



Issue 10

Spring 2004



Clockwise: 2003 WORK WEEK participants Dave Ritter (left), Phil Robertson (right), and unidentified party (top center) locating pipe-a new plaque on the Point in memory of Pete and Dottie-another banner year for brush hauling- Russ supervises a jolly kitchen staff- Jeanette stalks the elusive hummingbird-a welcome mid-June flurry.





From the President...

Last summer, I made two trips to Red Lodge. The first one was a too quick trip for the Annual Meeting. I don't know about you, but once I get to Red Lodge, I do not want to leave. All the pressing matters that control my life at home just go on hold when I arrive at YBRA.

The second visit to YBRA was longer. I came for a week and a bit to help run an Alumni College for Amherst. Since my first visit to YBRA as an Amherst faculty member, the Amherst Alumni Office has been asking me to help run an Alumni College. I repeatedly refused this request. However, last summer I relented and agreed to miss a year of teaching Field Camp in order to participate in the Alumni College. I only agreed because it would be possible for my family to accompany me on the trip.

I was in for an incredibly pleasant surprise. Working with the alumni group was different but just as interesting and enjoyable as teaching the undergraduate field course. I still got to do one of my favorite things, introducing new people to the geology of the Red Lodge area. And, as with a field course, there were the obligatory side trips to the Griz in Roscoe and the pig races in Bearcreek. But, I also got the chance to learn new things. From Phil Robertson (SIU Forestry), I found out a lot more about the importance of fire to the local ecology and now may be able to identify at least some of the local trees. I also got new insights into Crow history from Fred Hoxie (Amherst alum and now University of Chicago, History). This did seem to be more like play than work.

But most importantly, my kids (ages 6 and 8) got a chance to spend time around Red Lodge. We were lucky because the Alumni group included eight other children who ranged in age from 3 to 13, with a good cluster about the same age as mine. The kids

came with us about half of the time. On the first day, most of the kids participated in Phil Robertson's tree identification exercise, and some of them got it down well enough to keep pointing out different trees throughout the week. They were just as enthusiastic as field camp students when we were on a field trip looking for gastroliths or *Gryphea*. The kids had a great time at the pig races (I bet none of you ever noticed that there was a playground there) and downed a (root) beer at the Griz. Back in camp the children ran wild, as I have been told that some of you reading this once did. For us parents, that was great. The kids ran as a pack until they could not run any longer. And, then they went to bed (really!). The next day, they got up with the sun to do it all over again.

This trip made me realize how much I really love Red Lodge; I love the geology of the Bear-tooth Front and I love introducing geology students to both. Summers are always busy and coming to Red Lodge to teach at YBRA ranks pretty high on my summer priority list. It was especially meaningful to me in that my kids really like YBRA and want to go back. Thinking about this makes me think about the future of YBRA. I want to see that YBRA as we know it today is around for them, for that next generation. Land development is changing the Rock Creek Valley. Although we cannot stop that, YBRA has been committed to trying to preserving its immediate environment. This is difficult, costly and uncertain. The infrastructure of YBRA is aging and in need of continual repair and replacement. This however is something that we can control. The YBRA bridge fund has been set up to help fund capital improvements, specifically for the replacement of the Rock Creek Bridge and upgrades to the water supply. For the next generation as well as today, please consider contributing to the bridge fund.

Peter Crowley
YBRA President

Penn State Reunion a Go (Finally)

After several years of postponement, the Penn State Field School Reunion is set for August 20 – 23, 2004 at the YBRA camp. This is open to all PSU Geosciences and Earth Science alumni in addition to former field school participants. Additional information and the registration form can be found at <http://www.ybra.org/reunion/reunion.htm>. Pre-registration is due by June 30th, and cabin space is first-come first-serve, so sign up early. Leftover funds will be donated to the camp for capital improvements, particularly the bridge replacement.

