

## Field Studies – A Not-to-be-Missed Educational Experience

*By Joseph H. Hartman & Arthur E. Bogan*

*Joseph Hartman and Art Bogan continued their fossiling for mollusks in the western U.S. this past summer. Read about last year's adventure in AP 15(3): 34-35, Fall 2007.*

Once again this summer, we witnessed one of the glorious aspects of science that happens every season – students experiencing the joy of discovery. In our case, the joy originates in paleontology and geology and includes learning the practical aspects of retrieving fossils and their attendant information set (for the most part) in continental semi-unconsolidated sediment. The outcome, we hope, for our students and others who participate in this and similar rituals is the desire to continue in science, in whatever discipline they might embrace.

This summer, we again collaborated with paleontologists and geologists interested in the Hell Creek and adjacent formations. The field groups were led (or sponsored) by the two of us, Greg Wilson (University of Washington-Seattle; UW), Jack Horner (Museum of the Rockies, MoR), and Will Clyde (University of New Hampshire-Durham). Students from around the U. S. and the world engaged in a variety of proj-

ects at various stages of their education. Like others, Kristyn Voegelé (Concordia College-Moorhead, Minnesota) in our group took a UND “field class” for her degree. Although Kristyn assisted greatly with our continental molluscan studies, her passion is to be a kind of Mary Schweitzer, a molecular paleontologist at North Carolina State University-Raleigh and NCSMNS [Ed. Note: see *AP* 15(1): 19-23, Spring 2007]. This summer gave Kristyn the opportunity to work in the field with the Horner group under the direction of satellite camp leaders Denver Fowler and Becky Schaff (both MoR), who are excavating end-Cretaceous dinosaurs from the Hell Creek Formation. Don McCollor, a chemist and technical manager with the Energy & Environment Research Center (UND), uses vacation time to further his education and enjoy Montana and North Dakota badlands in search of mollusks. Don is a more mature student (having received his degrees some decades past) who regularly takes paleontology courses, attends seminars, and participates in class field trips. Paleontology affords learning as a lifelong pursuit!

Our group also included Peter and Dan Hartman (Joseph's brothers) who joined us for their first-ever fieldwork



*Don McCollor, Phil Kilbreath (Montana State Game Warden), Ray Butler, Greg Wilson, Jessica Gudgel (Warden's fiancée and sometimes cook), Kristyn Voegelé, and Denver Fowler relax in camp on a typical, spectacular nightfall on the shores of Hell Creek Bay, Hell Creek State Park (J. H. Hartman photo).*



*Don McCollor, Art Bogan, Peter Hartman, Dan Hartman, and Kristyn Voegele dig in the open pits of a continental shell bed near Brownie Butte in the Hell Creek Formation (J.H. Hartman photo).*

together. Peter, a soil scientist for the Natural Resources Conservation Service, and Dan, a computer systems manager, now know, at least from a few days of experience, what all the fuss is about after 35 years of rumors about what their oldest brother does.

Greg Wilson spent most of the summer in search of mammalian fossils, documenting old localities and searching for new ones at new stratigraphic levels. Students came and went from his camp at Hell Creek State Park, north of Jordan. While we were there, his wife Caroline Stromberg and Jeremy Riedel (both UW) were searching for the appropriate indicators to bulk load matrix back to camp and wash matrix for picking back in the lab. Washing matrix in Hell Creek Bay is roughly analogous to milking cows, but without immediate results – wet, messy work done twice a day, up to one’s ankles in goo, hoping the rewards will be worthy of the back-breaking effort.

Working on the Hell Creek Project is paleomagnetism expert Will Clyde and his student Rebecca Dodds. With Greg, Will and Rebecca sampled a geologic section on East Reid Coulee to determine the paleomagnetic stratigraphy of the Hell Creek Formation. This effort is the core of Rebecca’s Ph.D. dissertation. After considerable discussion, this section now appears to be appropriate to represent the Hell Creek Formation as its “type,” something Barnum Brown failed to designate. Slightly later in the summer, Denver Fowler and Joseph determined the pathway that the section should take and plan to measure it lithologically in the Fall. In addition, Nels Peterson (MoR field engineer and recent graduate) is providing a 3-D LiDAR (light detection and ranging) image of the primary butte representing the stratotype. Our return trip in September will likely include Will Gosnold (UND) and students from his Digital Mapping Methods course, who

will GPS (global position system) the section for practice and research benefits.

Other collaborations and student activities this summer included John Scanella and Denver Fowler (both MoR), who are managing dinosaur excavations near Brownie Butte, north of Jordan. Both localities are interesting for “mollusketeers” in that they are at or near freshwater shells. Greg, John, Denver, and Ray Butler visited UND in March to discuss goals and summer field plans. John and Denver talked specifically of their dissertation studies to students in the “John Denver Project,” which includes the ontogeny of *Triceratops* and the sequence stratigraphic framework of the Hell Creek Formation and adjacent units. While visiting UND, John borrowed a *Triceratops* femur and tibia for histological study. Some fieldwork turns out to be museum based and fortuitous. Ray Butler (Endyne, Inc.), a UND alumnus, provided insights into the regional sedimentological architecture for the Hell Creek Formation. An earlier meeting with Denver in Glendive, Montana, was followed by hikes through the proposed stratotype. One trip included Ray’s son, Alan (Butte, Montana), making the study of the rocks another family affair.

