A Short History of the
Geology Program at Whitman College
with special reference to collections


Bob Carson
Grace Farnsworth Phillips Professor of Geology and Environmental Studies
2016
Contributions to our geology program and our collections began more than a century ago. Dr. Benjamin Brown taught physics at Whitman 1894-1934; his occasional geology courses included field trips to places like Wallula Gap. He wrote the definitive paper on the Stateline earthquake of 1936 (1).

Richard Clem came to teach at Whitman in 1951. His two areas of research were Miocene intracanyon basalt flows and large Pleistocene mammals. See appendices. He “dug” many fossils which are stored or on display, for example mammoth, mastodon, giant bison, and horse. Dick died in October 1974 at the age of 49. (His fall semester courses were finished by a Washington State University graduate student, Thomas Peters. Spring semester courses were taught by Dr. Johnny Allen, recently retired geology chair at Portland State University.)
In 1975 I became the next and last solo geology professor at Whitman. (I gave up tenure at North Carolina State University where I had been teaching since obtaining my Ph.D. at the University of Washington). NCSU had no sabbatical leaves, so I spent winter and spring quarters at the University of Oregon. There Dr. Ewart Baldwin encouraged me to apply for the position at Whitman. Ewart then came to Whitman as an Arnold professor, teaching and leading field trips for three semesters. When the University of Oregon geology department reduced the size of its topographic map collection, Ewart brought hundreds of maps to Whitman.
The first geology major (combined with English) was Bill Reeve, who graduated in 1976 and then went to the Colorado School of Mines. Bill told me what he knew of Dick Clem and his research, about local places for geology field trips, and about the geology department collections.

With only one geology professor, a geology major at Whitman was not possible. However, the number of combined majors nearly doubled each year starting in 1977: geology with biology, chemistry, astronomy, physics, mathematics, history, and art. When Mount St. Helens exploded in 1980, then President Bob Skotheim declared that this message from God meant Whitman should have a geology major. So petrologist John Winter was hired in 1981 and paleontologist Pat Spencer in 1984. Both got their doctorates from the University of Washington, so the College had a little concern about having all three of us from the same university. However, knowing Northwest geology is a big asset for our extensive field trip program. In addition, there was little or no overlap in our University of Washington professors and research supervisors because I studied in the Quaternary Research Center, John in the Department of Geology, and Pat in the Burke Museum of Natural History and Culture.
A geology major was proposed in the fall of 1981. The proposal was voted down 5 to 4 in the Academic Council, but was brought to the faculty (while I was out of town at a meeting of the Geological Society of America). French professor Dale Cosper, who had voted against the proposal in the Academic Council, spoke in favor of a geology major at the faculty meeting. The new major was approved with only one dissenting vote, that by history professor Dave Deal who believed that a major requires a minimum of three faculty. By 1984, we did!
Most of the 1983 geology graduates, plus John Winter and Bob Carson (third and second from the right).

The first ten or so geology graduates were in 1983; the first was Charlie Hammond, who had taken geology field camp the summer before. About two dozen geologists graduated in 1984. Most years about 10 to 20 geology students graduate, including those with combined majors. Particularly popular is the geology – environmental studies combined major.

The fourth geologist, Kevin Pogue (structure and terroir), arrived from Oregon State University in 1990. In connection with his appointment, I became the director and only professor (half-time) in Whitman’s Environmental Studies program. Now considered one of our signature programs, Environmental Studies has grown faster than any other Whitman program in the past quarter century.
Kirsten Nicolaysen (volcanology and geochemistry) got her doctorate at the Massachusetts Institute of Technology. She replaced John Winter in 2006. Our fifth geologist, Nick Bader (hydrology and soils), earned his doctorate at the University of Santa Cruz and joined the Whitman faculty in 2007. My retirement in 2015 allowed for a position in geomorphology: the latest tenure-track geologist to join our department is Lyman Persico, who received his doctorate from the University of New Mexico.
Whitman has had many non-tenure-track visiting geology professors. Two were Arnold Professors, recognized for their outstanding research and teaching. Already mentioned was Ewart Baldwin, author of *The Geology of Oregon*. Another was Tracy Vallier of the U.S. Geological Survey, expert on the complex geology of Hells Canyon of the Snake River. Of the many geologists who have taught here as sabbatical replacements, those staying here more than a year are Steve May, now at Walla Walla Community College; Dave Blackwell, now at the University of Oregon; Brennan Jordan, now at the University of South Dakota; Ellen Bishop, now working in Oregon’s Wallowa County; and currently here, Grant Shimer (doctorate at the University of Alaska) and Bryn Kimball (doctorate at Pennsylvania State University).
As the only geology professor at Whitman until 1981, I was at times overwhelmed. The College created a geology technician position to help with collections and field trips. Our first geotech, Barbara Ellis, was here for two years (1979-81) just after she graduated. Barb went on to get her doctorate from Oregon State University and have a successful career with the U.S. Forest Service. From 1981 until 2012 we had a different “geotech” every year, almost always someone who had just graduated in geology or had a few required courses to complete in her/his senior year. There was no continuity, but in 2012 we hired a permanent geotech, Angela McGuire, who has an M.S. in geology from Western Washington University. She does everything earlier geotechs did, and occasionally teaches introductory geology laboratories. Angela was a co-leader of my Greater Yellowstone Ecosystems field trip in 2013-14-15.
More than a hundred geology departments offer field courses. Most are in the summer in western United States, but also popular with our students are field courses in Scotland, Ireland, Turkey, Iceland, and particularly New Zealand. Every summer there is competition among the greater than 1000 students at the field courses. The competition, sponsored by the National Association of Geoscience Teachers, is for 50 to 100 summer (the next year) paid internships with the United States Geological Survey. Despite Whitman’s small and young geology program, we believe we have had more nominees for and more winners of these prestigious internships than any other of the 400+ geology departments in the U.S. (Geology students with combined majors are not required to take an off-campus geology field course.)