YBRA Summer Activity Plan

This summer promises to be very active for the camp, with utilization numbers in the first half much higher than we've seen in some time. Josh Smith will be bringing a new paleontological group from Washington University, along with our regular "dinosaur hunters" from the New Jersey State Museum and the Cincinnati Museum. In another first, the University of New Orleans will be bringing though a program that exposes minority students to earth sciences and geosciences to encourage interest in these fields. Differing from past years, there will only be one session of the Penn/YBRA group, although it will be larger than usual. Work Week is planned for the first week in August. Closing out the season will be the Franklin and Marshall Alumni College and Penn State Field School Reunion, and the Red Lodge Women's Retreat. An open house will also be held, with the date yet to be set. The current schedule for all the groups is listed below, and a more detailed schedule can be found on the YBRA Web site:

- June** Smith Paleo (6/4 – 6/29)
 Penn State Field Course (6/7 – 6/22)
 Penn/YBRA Field Course (6/8 – 7/13)
 University of New Orleans Program (6/8 – 6/9)
 SIU Field Course (6/19 – 7/29)
 Penn Environmental Course (6/26 – 7/11)
- July** New Jersey State Museum Paleo (7/17 – 7/30)
 Cincinnati Museum Paleo (7/18 – 8/7)
 Work Week (7/31 – 8/6)
- August** F&M Alumni College (8/7 – 8/14)
 Penn State Reunion (8/20 – 8/23)
 Red Lodge Womens' Retreat (8/28)
 Open House (to be announced)

YBRA volumes available to buy:

1986 Geology of the Beartooth Uplift and Adjacent Basins: a 323 page illustrated hard cover guide book containing geologic articles by YBRA professors and Montana Geological Society authors. On sale now for only \$40.00

1997 Bighorn Basin Guidebook: a substantial volume that includes the proceedings of the Conference as well as a series of extended abstracts on a variety of Bighorn Basin topics. Also included are the complete proceedings of the 1997 conference on the "Improved Exploration for Natural Gas", organized by the Wyoming Institute for Energy Research and the Wyoming Science, Technology and Energy Authority. This guidebook accompanied an outstanding week-end of field trips, presentations and papers. Price for this volume is \$60.00.

To purchase the above volumes please contact Betsy Campen (Betsycampen@bresnan.net).

Significant YBRA People

Officers:

President: Peter Crowley, Amherst
 Vice President: Virginia Sisson, Rice U.
 Past President: Ed Beutner, F&M
 Secretary: Josh Smith, Washington University
 Treasurer: Betsy Campen Billings, MT

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 Russ Dutcher, Carbondale, IL
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 Laurel Goodell, Princeton
 Peter Muller, SUNY-Oneonta
 Don Fisher, Penn State

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CAMP MANAGER'S REPORT

The Spring 2003 UPLIFT reported on the problems with the water supply and distribution system in the Summer of 2002. We made it through that period and also made it through last summer. To say that it was uneventful, however, would not be quite correct. We had a profitable visit July 17, 2003 with two representatives from the Montana Department of Environmental Quality that we had been anticipating for 2 to 3 years. The State has determined that YBRA is a "Transient, Non-Community Public Water Supply" and we are now gearing up to function as such. This is mandated now as we serve "at least 25 persons per day for 60 or more days per year". So, the summer of 2004 will be a time of adjustment for the staff to the increased requirements and modified procedures.

The fact that our water supply is from a surface water source does also complicate the requirements somewhat. Yes, we must continue to filter and chlorinate, but we must now use the doubly-priced, absolute-rated one micron filters in place of the nominal-rated final filters that we have used for several years. Other specifications will require us to have vented water tanks; a main-line flow meter; an inspection by DEQ every 3 years; a new turbidimeter; annual lead, copper, nitrate and nitrite analyses; as well as documented routine start-up and flushing procedures.

In my review of last years report on our physical plant, I noticed the photograph on p. 4 of the UPLIFT and the words in the first sentence of paragraph 3 which might seem to identify it as a picture of "the water treatment house on the slope above the main tank". In fact, this is the newest (and smallest) building at YBRA which was built to house the plumbing and pressure system for the bathrooms in Princeton, Foote, Tom Dorf, Amherst, and Franklin and Marshall Cabins. The treatment house is 200 ft. up the hill and about 50 ft. vertically above the top of this photo.

