study. “What sets this study apart is that we were able to show using geological methods that the buried artifacts dating to pre-Clovis times were in their original state. This demonstrates unequivocally that the peopling of the Americas occurred much earlier than previously thought.”

The study appears in the March 25th issue of the journal *Science*.

For the last 100 years, archeologists have believed that the Clovis people were the first to enter the Americas about 13,000 years ago. Artifacts found by this study now place that time back 2,500 years, or to about 15,500 years ago.

At the Debra L. Friedkin archeological site, located about 10 miles outside of Salado in Central Texas, the Baylor researchers, along with their colleagues, found nearly 16,000 artifacts that predated the Clovis people. Most the artifacts were chipping debris from the making and reshaping of tools, however, about 50 artifacts were tools themselves such as knives and projectile points. The dating process placed these artifacts back to about 15,500 years ago. This find is not only the earliest evidence of human occupation in North, South and Central America, it also has the largest number of artifacts dating to the pre-Clovis time period.



Nordt and Dr. Steve Driese, professor and chair of geology at Baylor, College of Arts and Sciences, collected samples from the site and analyzed particle-size distribution, organic carbon and calcium carbonate content. The systematic depth functions of these properties demonstrated to the Baylor researchers that the mixing process from the dirt shifting or cracking was not a factor in the formation of the archaeological site. Their analysis proved that the site was undisturbed and that the artifacts were in place since they were discarded 15,500 years ago.

“There is absolutely no evidence that there was erosion or soil movement when the site was formed that could have significantly redistributed the archaeological materials,” Driese said. “This was really a critical finding. There have been several



Block A excavation

Buttermilk Creek, cont.

credible sites in North and South America which date older than the Clovis people, but the evidence is not real strong. This study proves people inhabited the Americas earlier than previously believed."

The Baylor researchers also said more than 60 "optically-stimulated luminescence dates" show that the early people arrived at the site by about 15,500 years ago. The luminescence dating technique is a method used to date the sediment surrounding the artifacts by dating the last time the sediment was exposed to sunlight.

The Baylor researchers said the artifacts show an array of different technologies and there is no doubt that the tools and weapons were human-made, dating to about 15,500 years ago. Analysis of the Debra L. Friedkin archeological site is ongoing and future studies will help explain where these people came from, how they adapted to the new environments and understand the origins of later groups like the Clovis people.

Funding for the project was provided by the North Star Archaeological Research Program and the Chair in First American Studies at Texas A&M.

Researchers from Baylor, Texas A&M's Center for the Study of First Americans, the University of Illinois-Chicago, the University of Minnesota and Texas State University all participated in the study.



Pedological sampling at Buttermilk Creek



Let's see; now for the microfossils.





BY THE EDGE OF A SPRING

Suzy Dahl

I sat in Peace
Profound Peace

The sort of peace that comes from being a student of the earth
I was taking a break from thinking “how does a water molecule move through soil and rock”



In this serene place
Where the.....
Artesian spring water bubbles up
Water-crest floats and waves
Creek flows nearby
Breeze, sun and, shade all combine

I look up – and the mist between now and before lifts
I am blessed
Blessed with watching
While not being seen
Native peoples of the Past

They were using this place, the land, the creek, the spring
Children play in the water
Women tend to food and fire
Men are working hides

With this blessing
My Peace Deepens



At once I am at a different bend in the river,
Further upstream along My Salado Creek
I am once again walking in ankle deep water
Atop a limestone creek bottom

Feeling the cool clear baseflow,
Studying the limestone and its fracture patterns
Studying the aquifer and stream as they interact beneath me
Walking, Studying, Learning, Recording

I stop and look around
I have the innate feeling of being watched by the unseen
My Deep Peace Deepens





At once I am yet at a different bend in the river
This section of the creek is also familiar to me
The tall trees reach all the way across the creek
And the shafts of light dance in the shadows

The stream bottom is firm and smooth
An easy walk
The clear water caresses my calves
And teasingly splashes up as I walk

I look to my right and then to my left
I am not alone, They are not alone
They see me, I see them, We know each other
Barriers of time and distance have no meaning

We are people of many different times
Walking together
Understanding Our Creek,
Knowing this Earth