Whitman geology students are highly desired by grad schools, almost always receiving fellowships or teaching or research assistantships. Their record of getting geological employment is excellent: many have been hired by firms consulting in hydrology and environmental and engineering geology (three are now CEOs, hiring current graduates). Many others are in education, from high school and junior high school earth science teachers to college and university professors. Some have joined the U.S. Geological Survey or a state
geology survey. A few have been employed petroleum and mining companies. One (Dottie Metcalf-Lindenburger) became an astronaut.

In part I attribute the success of our geology majors to our extensive field program. Nearly every course has at least one afternoon, daylong, and/or weekend field trip. Many field trips are to Wallula Gap to see basalt, fault, and flood features or to the western Walla Walla Valley to see Miocene interbeds or Pleistocene slackwater sediments. My geomorphology course had nine afternoon field trips as much as six hours long in order to learn about the geology of Palouse Falls, Juniper Dunes, and the Big Sink.

Special to our students and faculty are regional field trips occurring early in the fall semester and late in the spring semester. A total of about 42 students, profs, and the essential geotech pile into three Turtletops pulling two trailers on a Thursday morning for four days of geology and three nights of camping. The regional I best remember from the 1970s was to central Oregon and included then student and now anthropology professor Chas McKhann, trustee Steve Hammond, and geologist Bill Watts. Another was backpacking in Idaho’s Seven Devils Mountains. One led by Ellen Bishop in the 2010s included a jet boat ride in Hells Canyon. “Regionals” are commonly to northeastern Washington, eastern Oregon, and the Cascades, particularly Mount Rainier and Mount St. Helens. The most distant in four directions have been the Oregon coast, Washington’s San Juan Islands, Montana’s Glacier National Park, and the Albion Range in extreme southeastern Idaho (once we included Utah’s Wasatch Range).
We have also had many distant field trips lasting one to three weeks; these courses of about 12 to 22 students are almost always preceded by a semester of weekly two-hour meetings. My first was to the Grand Canyon in the 1977. Others have been to Hawaii in 1980 (emphasis on volcanoes), western Virginia in 2009 (emphasis on karst and caverns) and southwest Texas in 2011 (co-led by then sophomore Matthew Morriss). My favorite are the 10-or 11-day trips to the Greater Yellowstone Ecosystem I have led almost every summer beginning in the 1990s; from Hunter Peak Ranch in Clarks Fork Valley we study rocks of every period (except the Silurian), from gneiss 3.4 billion years old in the Beartooth Mountains to travertine only minutes old at Mammoth Hot Springs.
Many of these long special field trips have been to foreign destinations. Most common destinations have been Costa Rica led by Kirsten Nicolaysen (2007) or me (1979, 1989, 2012) and the Galapagos Islands led by Pat Spencer (2005) or me (2000, 2002); some of these trips were co-led by biology professors. My other foreign geology field experiences (in many cases with an environmental studies component): include the Antilles (1980, with Ewart Baldwin), Dominica and Montserrat (1997, Boiing Lake and Soufriere Hills Volcano), British Columbia’s Queen Charlotte Islands (1999), the Andes (Peru, 2000; Ecuador, 2002; Patagonia, 2009), Iceland and Greenland (2002), Bulgaria and Italy (2004, Vesuvius, Stromboli, and Etna), Africa’s Rift Valley and high volcanoes (2001, Mount Kilimanjaro; 2010, Mount Kenya), and Tibet (2005, Lhasa to Mount Everest).
Whitman College is proud to be a member of the Keck Geology Consortium. We were fortunate to be included in the first ten liberal arts colleges originally funded by the William Keck Foundation. Now eighteen colleges are receiving major funding from the National Science Foundation. The heart of our program is summer four-week intense research experiences, mostly in the field. Any professor at any of the colleges can propose a research project involving three to 12 students selected from across the nation. With few exceptions, every geology professor who taught at Whitman two or more years participated in at least one Keck research project. I included Pat Spencer on a Yellowstone project, and Brennan Jordan, Kevin Pogue, and Nick Bader on three of my Mongolia projects. Kevin included me on Oregon and Idaho Keck research projects. Kirsten Nicolaysen worked with Nick on eastern Oregon geology and with Lyman Persico on Aleutian Island volcanoes. These are only a few of the Keck research projects in which Whitman faculty have participated.
When I arrived here in 1975, Whitman College had a natural history museum in a huge room (currently rooms 107-112) at the north end of the first floor of the Hall of Science. The history of the museum was given to me by Jamie Warren, current manager of the Maxey Museum. The museum was established in 1899, with Howard Brode as curator from then until 1941; the natural history portion, housed in Billings Hall, was later curated by Art Rempel (1941-46) and Philip Pope(1946-1963). In 1963 the natural history collection was moved to the new Hall of Science, where it was curated by Whitman’s first geologist, Richard Clem. In nearly a quarter century here, Dick Clem collected quite an assemblage of topographic and geologic maps, rocks, minerals, and fossils. Upon Dick’s death in 1974, anthropology professor George Castile became the museum curator. With the completion of Maxey Hall in 1977 and the Hall of Science addition and renovation of 1981, the anthropological and archeological materials were taken to the new “Museum of Man and Nature in the Pacific Northwest”; much has been returned to Native Americans. Most of the rocks, minerals, and fossils remained in the Hall of Science. The Larson and Hanscomb shell collections are now on display in the Stevens Atrium.
The shells were curated by biology professor Chuck Drabek starting in 1975; the current exhibit was made by biology professor Paul Yancey.

![Harold Brode with mammoth tusk 7 miles northwest of Walla Walla.](image)

Although some of the geologic collections were purchased, most were donated. For example, of our thousands of specimens, number 277, *Baculites*, a Late Cretaceous ammonite from Wyoming, was given by J. F. Boyle in 1904. Our specimens are spread through various rooms on the first floor of the Hall of Science, with many minerals in room 112A, rocks in 112, topographic maps in 111 and 173, and fossils in 136. Most of the museum quality specimens are on display along the hallways of the first floor.
Baculites, a straight-coned ammonite cephalopod of the Late Cretaceous.

Maps

Whitman College is a government depository. In Penrose Memorial Library we have, for example, almost all publications from year one (1879) of the U.S. Geological Survey. In addition to being responsible for geology, hydrology, and other earth sciences, the U.S.G.S. publishes maps, lots of maps, lots of topographic maps.