The MoR Haxby dinosaur study area is remote. Sure, the tire-gravel-tire-grass-rutted trail-prairie dog byway-where’s-the-route-access to Haxby is only 48 miles from Jordan, and a few ranchers live on the peninsula between Dry Arm and Fort Peck Lake proper. But the land is as open and unexplored as it gets. Jack Horner’s satellite camp, managed by Lee Hall with oversight by Bob Harmon (both MoR), has been working (along with an Italian crew) on new dinosaur finds far from the beaten path. New molluscan beds were more or less simultaneously discovered by John, Denver, and



*Top left: Joseph Hartman (left) talking up shells to students Kristyn and Nels at a high-diversity molluscan locality southwest of Brownie Butte in the Hell Creek Formation (A. E. Bogan photo).*

*Lower right: Art Bogan (right) and students Sarah and Denver examine Haxby dig snails and mussels from massive float blocks in an in situ bed in the Hell Creek Formation (J. H. Hartman photo).*

Sarah Keenan (Bristol University, England). Sarah, working on her dinosaur taphonomy thesis, coordinated her studies with us last year at Quitting Time, a lake-based deposit rich with sphaeriid bivalves. This year, her efforts facilitated the collection of specimens and photographs of others from a truly marvelous horizon of literally tens if not hundreds of thousands of snails and some mussels. The largest fossil freshwater mussel that we have seen was found at this locality. Thanks to Sarah, John, and Denver.

Snap Creek, where Becky Schaff manages daily events, is southeast of Haxby and west of Dry Arm. Snap Creek is Jack Horner's current base camp in the Hell Creek country, where Nels works his computer (LiDAR) magic and Nels' wife, Laura (whose day job is as an operatic soprano), prepares

extraordinarily flavorful suppers. Snap Creek is one of the places where connections were made. When we moved from Hell Creek State Park to Snap Creek, Nels put us in contact with Monte Billing, who brought in a rock loaded with the freshwater snail *Campeloma*. After some minor complications making contact (with limited cell phone reception), we learned that the fossils were from the property of neighbors Pat and Bev Gibbs. On two-minute notice, Monte agreed to take us to the locality. Our preconceptions were a little misguided. After a long, hot day at the Haxby locality, we drove 14 miles south to a meander-cut bluff with big hissing "worms." We hiked the slope, crossed a couple of plowed, hard, dried fields, and descended with two dogs, Monte's two kids (Arielle and Reece) to another *Campeloma*-rich shell

A day's crew ready to discuss, argue, re-view, sample, and photograph the proposed stratotype section of the Hell Creek Formation on East Reid Coulee. Left to right: Ray Butler, Don McCollor, LiDAR expert Nels Peterson, Greg Wilson, LiDAR assistant Allen Rice, Kristyn Voegele, Denver Fowler, and Joseph Hartman (A.E. Bogan photo).



bed. Pat and Bev arrived on horseback a short while later. We took photos and some samples in twilight. The shell bed was massive in places, reaching a thickness greater than one meter. There were lots of questions from the adults and kids, too. We learned that folks had been climbing this coulee for generations to show and tell about these fossils, collecting samples for fun and doorstops. Apparently, our presence provided the first credible information about the geological history of their occurrence.

Our field work and studies expanded our fossil base for paleodiversity, environmental content, biostratigraphic range, and species novelty. We were also able to take part in team projects in lithography, from the traditional to the high tech. In all of these projects, undergraduate and graduate stu-

dents were involved and found opportunities for theses, dissertations, or publications. In addition, our interaction with locals, young and old, benefits future attitudes toward the sciences (and scientists) and awareness of resources. One new rancher in the area had no idea of the shells present on his land, and learning that shells are of freshwater origin comes as a surprise to a number of ranchers. An exception is the Trumbo family. Sylvia, John, Mike, and their land caretaker, Lon Bolick have provided locality data for fossil shells and vertebrates over the years. Other ranchers have shown great hospitality to the “clam and bone hunters.” The field experience gained by students, their advisors, and landowners is critical to future good will and the use of private lands. Besides providing truly enjoyable encounters, landowners become a field person's best friend for access, safety, and local history.

Although the Web has become the go-to resource for information, fieldwork continues to provide unique educational opportunities and unparalleled experiences. In testing hypotheses through observation, documentation, and bringing useful information back to others, field science becomes habit forming. Students are inspired by it, making a career a way of life, not just a job.

*Joseph Hartman is Associate Professor in the Department of Geology and Geological Engineering, University of North Dakota. Email [joseph\\_hartman@und.edu](mailto:joseph_hartman@und.edu). Art Bogan is Curator of Aquatic Invertebrates at North Carolina State Museum of Natural Sciences, Raleigh. Email [arthur.bogan@ncmail.net](mailto:arthur.bogan@ncmail.net).*

SCANDINAVIAN AND DOMESTIC FURNITURE  
AND ACCESSORIES OF GOOD DESIGN

**CONTEMPORARY TRENDS**

121 N. AURORA STREET, ITHACA, NY 14850      607-273-5142

*Did you know??*

Horseshoe crabs have the rare ability to re-grow lost limbs, in a manner similar to sea stars. They also have ten eyes.