Last Fall we had to perform major surgery on the pipes that leave the green tank back of Thom Library to carry water to Marathon Wash House; the galvanized pipe croaked after 35 years more or less. The system works like a charm now; but the old pipe is, as of this writing, still lying about the area. Some minor re-landscaping about Marathon is also in order. We will attempt to finish the work before Camp opens for the season, time and weather permitting.

It has been mentioned before that we are trying to get the Camp in good shape with regard to brush, limbs, proximity of trees to buildings and other fire prevention measures. Great strides have been made- you would notice the change if you have not been on the scene recently! The U.S. Forest Service has been a great help to YBRA in inspecting and guiding our work whenever we needed suggestions. They accommodated us again late last fall by burning the enormous brush pile

resulting from 2 years clearing efforts, including extensive tree cutting accomplished by last year's energetic Work Week crew! The November snowstorm made the burning possible, but also blew down the YBRA sign at the bottom of Howell Gulch Road and made it impossible to replace at that time. We also hope to have that problem taken care of before the first participant arrives!

We are planning on holding Work Week again this summer from July 31-August 5. Volunteers have done a great deal for us and we invite you to join in the tradition. You can contact the Camp or any of the members on the scene in Red Lodge for more details including the free room and board offer that we make for those willing to volunteer.

Otherwise, come and see us anytime you can!
Russ Dutcher

Hummingbird Highlights



For the past two summers, the camp has hosted a banding project to document hummingbird populations and migration patterns in the Red Lodge region. Ned and Gigi Batchelder, local hummingbird enthusiasts, set up their mobile banding operation at numerous sites around Carbon County, but particularly liked YBRA for the high density of birds and comfort of the Lodge porch. The photo on the front cover shows Jeanette holding the trip line on a clever cage used to harmlessly trap the hummingbirds as they came to the feeders outside the kitchen window. (Their tiny brains must have little room for short-term memory – the same bird might be trapped twice or more on the same day.) Perennial nomads, the Batchelders have since moved on to Alaska, and we don't have the final statistics of their work, but the new bandings numbered in the hundreds, and there were a number of recaptures from previous years. The kitchen staff had fun helping out and will be continuing the feeders, so visitors will be entertained by dozens of these fascinating aerial acrobats.

Introduction to the Precambrian

Some of the oldest rocks found anywhere in the world occur in the Beartooth Mountains. Rocks as old as 3.96 billion years (3,960 million years or 3,960,000,000 years) have been determined by zircon dating of a quartzite sample from Hell Roaring Plateau. These quartzite rocks were derived from preexisting igneous rocks that must have been even older than this date. The age of the earth is generally accepted as being 4.6 billion years. Therefore these Beartooth rocks represent some of the first rocks formed after the initially molten earth cooled. The “Precambrian” is the period of time from the origin of the earth (4.6 billion years ago) to the beginning of the Cambrian Period (see legend).

Grizzly Peak : Grizzly Peak stands at an elevation of 9,416 feet. It forms the highest part of the Red Lodge Ski area. Its name is derived from the occasional grizzly bear that was sighted in its foraging out of the Yellowstone area. A grizzly sighting, although quite rare, does still occur in this region. Most such reports turn out to be brown-colored black bears.

Isotopic age dating techniques:

There are a number of elements whose nuclei spontaneously emit particles that change in form and produce new elements. This process is known as *radioactivity*. Early in the 20th century it was discovered that minerals containing radioactive isotopes could be used to determine the age of the minerals contained in some rocks. We are most familiar with radio-carbon dating. The carbon-bearing material may be wood, bone, ivory, or charcoal, for example. This technique has proven very useful for items no older than about 60,000 years.



Radioactive decay occurs when one element (the *parent* isotope) changes to another element (the *daughter* isotope) at a measurable rate. We call this rate the *half-life* of that decay process. That is the time required for half of the nuclei in a sample of an element to decay to its daughter isotope. After one “half-life” there will be found in the sample only one-half the amount of the original parent isotope and there will also be one-half the amount of the newly formed daughter isotope. After another “half-life” the ratio will be one-quarter parent isotope and three-quarters daughter isotope. After the third “half-life” the ratio will be 1/8 parent isotope and 7/8 daughter isotope. This process continues until there is so little of the original parent isotope that it becomes impossible to detect by current techniques.