By 1974 Dick Clem and the library had accumulated tens of thousands of topographic maps. Since 1975 I have been the curator of topographic maps in the Hall of Science and advisor to the library regarding acquisition of topographic maps. Some decades ago we decided to keep in the library the latest editions of 1:24,000 topographic maps of Washington, Oregon, and Idaho, that is, the maps most useful to the Whitman community. In rooms 173 (and 111) in the Hall of Science, we have the following topographic maps:
1:500,000 (approximately 8 miles per inch): Canada, Mexico
1:250,000 (c. 4 miles/inch): United States, including Alaska
1:100,000 (1km/cm): conterminous western United States
1:125,000 (c. 2 miles/inch) and 1:62,500 (c. 1 mile/inch): old, out-of-print maps of much of the USA, particularly the Pacific Northwest (some of the 1:125,000 maps, more than a century old are rare and valuable)
1:24,000 (1 inch/2000 feet): much of the USA, particularly the Pacific Northwest (when the library gets a new edition of a map from WA, OR, or ID, the old edition is transferred to the Department of Geology).

Steve Hammond, geology-mathematics major graduating in 1979, had a long and successful career with the U.S. Geological Survey. In 2015 he was able to obtain the three copper plates used to make the 1897 1:125,000 Mt. Stuart, Washington topographic map. Two geology-art double majors, Bea Sheffer ’16 and Fiona Bennitt ’17, used the three plates to individually print the culture (black), hydrology (blue), and topography (brown) on separate pieces of paper, then used the plates together to exactly reproduce the original 1897 map. In the hall between the doors to room 177 is a display about topographic maps that features these copper plates.

Geologic maps are published not only by the U.S. Geological Survey but also by state geological surveys and many other geological organizations. The geologic maps of all contiguous western United States are on the walls of the first floor of the Hall of Science. The geologic maps of most other states are in the closet of room 176. We are proud of having the entire 1:250,000 geologic map of the State of Washington on one wall.

Other geologic maps on the first floor walls include geologic and tectonic maps of North America, a small earthquake map of the Pacific Northwest (Walla Walla had a magnitude 6 earthquake in 1936), a fault map of the San Francisco Bay area, and a tectonic map of the
Canadian Cordillera. Also we were able to obtain and exhibit one of the huge (16 feet wide) geologic maps of the world. Geologic maps of many other nations are in Science 176.

Albert Ripley Leeds

I brought to Whitman the collection, mostly minerals, of my great-grandfather, Dr. Albert Ripley Leeds, an early American geochemist. Dr. Leeds got his bachelor’s degree at Harvard in 1865, published a chemistry textbook in 1866 (recently reprinted) (2), and studied at the Berlin School of Mines. My family and others gave the endowment for the Leeds Prize for Excellence in Geology. Dr. Leeds taught for decades at Stevens Institute of Technology; his chief “research” was purifying the water supplies of several large East-coast cities. He was president of the American Chemical Society. Penrose Memorial Library has asked to keep his notebooks in the archives.

Albert Leeds and smoky quartz and microcline from Pikes Peak, Colorado.
Petrified wood

At various times folks have given us large pieces of petrified wood which now reside inside and outside the Hall of Science. The most recent, which lies under the locust stairway in the Stevens Atrium, was donated by Duane Scroggins.

The largest and most interesting specimens of petrified wood are at the east end of the Hall of Science. Two have “butt spread”, meaning they are from where the base of a tree flares outward into the roots. This petrified wood is likely from the Miocene Columbia River basalts, as in the case at Ginkgo Petrified Forest State Park at Vantage, Washington. One morning long ago a guy began loading these petrified logs into a truck he had driven onto Ankeny Field. I can’t remember his reasoning, but I asked him to get lost.

A stump of petrified wood.
Memorial Hall

By volume the most common rock on Whitman’s campus is sandstone. The building stone for Memorial Hall is likely the Tenino Sandstone of Eocene age. Quarries near Tenino, Washington have provided dimension stone for buildings in Seattle, Tacoma, Portland, Spokane, and San Francisco (3).

Tenino Sandstone quarry. (photo by David Williams, 2010)  Memorial sandstone

Large chunks of granite and basalt

The College has lots of basalt and granite. By granite I mean granitic; most of the light-colored rocks are granodiorite, but some may be granite or diorite or related rocks. The largest rock on campus was not transported here by the Missoula floods. Whitman archivist Melissa Salrin (January 2016) summarized what she learned from the June 1930 issue of The Whitman College Quarterly: The huge granite boulder was given by the Potlatch Lumber Company of northern Idaho through the courtesy of its manager, Mr. A. W. Laird. The Walla Walla Chamber of Commerce provided for the transfer of the boulder from the railroad to the campus. Lying just south of Lyman Hall, Treaty Rock has brass plaques commemorating Chief Lawyer and the Stevens Treaty Council.
When the enormous floods from Montana’s Glacial Lake Missoula swept into the Walla Walla Valley and elsewhere, they carried icebergs with rocks imbedded. Most of the largest boulders are granitic, plucked by glaciers from British Columbia and northern Washington, Idaho, and Montana. The granitics are called erratics because they do not match the basaltic bedrock of southeastern Washington.

One granitic erratic was brought to campus in May of 1979. I had been leading a whitewater trip down the Grande Ronde River at flood stage. Near the takeout I was trying to tie our raft to a tree. Before I finished the knot, the swift current caught the raft, pulling the half-inch rope like a saw which severed the end of my finger and resulted in days of intense pain. Trying to cheer me, four students (Megan Ferguson Clubb, Barbara Ellis Sugai, John Quikstad, and Steen Hudson) commandeered a front-end loader and a truck to move two granitic boulders from near Lowden to campus...at night. The smaller granodiorite rock was delivered to my home, where I was trying to grade papers and exams. The larger diorite boulder appeared at the Hall of Science, and now rests near three redwoods (*Sequoiadendron gigantea*) at the edge of Ankeny Field.
Years ago Mark Waggoner, a farmer who lives near Touchet, gave me what is likely the largest granitic erratic in the Walla Walla Valley. Mark used a bulldozer to dig to the bottom of this 10-foot-diameter monster probably weighs about 30 tons. I have not yet figured a way to get it to campus.
Soaring Stones is a magnificent sculpture of six boulders just to the south of Cordiner Hall. John Young, an art professor at the University of Washington, created the sculpture in 1990 and gave it to Whitman College in 2007. The boulders from the Washington Cascades rise westward from flush with the ground to the tops of higher and higher steel pillars. (2)
Many of our granitic boulders sit adjacent to wooden benches; they were brought here when Lakum Duckum was remodeled in 1995. These boulders of granodiorite from the 25-million-year-old Snoqualmie Batholith were excavated at Bandera Mountain between Fall City and Snoqualmie Pass.