My Peace deepens to Abyssal Depths

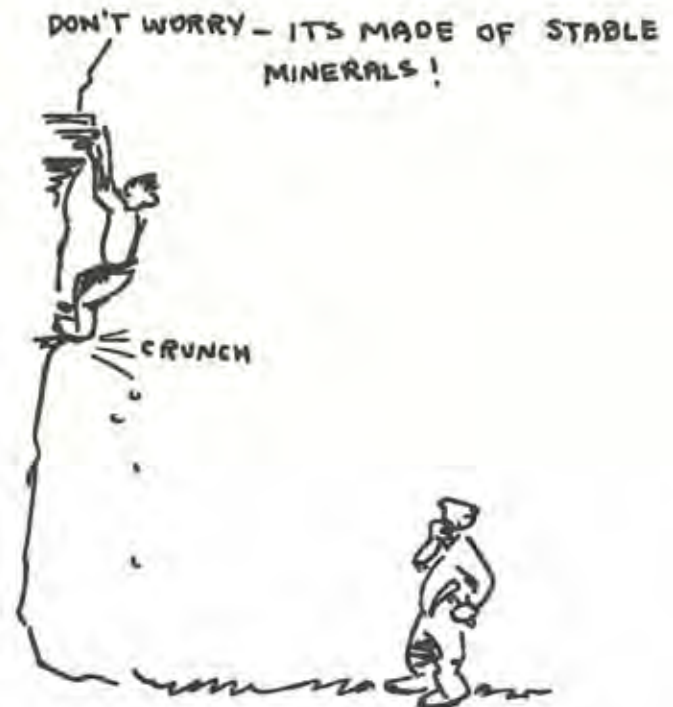
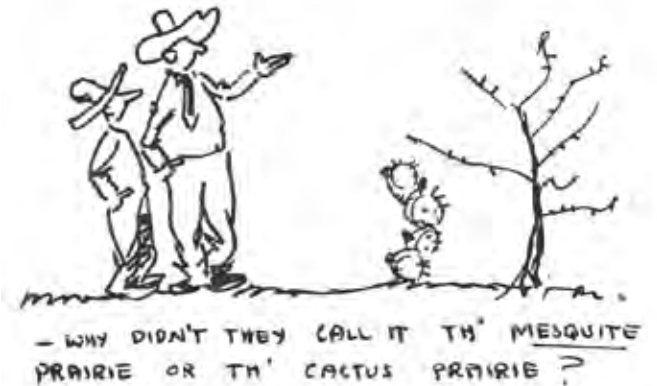


At first - my studying of the land, spring, creek
Allowed me to see them in their time

Then their appreciation of this creek, this part of earth
Allowed them to see me in my time

Then We All walked together in the creek we all loved
In the Creators Time

My Peace became Indescribable



GRADUATES AND AWARDS

Bachelor of Science Thesis

Tyler Landers, B.S.

Influence of Late Holocene climate change on floodplain deposition, erosion, and soil formation along Williams Creek, central Texas, USA

Ben Phrampus, B.S. in Geophysics

Analysis of Broadband Seismic Station Coverage for a Seismic Survey across the Texas Gulf Coast

Brandon Swain, B.S.

Internship Report with Abraxas Petroleum Corporation, Summer 2010

Master of Science Thesis

Dan Lancaster, M.S.

Correlation of Earthquakes with Seismogenic Faults along the Northern Arizona Seismic Belt, Southwestern Margin of the Colorado Plateau

Stephen Secrest, M.S.

Analysis of Calcite-filled Faults in Carbonate Strata, Balcones Trend Near Waco, Texas



Doctoral
Dissertations
**Jason S. Mintz,
Ph.D.**
Rise of the
Givetian (385
Ma) Forests,
Northern

Appalachian Basin, Catskill State Park, New York, U.S.A. *Pictured above with mentor: Dr. Steven G. Driese*

Awards

Stephanie LeBlanc – 2011 recipient of the Robert T. Hill Award for Academic Excellence in Geology

Stephanie LeBlanc, John McFadden and Ben Phrampus - Chosen to represent the Geology Department at the 2011 College of Arts & Sciences Honors Convocation. *(pictured right with Dr. Driese)*

Blake Taylor and Garrett Fletcher (son of Tom Fletcher) – 2011 recipients of the Dixon Undergraduate Field Assistant Award.

WHERE ARE THEY NOW?



John Shelton, (Geology Minor, 1949) is the 2011 recipient of the prestigious Sidney Powers Award. A write-up can be found in the April 2011 AAPG Explorer page 22, 24, and 45.

Mack Cox (BS, 1959) after retiring as a Captain working in naval intelligence in the US Navy, Mack worked in international and domestic sales and management.

Tom Wedel (BS, 1959) After time spent as a member of the AFROTC at Baylor, 7 years flying in the USAF, and 30 years with United Airlines, Tom is now working to restore prairie and savanna on his 398 acre southwest Wisconsin farm with his wife, Eva.

Robert Hobbs (BS, 1987) is the CEO of TGS Geophysical and lives in Houston with his wife Michelle, and daughters Ashley (18) and Lauren (13). Robert says both of his daughters are thinking of coming to Baylor and Ashley has been accepted.

Congratulations to...

Shannon and Jamie Ruth on the birth of their son, Justin, on October 14, 2010.

Zachary and Sara (Sipahioglu) Bright on the birth of their son, Dylan, on December 15, 2010.

Shane and Micah Prochnow on the birth of their son, Joergen, on June 23, 2011.



WHERE ARE YOU NOW?



We would love to know! Please complete the form on the back, fold in half, place a stamp, and put it in the mail. We will use this information to update our departmental files. You can also email your information to: Paulette_Penney@baylor.edu.

Also, remember we have the "Geokid" bulletin board in the office with photos of children of Alumni, so send your pictures to Paulette_Penney@baylor.edu.