A great variety of rocks found in the Beartooth Mountains are Precambrian in age. Here on Grizzly Peak are some *granites*, *granite gneisses* and *schists*. Elsewhere occur these same rock types as well as *granodiorites*, *migmatites*, *gabbros*, *basalts*, *ultramafics*, and *amphibolites*. All these igneous rock names come from the fact that they contain varying amounts of the major rock forming minerals – quartz and feldspars (plagioclase and potassium feldspar), iron-magnesium minerals such as biotite, amphiboles, and pyroxenes. One such classification of igneous rocks is illustrated here.

Studies of the Precambrian “basement” rocks of the Beartooth Mountains have revealed several episodes of igneous intrusion of dikes cutting the older rocks. The earliest intrusive event appears to have been approximately 3600 to 3700 million years ago. A major mountain-building episode, called the “Beartooth Orogeny” occurred about 2800 million years ago, with intrusion of the Long Lake granite and granodiorite and associated metamorphism of the adjacent rocks. This was the first in a series of four age groupings of such dikes – 2800-2500 m.y., 2200-2100 m.y., 1300 m.y. and 740 m.y. These dikes occupy fracture sets with a variety of orientations. The 2800-2500 m.y. old group shows the most diverse set of orientations. The 2200-2100 m.y. group are all generally oriented north-south. The 1300 m.y. old set is oriented 30 degrees west of north. The 740 m.y. old set is oriented 75 degrees west of north.

WORK WEEK 2004

July 31-August 5

YBRA will convene the 10th edition of WORK WEEK beginning July 31, 2004. This year is the first time, and possibly the only time for the near future, that Camp will be able to accommodate this activity during prime vacation time in early August. WORK WEEK was first organized in 1995 by the Dutchers at the suggestions of now Special Councilors Gerry Brophy and Bill Bonini. This year’s version will continue through August 5, 2004. Participants may arrive at anytime during the period- dinner will be on the table beginning the evening of the 31st. There is a variety of work to be done, so whatever talents you have will be gratefully utilized!

Last year we had a shortened Work Week; however, much was accomplished. After Camp was closed for the winter, two of our stalwart members returned to the hill to put their considerable expertise with chain saws to work again. We had a huge pine tree very close to the main water tank, as well as a smaller version that needed to go. The lack of people present was important due to the tricky placement required for dropping the two trees. The heroes had to miss the water tank, the newly constructed pressure tank building and a great number of pipes of all sizes and configurations. They did this all with great finesse and we appreciate their efforts a great deal!

During WORK WEEK, room and board is courtesy of the Yellowstone-Bighorn Research Association. Spouses, supervised children and working friends are all welcome! To provide for other groups arriving, WORK WEEK participants will have to be out of Camp after breakfast on the morning of August 6th. Please contact me via the Camp by phone at (406) 446-1333 or c/o YBRA at P.O. Box 630, Red Lodge, MT 59068 with further questions. Please join us if you can!

Russ Dutcher

FROM THE ARCHIVES:

In June of 2001, Ed Kemmick of the Billings Gazette revived the 75 year-old Siegfriedt story about how the good doctor picked out a mammalian tooth embedded in a shale chunk from a loaded coal car while on duty outside a mine in Bearcreek. Along the way, Siegfriedt told local newspaper reporters that it was human, developing his theories about “the cradle of mankind” and anointing Bearcreek as the Garden of Eden (“Paradise Lost,” June 10, 2001, p. 1C). A search of Kemmick’s cited sources sheds but little light on precisely when and how Siegfriedt learned from paleontologists that the tooth was not human.