Our large dark rocks are from two nearby sources of the Miocene Columbia River basalts. The more-or-less equally dimensional boulders are from a quarry near Milton Freewater. The elongate columns were broken from a lava flow south of the mouth of the Palouse River. Thomas Berger, a landscape architect from Seattle, designed the gateway of basalt columns at the entrance to Narnia (Cordiner Glen)(2).
Oldest rock in the United States

Tom Cronin was president of Whitman College from 1993 until 2005. Early in his presidency he directed the formation of the Trees and Landscaping Committee. Tom made sure that more than a thousand trees of dozens of different species were planted at the College during his presidency. In 2005 the committee wanted to recognize Tom’s love of campus landscaping in general and trees in particular. When we decided on a stone bench, I mentioned that I had built a bench of Morton Gneiss, at 3.5 billion years, the oldest rock in the United States. I chose this metamorphic rock not only for its age but also for its beauty. When Peter Harvey saw a slab of the Morton Gneiss, he liked it, and suggested that a checkers/chess board be engraved on the top. The bench was installed near the Hall of Science with a tree planted on either side.
A better geology museum

Compared with those of other geology programs, our collections were measly. At about the time (1981) that our geology major was approved, I was contacted by Tom Laronge from Vancouver, Washington. Tom had collected, purchased, and exhibited the best fossils he could find from around the Earth. He offered the entire collection to his alma mater, Lafayette College. They replied, just pack them up and ship them across the USA (at your expense). How does one ship natrolite crystals, centimeters long and less than a millimeter wide, 3000 miles?

At a meeting of the Portland (Oregon) gem and mineral society, Tom mentioned his desire to find a suitable home for his collections. I had gotten to know Betty Church (Whitman ’24) in connection with her donation of books and archeological items to Whitman. She told Tom about Whitman. Tom called, inviting me to stay at his home and see his minerals and fossils. I was there the next weekend and could hardly believe the outstanding quality of such a large collection. Within a month I had taken a van, two students, many cardboard boxes, and at least one case of toilet paper to Vancouver and back. Suddenly, thanks to Tom and Judy
Laronge, Whitman’s geology department had a world-class collection of minerals and fossils, appraised at more than a quarter million dollars. Of special note are several parts:

2. The dozen or so specimens of the zeolite family of minerals won first prize for a mineral collection at the New York Mineral Show.
3. During the moist Eocene a lahar (volcanic debris flow) occurred near Clarno in central Oregon. This 44-million-year-old debris flow deposit in the John Day Fossil Beds National Monument has a unique collection of plant material: wood, leaves, fruits, nuts, and seeds. The greater than 175 species of plant fossils is more than anywhere else on Earth. The Clarno “nut beds” were quickly mined out, in part by Tom Bones of the Portland area (by coincidence Tom Bones, Betty Church, and Tom Laronge were friends). Portions went to places like the Smithsonian Institution, the Museum of Natural and Cultural History at the University of Oregon, the Burke Museum at the University of Washington. Steve Manchester, the paleontologist who has published extensively on the nut beds, took specimens to Indiana University and then the Florida Museum of Natural History. In 1981 Tom Bones gave us a collection of Clarno limbs, leaves, nuts, and seeds. Tom Laronge added to our collection of Eocene plant fossils, perhaps buying them after they were stolen. The Clarno nut beds display is near the north end of the first floor.
4. Above the Clarno nut beds is the largest rock of the Laronge gifts, a slab of earliest Jurassic sedimentary rock with the footprints of two dinosaurs. The rock was quarried in the Connecticut River Valley, the place where dinosaur tracks were first found in North America, and where such tracks were first scientifically described.
5. The donations include museum quality fossils of many phyla including arthropods (especially trilobites), brachiopods, echinoderms, mollusks (especially cephalopods). Some of the fossils (e.g., a giant Mississippian nautiloid cephalopod) have been
Relics from 40 million years ago

Whitman receives fossils

For the Union-Bulletin

Seeds, nuts and parts of plants that flourished in North Central Oregon as long as 40 million years ago can be seen in a rare collection of fossils which has been donated to Whitman College by a Vancouver, Wash., rockhound.

Taken from a geologic "time capsule" located near the town of Clarno on Oregon's John Day River, the fossils were gathered by Thomas J. Bones, an amateur paleobotanist. Most of Bones' fossils, gathered over a 30-year period, repose in the Smithsonian Institution in Washington, D.C. Others can be seen at the John Day Fossil Beds National Monument Visitors Center near Dayville and at the Oregon Museum of Science and Industry in Portland.

The fossils are relics from a time when Oregon's present desert was a lush, tropical forest, supporting many varieties of animal and plant life. As the land changed volcanically over millions of years, the only record of that abundant verdure has been found in the remains of seeds, leaves and woods frozen in time by the right combination of minerals, water and thermal activity.

The Whitman collection includes large rock samples in which are bedded a variety of materials, such as walnuts and wood, and individual fossil seeds, some as tiny as grains of sand. Among individual specimens are seeds of the magnolia, hackberry, sugarberry and grape families, sycamore fruits and fossilized horse tail rushes.

The horse tail rush is interesting because it grows today in almost the same form found 40 million years ago, said Whitman geology professor Robert Carson.

But it has taken careful research by scientists to identify some of Bones' fossil finds. Although some of the fossils are seeds of familiar plants which continue to grow on earth, many others are from extinct species. Some seeds are so small that a microscope is required to see fine details by which they can be identified as belonging to a specific family or genus.