PLACE
STAMP
HERE

Baylor University
Department of Geology
One Bear Place #97354
Waco, TX 76798-7354

PERSONAL INFORMATION SHEET

DEPARTMENT OF GEOLOGY

Name: _____ Class: _____

Degree(s): _____

Phone: _____ Email: _____

Mailing Address: _____

Type of Work: _____ Location: _____

Company Name: _____

Family Information: _____

Hobbies: _____

Interests: _____

Spare Time Activities: _____

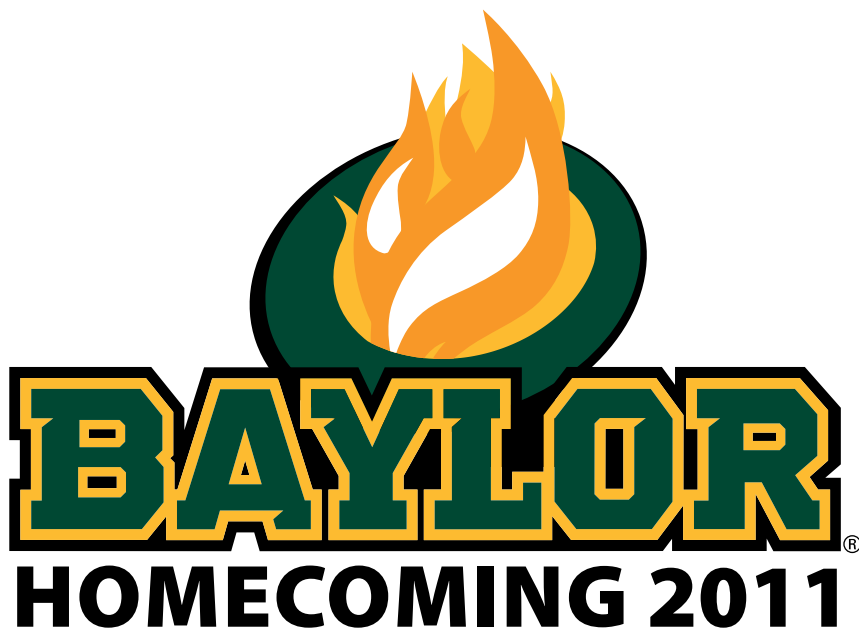
Would you like to share information in the Homecoming Newsletter Section, "Where Are They

Now?" Yes ___ No ___ If yes, write information here: _____

Are you willing to speak to the Department?

Yes ___ No ___ If yes, write topic here: _____

Suggestions: _____



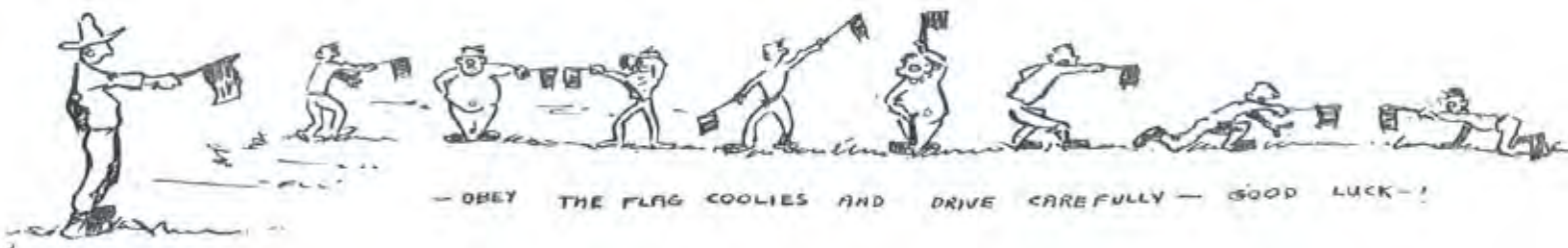
Please join us!

GEOLOGY OPEN HOUSE

Friday, Nov. 4, 2011

7:00–9:00 pm

Baylor Sciences Building, E401





BAYLOR
UNIVERSITY

COLLEGE OF ARTS AND SCIENCES
Department of Geology

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Waco, TX 76798-7354

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Dr. Peter Allen | Professor

Dr. Stacy Atchley | Professor

Dr. Rena Bonem | Professor

Dr. Vincent Cronin | Professor

Dr. John Dunbar | Associate Professor

Dr. Steve Dworkin | Professor

Dr. Don Greene | Professor

Dr. William Hockaday | Assistant Professor

Dr. Boris Lau | Assistant Professor

Dr. Lee Nordt | Professor & Dean, College of Arts & Sciences

Dr. Daniel Peppe | Assistant Professor

Dr. Jay Pulliam | W.M. Keck Foundation Professor of Geophysics

Dr. Joe Yelderman | Professor

Dr. Tom Goforth | Emeritus Professor

Dr. Harold Beaver | Emeritus Professor

Dr. Bill Brown | Emeritus Professor

Dr. Don Parker | Emeritus Professor

Paulette Penney | Office Manager

Erin Stinchcomb | Administrative Associate

Janelle Atchley | Administrative Assistant

Jamie Ruth | Administrative Associate

Sharon Browning

Geology Freshman Laboratory Coordinator

Dr. Ren Zhang

Stable Isotope Lab Instrumentation Specialist

