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## BIVALVES

## Fossil Freshwater Molluscan Field Trip to the Late Cretaceous

By Arthur E. Bogan and Joseph H. Hartman

The idea for an excursion to the badlands specifically for fossil freshwater mollusks had its inception over a beer in Barcelona. After sporadic discussions of where, when, and even why, we finally settled on the end of July through early August 2007. We discussed eastern Montana and southwestern North Dakota, and even northeastern Wyoming, then for timing reasons, we decided on the Williston Basin. Here were great vertical continental exposures of the uppermost Cretaceous Hell Creek Formation and Tullock and Ludlow Members of the Fort Union Formation, which commence at or just below the Cretaceous-Paleocene (K/P) boundary. We would visit some identified sites to look for freshwater gastropods and bivalves, with the goal of tracing their occurrence across the K/P boundary. Arrangements were made to stay at the Snap Creek Camp of Jack Horner of the Museum of the Rockies (Montana State University), located west of the southern arm of the Fort Peck Reservoir and about 60 miles northeast of Jordan. Upon arrival, we discovered that the camp had all of the amenities of home: wireless internet, satellite telephone, cell phone coverage (if you were on top of the ridge behind camp), outdoor facilities, hot water for showers (at least in early evening), and a fabulous cook and camp facilitator (Laura Loge and Nels Peterson). Breakfast and lunch were simple, but dinner was always a treat, and for the time we spent in camp, no two dinners were alike.

Our crew of five explored the ridge northeast of camp, finding nice specimens of a species of *Viviparus* and a few fragments of unionid clams. The climb was steep and hazardous, and very hot (108°F). We returned later in the week to this same spot to find another site, a small bowl-shaped depression on top of the ridge. We found areas where the gastropods were simply lying on the surface, having eroded out of the matrix from surface outcrop. The only problem with the site, which had hundreds of specimens, was that there was no wind, so it felt like we were in a bowl of hot soup. Only part of the trip was spent prospecting in the heat – two days of walking up and down buttes looking for fossil mollusk-bearing beds proved to be good only as exercise (except for a few dinosaur bones).

One of the students working on the *Triceratops* bone bed northwest of camp commented one evening about “tons” of small freshwater clams on the small ridge just west of their site. So, the next day we drove to that vicinity. We had a short walk across the prairie flat and down into the valley of the bone bed. There lay five plaster jackets covering dinosaur bones to be moved back to camp and then on to Museum of the Rockies. The top of the adjacent ridge was, as promised, spotted white with shells and fragments eroding out of the mudstone. We collected numerous samples of some very large Late Cretaceous fingernail clams (family Sphaeriidae) plus the occasional gastropod. Near one edge of the ridge, we found a bed containing huge plant stems with unionoid shells lying among them.

We left Jack’s isolated, but very accommodating, Museum of the Rockies field camp and moved southeast to Bowman, North Dakota. Here we were still in tents, but now in a mini-campground with good indoor toilets and hot and cold showers. The Pioneer Trails Regional Museum in town featured exhibits on the local history and a section devoted to local paleontology, including a complete, mounted *Triceratops* skeleton. We explored three locales in this area, all relatively close to the road (something different). At one, we collected ironstone gastropod steinkerns and, from the top of a small butte, ironstone steinkerns of several species of Late Cretaceous unionoids. One site that we visited on three different days was a thin horizon near the top of a butte containing abundant compressed unionoid impressions, but lacking any evidence of shells.

We brought back a good quantity of specimens and matrix from most of the sites to be processed in our laboratory. All of the specimens and blocks had been carefully wrapped in the field in university-grade toilet paper, labeled, and then placed in plastic bags. These were then packed in backpacks to be carried out to the vehicle and finally back to camp. Only the number and strength of people available to carry the fossils limited the total amount moved. Upon returning to the University of North Dakota, in Grand Forks, the boxes of specimens were organized in Room 1 of the newly named John Reid Research



View of Hell Creek-Fort Union formational contact across Snap Creek drainage, Garfield County, Montana. Photograph by J. Hartman.



Hartman enjoying the first fossil locality in the lower part of the Tullock Member. Photograph by A. Bogan.

Laboratory in the Department of Geology and Geological Engineering, to await unpacking and preparation. The materials we collected will be used in three master's theses, representing efforts of the crew, Matt Burton-Kelly, Anna Crowell, and Tanya Justham. Other crew members included Ph.D. student Marron Bingle and volunteers Kristyn Voegelé and Don McCollor of Grand Forks.



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Bogan checking out Tullock exposures near Moose Crossing. Photograph by J. Hartman.

*Those Other Mollusks, continued from page 33*

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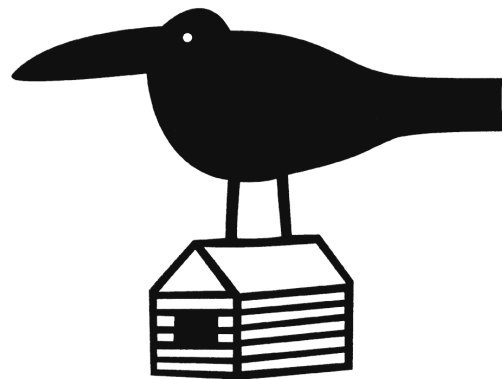
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