The Clarno fossil area was first recognized in 1890. By 1902, 22 fossil flora forms had been identified in the formation. Now, 75 identifications of seeds, woods and leaves have been made. Much of this knowledge has come from Bones' field work and his cooperation with researchers.

A photographer by profession, Bones first visited the Clarno Formation in 1942. He decided to restrict his collecting to Clarno plant fossils.

"I discovered that finding specimens there was a real challenge," Bones said. "At first, I could find only some of the larger seeds, but later discovered that seeds even the size of a poppy seed could be found. The larger specimens are worked out in the field as a hard rock mining operation by digging and breaking. The smaller seeds are obtained from matrix material that is broken down at home, screened and looked over with a magnifying glass."

Hundreds of hours of work go into screening materials and carefully cleaning the fossils, Carson said.

Bones' fossil documentation has been augmented by his long-time hobby, macrophotography. He uses a short lens and long bellows to obtain a larger image on color slides. For more enlargement of tiny seeds, he makes color prints for display with the specimens.

The Whitman collection is housed in a glass case in the college Hall of Science.
replaced with pyrite. Others (e.g., Cretaceous ammonoid cephalopods) have original shell material (about 100 million years old).

6. Another part of the Laronge gift is Eocene fossil fish from near Wyoming’s Fossil Butte National Monument. These have been supplemented by specimens given by John Henkels. The display of at least five species of fossil fish is opposite the dinosaur footprints. John and Jean Henkels of Salt Lake City also gave us many beautiful mineral specimens.

7. Most copper ore comes from sulfide minerals. Tom gave us many beautiful copper minerals, located in the display case just to the right of the fossil fish. The Earth’s major deposit of native copper is on Michigan’s Upper Peninsula; he gave us many specimens of this beautiful mineral; each is a piece of art – a small sculpture.

Tom Laronge came to visit the displays of fossils and minerals, many in four illuminated walnut and glass cabinets that he shipped to Whitman. He was so pleased that later he gave the solar telescope that resides in its own dome on the roof of the Hall of Science.

Field trip prizes

Every semester our geology department has a four-day field trip to somewhere in the Pacific Northwest. We bring back a lot of rocks that decorate the inside and outside of the Hall of Science. The largest is a somewhat aerodynamically shaped breadcrust bomb from Oregon. How to bring this ton-or-so basaltic monster back to campus required sophisticated engineering. We always have one or two trailers to haul our food and sleeping supplies. One trailer, not attached to a van, was emptied, then tilted backward by raising the tongue. Some of our many strong geology majors rolled the boulder into the back of the trailer. Others stood on tongue, using leverage to make the trailer horizontal and hook it to a van. Then the boulder was rolled to above the trailer axle and surrounded by camping gear for a safe journey home. This textbook volcanic bomb is just inside the door leading to the extreme northwest corner of Ankeny Field.
Another remodel and addition

In connection with the 2002 addition including the Stevens Atrium, the department was invited to purchase museum-quality specimens. We obtained a cluster of trilobites of typical size, plus one football-sized trilobite. Also on display is a gigantic cluster of quartz crystals from Arkansas. A small study lounge was given in memory of Dick Clem. The wall of the lounge is adorned with a huge slab of fossil-bearing Devonian limestone from Morocco. The slab with its cross-section of nautiloid cephalopods was given by Mari Jalbing and Jim Robart '69.

Devonian nautiloid cephalopods from Morocco.
Brazilian agates

Usually agates are small, and purchased as thin slices. That changed the day Bob Storch greeted the geology department (see Walla Walla Union-Bulletin article). It is my understanding that the world’s largest agates are from southern Brazil, and that these small deposits are mostly mined out. Bob’s agates are larger than basketballs! He gave to Whitman a half and a third of two agates and inch-thick slices of nine more. Most have alternating concentric zones of cryptocrystalline quartz and inward-growing quartz crystals. Some have hollow centers. My favorites are the three with multi-colored horizontal bands showing the orientation of the agates when they were growing in late Permian volcanics. These spectacular agates reside near the southeast corner of the Stevens Atrium. In 2001 Bob’s family also gave us approximately 200 more beautiful specimens, mostly minerals but some fossils.
Northwestern minerals

Also on display in the Stevens Atrium are museum-quality specimens of Pacific Northwest minerals. Northwestern USA is not known for spectacular minerals, but over the year two Whitman alums have purchased magnificent fist-sized specimens. Emery Bayley ('62) and Geoff Clark ('62) have given these minerals to the College in memory of their only Whitman geology professor, Dick Clem.

Ron McMullen gave us a large (about 3 cm in diameter) garnet from northern Idaho; this garnet is particularly interesting because it has been abraded, rounded, and polished by tumbling in a stream.

April 30, 2012

Mr. Brian Dohe
Director of Annual Giving
Whitman College
345 Boyer Avenue
Walla Walla, WA 99362

Dear Brian,

Here is the large garnet I promised to send as a donation to Whitman College for the geology department. I did not see any garnets in the large mineral exhibit in the Hall of Science during my recent visit and thought this would make a nice addition.

Our family found this gem stone in the early 1950’s at Cataldo Mission in Northern Idaho in a gravelly wash. The mission is now an historic landmark and is also known as the Mission of the Sacred Heart founded by Jesuit priests who were invited to the area by the Coeur d’Alene Indian tribe. The mission site today is about one mile from Cataldo, ID, just off I-90 at exit 39.

I have included a piece of amber that I noticed when I retrieved the garnet. Amber is not endemic to the PNW and is found mostly in Poland or the Baltic regions.

I hope that these will display well.

Sincerely yours,

Ron McMullen
Art

The 1981 senior gift to Whitman College was two paintings by Ted Vaught, an artist from Portland. The watercolors depict Mount St. Helens before and after its catastrophic eruption May 18, 1980. The seniors had heard the explosion on the Sunday in the middle of final exams year earlier.