Phil Gingerich (Early Cenozoic Paleontology and Stratigraphy of the Bighorn Basin, Wyoming 1880-1980, 1980, Univ. of Mich. Papers on Paleontology No. 24, pp. 16-17) suggests that Siegfriedt found this out when contacted by Henry Fairfield Osborn of the American Museum sometime shortly after Siegfriedt had sent more fossils from the site in May, 1927. Both the American and Carnegie Museums sent collectors to the site that year. Thomas H. Lewis of Billings says that, “Siegfriedt wrote Osborn in September, 1927 about this material and later sent his collection” (Northwest Science, 1982, Vol. 56, No. 1, pp. 58-61). (In this article, Lewis is the source of misinformation for Kemmick where Lewis says of Siegfriedt, “He suggested-----the Yellowstone Bighorn Research Association, an institution of research and teaching-----”). Lewis concludes that this was the beginning of Siegfriedt’s “two-pronged approach to matters---repeatedly expressed in his life” where “he spoke in a serious way to his paleontological colleagues” but creatively as a citizen (later mayor and state senator) to the press or any gullible persons who could serve as an instrument in promotion of the Carbon County area.

Since the Y.B.R.A. archives contain correspondence between Siegfriedt, Thom and others, the search was on by yours truly to see if anything there would contain new material. According to his letter of March 1, 1929, Siegfriedt sent a clipping and photo of the molar (taken in Red Lodge by William Lewis (Lewis, 1982, p. 59)) to W.T. Thom. This letter and photo have been on display in the Fanshawe Lodge and identify the tooth as belonging to a condylarth, possibly Phenacodus, a group ancestral to the hoofed animals. Siegfriedt inquired of Thom, “You have done a lot of work in coal. Have many fossil specimens been found in coal seams heretofore? I suppose that plenty of Reptilian material but as to mammals it is probably a matter of finding them.” On March 5, 1929 Thom replied, “So far as I am aware, comparatively few fossils have been found in coal beds except plant and fish remains. Perhaps in localities with which I am unfamiliar, bones may be associated with coal beds in some places, but I imagine that such occurrences are comparatively rare.” On June 21, 1930 Siegfriedt wrote Dr. Richard M. Field of Princeton promoting geological attributes of the area, agreeing to guide him and students on an excursion including his site at the Eagle Coal Mine. In this collegial correspondence to a potential colleague, Siegfriedt refers again to the Eagle Mine fossil bed as the place “where I uncovered several Primate specimens.”

These letters demonstrate that Siegfriedt was truly an interested, albeit amateur scientist learning geology and paleontology as the opportunity arose. Mary Dawson, Curator of Vertebrate Paleontology at the Carnegie Museum in Pittsburgh is quoted by Kemmick (2001, p. 4C) as having concluded this earlier: “So far as I can determine, there was no attempt at fraud, just a bad case of misidentification” (source undocumented).

Tracing actual events surrounding the “cradle of civilization” myth past 1930 is difficult and no one appears to have undertaken the challenge. The Billings Gazette published an article February 18, 1934 subsequently appearing in the New York Sun March 20th, which discusses a “man hunt” at Beartooth Butte in “Beartooth shales” in which Thom is credited with making “further encouraging statements”. The lack of complete quotations, dates etc. makes it difficult to sort out who said what and when, and to what extent the myth was actively being cultivated by Siegfriedt versus leaps of facts by the press. Gingerich concludes from an article in the Carbon County News in 1929, that the local press was a perpetrator after the original suggestion by Siegfriedt. Having taken note of the parade of visiting paleontologists between 1927 and 1929 and resulting scientific papers published in 1929, it was the press who “echoed Siegfriedt’s original claim noting: “it may possibly be found that the ancestors of most mammal life may have originated, not in

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Asia or Europe, but in North America, and that the Garden of Eden was actually located in the foothills of the Rocky Mountains, with Bear Creek, Montana figuring as at least the porter's lodge or one of the sub-urbs"" (Gingerich, 1980, p. 17).

I plan to seek out the 1936 Beartooth Highway marker that Kemmick says was moved in 1986 to the turnout near the old zoo at the south end of Red Lodge (2001, p. 4C). The last paragraph reads: "Some students opine that prehistoric man existed here several million years before heretofore believed. Personally we don't know, but if there were people prowling around that long ago of course they would pick Montana as the best place to live". Siegfriedt's myth had definitely taken on a life of its own!!

Linda Dutcher
4/07/2003

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ATTN: Proxy Enclosed