Most geologic time scales have the Phanerozoic (the last 542 million years) on 9/10 of the page, with the first 4 billion years tucked away at the bottom. My dream had been to portray Earth’s history at true scale. I noted that the walls circling the central stairwell in the Hall of Science are about 45 m long. Bingo! Our physical plant mounted boards about 1 m wide diagonally from the lowest floor to the attic ceiling. In the summers of 1992 and 1993 Ben Carson painted the long mural of life through the ages, orogenies, volcanism, and glaciations. The entire Phanerozoic takes about one half of the first floor portion of the stairwell.

In 2002 John Knapp, a local restorer of antique furniture, gave us a painting of two scenes of Dry Falls between upper and lower Grand Coulee. The upper scene is of a waning Missoula flood pouring over the falls and eroding the Columbia River basalt. The lower scene is of Dry Falls today, with water only in the plunge pools at the base of the falls.

In 2004 Ellen Watts Lodine and Paul C. Lodine, 1974 alumni, gave an art piece by Dale Eichman of Portland. This textured painting in the Stevens Atrium includes ammonoid cephalopods, a trilobite, and an early tetrapod from late Paleozoic time.

The William Shawver Vertebrate Fossil Collection (by Pat Spencer, March 2016)

Whitman College and the Department of Geology received a new vertebrate fossil collection, comprising more than 500 individual elements ranging from isolated teeth to limb bones, jaws, antlers and other body parts. Most of the specimens were collected from the Miocene-Pliocene Ringold Formation along the White Bluffs north of Pasco and across the Columbia River from Hanford. Additional
specimens were obtained from southern Idaho in the Glenns Ferry Formation. The age is probably 6-8 million years. The collections were made by William Shawver, Sr., who was a middle school principal in Finley, Washington. He collected the fossils on weekends and in his spare time, in the 50s and 60s, prior to National Monument status.

Mr. Shawver identified most specimens with amazing accuracy given that he was not a paleontologist. In addition, he reconstructed specimens that were, in many cases, badly broken during extraction. Specimens include horse, two species of camel, giant sloth, rodents of various types, big- and medium-sized cats, bear, hyena-related dogs, badger, deer, and peccary. The collection also includes a significant number of horse fossils excavated from the Pliocene-epoch Hagerman Fossil Beds (now a National Monument) in southern Idaho.

When William, Sr. passed away, his son William Shawver, Jr. inherited the collection. He wanted to auction his father’s estate, but did not know the value of the fossil collection. Mr. Shawver was provided with an informal appraisal of the market value of specimens and told that the real value of the material is to science and it should be kept together, wherever the collection ended up. The University of Washington, the University of Oregon, and the University of California, Berkeley, have significant collections of similar material and would be reasonable places to house the Shawver specimens. He was also told that the collection, if given to one of those institutions, would likely reside for eternity in a dusty cabinet in a museum basement. We suggested that Whitman would not only keep the collection safe and well-housed, but would honor his father by putting some part of it on display, while making the entire collection available to scientists for study.

Mr. Shawver decided to give the collection to Whitman College. Material has been loaned to a University of Oregon scientist on three occasions; the result was a scientific paper on a new species of deer. Three Whitman students have done research on aspects of the collection. A significant number of Ringold and Hagerman fossils from the Shawver collection are on display in the atrium of the Hall of Science. The remainder of the collection is kept in the Paleontology teaching lab for use in classroom activities.
Jaw of Pliocene hyena-like dog, Ringgold, WA

Jaw and limb of Pliocene horse, Hagerman, ID
Expensive transport of Coconino Sandstone

The second cliff below the rim of Arizona’s Grand Canyon is the Coconino Sandstone of Permian age. From outside the national park Joe and Virginia Young obtained a six-foot-long slab of this 275-million-year-old rock of wind-deposited sand (mostly quartz). Years ago they transported this rock to Walla Walla; in 2015 they asked if our department would like it. I was quite impressed with the three rows of tracks (probably reptiles) crossing the huge slab. A moving company estimated $150 for transporting the rock across town. Usually one to try to save money, I hooked up my utility trailer and invited half a dozen students to be heavy lifters. Backing, I jackknifed the trailer into my car. Repair would have been >$2,000, but the body shop took pity on me and painted the dent for the cost of the paint. The slab stands near the southeast corner of the first floor of the Hall of Science; morning sunshine highlights the vertebrate tracks.

Reptile tracks on Permian Coconino Sandstone.
It takes time to get some rocks

When visiting the new geology and paleontology museum at Amherst College, I was particularly impressed by multi-ton boulders of a rock from the Adirondack Mountains bearing softball-sized garnets. I learned that a New York company mined industrial garnets from two mines: the Gore Mountain deposit with the Earth’s largest known garnets, and the Ruby Mountain gneiss. Our department contracted with the company to ship a one-ton boulder of each to us. I had pictures of the particular rocks, and paid half in advance.

Despite many years of letters, emails, and phone calls, we got nothing. In April 2015 I flew to Albany, drove to the Gore Mountain mine (now closed), and talked with folks at the processing facility in North Creek, New York. Net result – nothing, but I got a lot of contact information.

In September I saturated the company with letters and emails. The administrative assistant for the new company president contacted me and got things moving – a one-ton boulder of garnet gneiss was shipped from the Ruby Mountain Mine to Whitman College in November 2015! This splendid sample of one-billion-year-old metamorphic rock now sits on display at the west entrance to the Stevens atrium, a decade after the boulder was purchased. Now, how do we get a boulder from the Gore Mountain mine?

This garnet gneiss from the Adirondack Mountains is slightly more than 1 billion years old.
The answer was to go get it. First I got permission from the company. Next I arranged to meet the woman who manages the gift shop at the Gore Mountain mine, now a tourist destination. Driving west from New England in October, I stopped at Gore Mountain on the last weekend the site was open. There I loaded two boulders into my car and headed for Walla Walla. (Of course I had to stop at the copper and iron mines at the west end of Lake Superior to investigate the geology and get more rocks.) Soon these boulders from Gore Mountain will be exhibited near the garnet gneiss from Ruby Mountain. Come see them!

References cited
2. Whitman College Communications,_, Outdoor sculpture walk (photos by Greg Lehman)
Appendix A: Memories of Professor Richard Clem by Bill Watts, Whitman ‘77

The photo that you have of him (in your latest book) squatting next to a mammoth tusk sort of sums up what I remember of him. He had a good sense of humor and was interested in all things about geology and the region. I remember that his last research project dealt with fission track dates and was impressed with the fact that he was doing something like that. I think that he had a pretty sharp mind, and the research probably helped to keep him interested in the pre-geology-major years. He also had an interest in history, which translated to the classroom. He must have talked to some old-timers in the area and done a lot of reading about the Walla Walla area, because I think it was through him that I first heard about the extensive soil erosion, as well as the conversion of natural grasslands to agriculture. I think he also took a class I was in to Burlingame Canyon, where I first heard about the Touchet Beds and clastic dikes. So, at the very least, he left an impression on me.

I also remember that his field trips were pretty fun and were a lot like yours - lots of stops and poking around to look at the sites. John Allen's field trips were highly structured and weren't as much fun as they were work - they included timed stops to sketch and write, followed by trying to finish the work on the bus (and being graded on neatness). That said, a field trip is still a field trip, and observing things first hand is still the best way to learn. My first field trip with Dick Clem was to the north of Spokane. Jim Todd came along on that one and I remember that he and Mr. Clem had a good relationship.

As I mentioned when I was over, I think he put a lot into his History and Philosophy of the Earth Sciences class, mostly to connect the earth sciences to the liberal arts. I also mentioned that sometimes he would get excited in class and start to lecture so fast that we all had to really hustle to get our notes taken, with some lectures being completed in thirty five minutes. One of his favorite topics in the History and Philosophy class was the 40th Parallel Survey of Clarence King and the establishment of the USGS. In particular, the Great Diamond Hoax lecture was one of those that went fast.

Other times he would come up with something or other that was humorous. One morning he came into class and was talking about running across military records in the government documents section of the library. He had found the history of the marine anti-aircraft unit that he had served in in the Pacific during WWII. He laughed and (I think) said that they hadn't mentioned the two American planes that they had shot down. He clarified it, though, to say that the planes were returning at sea level and they had to fire on them without being able to identify them.
Appendix B: Dick Clem’s mammoth excavation, 1966 (More newspaper articles, photographs, and other materials are archived in Penrose Memorial Library, Whitman College)
Remains of Mammoth Prepared for Display

Remains of the ancient mammoth exhumed near Gardenia two weeks ago are being dried and scraped in preparation for a place of honor in the Whitman College Natural Science Museum.

The specimen uncovered on the Fulgham property has been identified as a paralophodon washingtonii.

Richard Clem, associate professor of geology at Whitman, explained that, while the "old boy" cannot be reconstructed completely because a good number of his bones are missing, he will become a window display.

Found Over Half

All in all, the excavators were able to find about 60 percent of the great mammoth that roamed this area in great herds about 12,000 years ago.

Clem said two students have agreed to attempt to reconstruct the skull from the thousands of photographs he obtained from Dr. W. Frank Scott of Washington State University. "If the students can reconstruct the skull even if it is mostly plaster," Clem said, it will fill a vacancy in the school's collection.

This is a rare find, Clem explained, because when these mammoths died they generally died on a slope and the bones became scattered over a large area.

He feels there may be around 100,000 other bones, and Touchet but finding them is a per chance happening. And when remains are found, he said, "with machinery, an accidental bump means the end of a bone."

He complimented the cooperation of the Fulghams in the excavation and pointed out that geologists are completely dependent on calls by citizens when they run across such a find.

There would be great expense involved in the reconstruction of "our friend Mr. Mammoth," Clem continued, "to do this will require several thousand dollars in framework building, missing parts and site development."

A Mystery

He explained he has a non-professional hypothesis about why some of the bones were found in poor condition. The leg shafts, normally the strongest part of the animal, were shattered longitudinally which is unnatural. Clem feels man may have come across the mammoth shortly after death and shattered the shafts with rocks in order to get at the marrow.

Clem hopes to have the display ready shortly so that the estimated 300 school children who trooped over the Fulgham property to watch the "dig" can examine it. It is only a tentative theory, further investigation and correspondence with anthropologists may prove it probable.

Post Script

The Department of Geology would like to express its sincere thanks to the wonderful cooperation of the farmers who helped in every possible way to expedite the operation. It would also like to extend a "well done, good fellow giant diggers" to three most worthy gentile ladies -- Mrs. Florence Brooks, Miss Molly McNamara, and Miss Sharon Wohlet -- who spent a total of at least thirty hours each in the hole digging.

R. H. CLEM
1966 mammoth excavation at Gardena
“Molly McNamara” written on back of photo.

Dick Clem (front left) and Art Rempel (back).
Appendix C: Clippings and press releases about Dick Clem’s vertebrate fossil and intra-canyon basalt research (more archives in Penrose Memorial Library, Whitman College)

Elephant Family Tusk Discovered Near Athena

Somewhere between 10,000 and 20,000 years ago a large animal died near the present site of Athena, Ore. Now the earth has yielded first evidence of the burial spot.

Ernest Duncan happened to notice recently a piece of bone sticking out of an embankment beside a secondary road near the Anna Bell ranch.

Richard Clem of Whitman College examined the object which appeared to be a tusk and ascertained it worth removal to the Whitman College Museum of Natural History. Time was to prove that nature had already removed any uselessness of the find to mankind.

The tusk that was buried 3 or 4 feet below the surface of the ground had for thousands of years been repeatedly wetted by ground water and then dried. This process had caused a chemical deterioration of the tusk to the point that when it was removed it broke into several pieces. When the object was taken to Whitman College and allowed to dry out, it completely decomposed into tiny fragments.

The tusk could have been preserved. However, a long expensive process would have had to been followed. The process would have involved plastering the tusk at the site of discovery, very slow drying, and treatment with a preservative.

Clem stated that from the tusk alone it was impossible to identify the animal from which it came. He went on to say that it was his belief that it was probably an elephant columbi or commonly known as a mammoth. Evidence for this belief is found in other discoveries around this area which have all been the elephant columbi. Clem also stated that to his knowledge there have been no mastodon remains found east of the Cascade Mountains. To establish positive identity more parts of the skeletal structure would have to be found, for example teeth or skull.

Richard Clem, associate professor at Whitman College, is shown as he looked over a tusk (at near Athena. It disintegrated after being removed.

Finds within the immediate area for which positive identification has been made include a complete jaw of an elephant columbi on the Washington State Penitentiary grounds, also what amounted to a complete side of an elephant columbi seven miles northwest of Walla Walla.

6-14-61
Geologist at Whitman Studies Snake Canyon

By JIM B. SCHICK

Centuries ago the turbulent meandering Snake River carved out a deep and probably narrow canyon. But nature changed the landscape, filled much of the old canyon and moved the river to its present wider bed.

The old river canyon was probably similar to the present Tucannon River and whether it carried as much water as the present river is not known. If it did, it was deep, narrow and turbulent.

It might have produced an abundance of power in the dams being constructed today but slack water navigation to Lewiston would never have been possible.

Tracing the former Snake River canyon through a study of basaltic and volcanic flows has been a project of Richard Clem, Whitman College professor of geology. He describes the work as "pure science" and a project that may lead to further extensive study.

For Corps

In a project for the Corps of Engineers in 1958 and 1959, Clem traced the existing lava flows in what will be Lower Monumental Dam reservoir. Last summer he followed the lava flows in the entire Snake River area trying to trace a series in the former canyon believed to have been cut by the river in the lava formation.

Clem and his assistant obtained 173 samples of the entire Snake River canyon to Lewiston and utilizing the pictures with maps, they selected areas that looked the most promising. Some intracanyon flows were plotted about 1949 but Clem has found they are much more extensive.

This basalt is older than any gravel of the present day Snake and the Palouse rock is considerably younger than the other lava flows.

Clem said the old flows are as much as 20 million years old while the Palouse soil is probably 10,000 to 25,000 years old. Dating is by analysis of radioactive materials.

Research Corp. of America has awarded Whitman College grants for science projects and this is one being carried out by the school.

Clem said they started at Devil's Canyon near the axis of Lower Monumental Dam and by the end of the summer were near Lower Granite Dam about 70 miles upstream. Clem and his assistant, Bruce Stuart, graduate student at Washington State University, spent two days a week in the field. Much of the time the weather was hot and the terrain difficult.

Cut in Texas

They took 173 samples, many of them as big as a fist. The samples are professionally cut in Texas and examined here under a petrographic microscope which creates a petrographic effect in minerals. This gives some idea as to the age of the basalt.

Apparently, Clem said, the old Snake River canyon filled with lava and the river cut a new route.

The filled canyon appears to be the story of the Columbia much smaller than the present Snake River — probably more like the existing Tucannon River with steep walls.

Clem described the project as thorough examination of the one that will help piece together basaltic.

Richard Clem, Students Find Bones Early Horse

Nearly all the bones of a horse, probably an ancient species, have been unearthed from a bank of the Yakima River by a Whitman College professor. Another college employee, a student and an interested Walla Walla resident.

Richard Clem, professor of geology; John Dulaney, shop technician at the college; Greg Brown, Whitman student, and Mrs. Peter Brooks, of Walla Walla, a former student at Whitman, dug up the bones recently just northwest of Granger Wash.

Prof. Clem learned of the horse bones from Clinton Gallaway, of Benton City, who came across them on his property and brought half a dozen bones to the Whitman professor in September.

The bones were in glacial lake sediments on the side of a cliff overlooking the river, explained Clem, who led an excavation party that dug up mammoth bones several years ago. He said just about all of the bones, except the skull, were obtained, and they are now in the Hall of Science at Whitman College.

The local geologist believes that the horse was of the modern genus, Equus, but probably not the present living species. He estimated that these remains could be 8,000 to 12,000 years old.

Clem said the structure of the teeth is important in determining the species, but the only parts of the head found were a piece of the lower jaw with one tooth and a molar from the upper jaw. However, the jaw bone is of a different shape than the jaw of the present species, and
whitman news service Nov. 18, 1967

Richard Clem, professor of geology and biology at Whitman College, has obtained the forehead and one horn of what he believes is an extinct form of bison that roamed this part of the world approximately 10,000 years ago.

The old skullcap was accidentally unearthed Thursday by men digging an irrigation ditch on the Garby farm in the Gardena Bench area about four miles south of Touchet. Prof. Clem was involved in a week-long uncovering of mammoth bones in that area in February 1966. He said bisons and mammoths lived in this region at the same time.

The Whitman professor said the newly-found skullcap will have to be cleaned and examined more closely to determine whether it is part of an extinct bison.

whitman college news service Sept. 7, 1968

Mrs. Warren C. Hamlin and Mrs. James H. Cummins, both of Wallula, directed Prof. Richard Clem to the four-foot-long tusk of an ancient mammoth at Wallula Junction Friday.

Clem, a professor of geology and biology at Whitman College, said half of the tusk is in good condition, but that the other half may crumble if moved. The ancient tusk was discovered by Mrs. Hamlin on the north side of the Walla Walla River about three miles from the town of Wallula.

Clem said the tusk was found in river sand and probably had been washed away from the other mammoth bones. Therefore, he concluded that the other bones probably weren't in that area.

The Whitman professor guessed that the tusk is from 8,000 to 12,000 years old. He said he probably would take a class to see the tusk next Thursday.

Clem has been to the Marmes archeological site this summer. He expects to take classes there, also.
Nearly all the bones of a horse, probably an ancient species, have been unearthed from a bank of the Yakima River by a Whitman College professor, another college employee, a student and an interested Walla Walla resident.

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Clem said the structure of the teeth were important in determining the species, but the only parts of the head found were a piece of the lower jaw with one tooth and a molar from the upper jaw. However, the jaw bone is of a different shape than the jaw of the present species, and the two teeth also seem to be different from the horse of today.

The science professor said the bones were weathering out of the cliff, and that the skull could have tumbled into the river. The people who unearthed the bones secured themselves with ropes tied to a truck, or used a rope ladder tied to the vehicle when they worked on the cliff.