

GSA GeoTales

Memories from GSA members
volume 1

Dedication

I would like to express sincere appreciation to all the GSA members who so willingly shared their memories for this booklet with the Foundation. And, a special thank you to Phil LaMoreaux for brainstorming this idea with me, and to Bunnie LaMoreaux for the title – GSA GeoTales. I hope you all enjoy these special memories from GSA's special people.

Donna L. Russell
Director of Operations
GSA Foundation
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The Mystery of Hester Lake

On a summer day, July 27, 1960, Frank Dodge and I, geologists with the U.S. Geological Survey, prepared to map part of the east side of the Black Divide in the Mount Goddard 15-minute quadrangle within the remote central Sierra Nevada. We were camped near the John Muir Trail on the Middle Fork of the Kings River in Le Conte Canyon, and had fortuitously asked a seasonal park ranger, Leroy Brock, who was stationed nearby, to accompany us on this traverse that entailed a climb of more than three thousand feet.



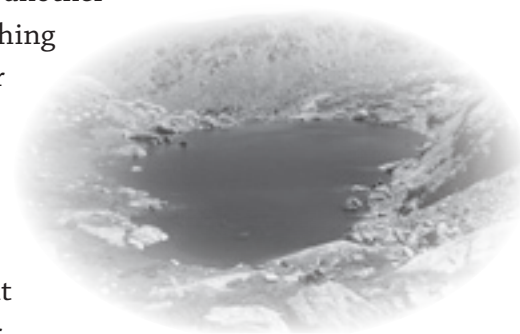
We worked up a creek gorge, passed some small ponds, and eventually reached an unnamed lake at 11,255-foot elevation, partly frozen on the far side. As we knelt at the lakeshore for a much-needed drink, I noticed two floating objects lodged among the rocks at the lake outlet. One was a wooden aircraft wheel chock and the other a small metal pressure tank (2–4 liters in size) of the type used for breathing oxygen. These items signaled that a plane had crashed in or near the lake. We began circling the

lakeshore toward the north and before long spotted an open parachute submerged in shallow water. I took off my pants, waded into the freezing lake, and grabbed the white fabric which ripped and tore in my hand. Soon after, Frank spotted a boot in about six feet of water. Despite the rising goosebumps I stripped down completely, dived into the water, and grabbed the boot, but could not bring it to the surface because of cords attached to it. During another dive, I cut the cords with a knife and tossed the boot on the grassy shore.

It was a flight boot that contained a human foot, broken off at the ankle. The cords proved to be insulated wires that apparently were part of an electric foot warming system. The skin of the foot, though slightly wrinkled and bleached, was otherwise almost perfectly preserved. We thought we were dealing with a crash that was a year or two old. This lake was frozen much of the year, and its waters remained frigid the rest of the time.

Before long we found a weathered leather briefcase 30 feet upslope from the water's edge. Papers within, though caked and barely legible, revealed that they had belonged to the navigator of a B-24 bomber, the four-engine Liberator. Further climbing revealed part of the shattered tail assembly on a high ridge southwest of the lake. We surmised that the plane had come in over the ridge a bit low, had struck a rocky spur at nearly thirteen thousand feet, and cartwheeled down into the frozen lake. Most of the plane had sunk in deep water, but some objects had torn loose and skated across the ice to end up in shallow water or up on the sloping bank.

The next day we continued on another traverse up Ladder Creek, not wishing to lose any time on this particular trip into the mountains. Leroy radioed the information on the plane to headquarters. The whole story soon came out. The plane had been on a training flight during World War II on December 5, 1943, and had never returned. It had departed Hammer Field near Fresno, California, flew to Tucson, Arizona, and disappeared on its return flight somewhere in the high Sierra Nevada.



Clinton Hester, the father of co-pilot Lieutenant Robert Hester, had become obsessed with finding the plane and his son. He spent every season examining the vast reaches of the alpine Sierra on foot. This passionate search was unsuccessful and eventually he died in 1959, the year before we discovered the plane. It had been in the water at this isolated spot for more than 16 years, a place that was apparently unvisited during that time. When an Army diving team traveled to the lake by helicopter later in the summer, remains of the six-man crew were recovered from deep water, but equipment was unavailable to raise the wreck. The lake is now named Hester Lake on the U.S. Geological Survey 7.5-minute North Palisade Quadrangle.

- James G. Moore

A Lucky Day

It was a typical hot muggy day some 55 years ago in mid-July of 1949, with both the temperature and the humidity somewhere between 90 and 95. I was working for the U.S. Geological Survey in the beautiful back hills of the Cumberland Plateau in Leslie County, Kentucky. Our field party was working on the eastern Kentucky coal project, measuring sections, sampling coal seams, and structure contouring on the fire clay beneath the No. 4 Coal of the Breathitt Formation (Pennsylvanian).

Although our field party generally worked in pairs, on this particular day I was working alone. Having spent much of the morning in a small mine, barely five feet high, collecting and quartering a coal sample, I was hungry, itching with chigger bites, dripping wet with perspiration, and somewhat exhausted from the heat and humidity. My hands, arms, and face were covered with coal dust. To be sure, I was quite uncomfortable. And although I had some water left in my canteen, I dared not use it to wash off the coal dust, as there likely would be no source to refill my canteen before the end of the day.

Shortly after I left the mouth of the hollow and started trudging down a somewhat larger creek, I came across a most unusual dwelling. By the standards of that area at that time, with its one-room tarpaper shacks, home coal banks, and private stills, this dwelling was a virtual mansion; as I recall, it even had a couple of white pillars that held up the roof of a sizeable front porch. Unlike most of the shacks, it was set back several tens of feet from the creek bed, and between the creek and the house there was—of all things—a well. Thinking that this was my lucky day, I approached a pipe-smoking lady sitting on the porch and asked if I might draw some water from the well. She readily agreed.

As I pulled the bucket up by the rope and poured some water over my hands, being careful to keep my arms and hands outside of both the bucket and the well, I was met with a loud demanding male voice “Get the hell out of here, you @#%.” Just as I turned toward him to speak, he fired two shots from his rifle. Neither hit me. Needless to say, I vacated the place in a big hurry and remained



hot and dirty for the remainder of the day. As I retreated, I heard him yell something about sticking my dirty hands into the bucket (I had not). Whether he shot to kill—which would not be unusual in that area—or simply to scare me off, I shall never know. But in retrospect, that was probably my lucky day after all.

- Allan F. Schneider

“While mapping asbestos field in an African woodland, I emerged into a clearing at the same moment as a leopard on the other side. We both retreated!”
- H. Basil Cooke



“1949 – Laramie Mountains, WY – PhD field work: killed rattlesnake; Undergrad. Asst. W. C. Vollendorf (now deceased) said: “Let’s have it for supper.” He cooked it. I had one bite. He ate the rest with gusto.”
- James Peterson



“Doing hard rock field geology, under the direction of Mr. Ray Bassler, in the Cemeteries of Washington D.C. in 1948.”
- Alwyn Williams



An Evening on a Tropical Beach

The night of February 14, 1969, I sat alone on the south shore of St. John in the U.S. Virgin Islands, listening to the waves lapping against a beach of coral rubble. The sky was brilliantly lit with stars, and a light, warm breeze touched my face. Introspection claimed me, for I was on the brink of trading my familiar sun and starlit world for an alien undersea environment. The following afternoon, three marine biologists and I would splash down to a seafloor habitat where we would spend the next 60 days as aquanauts in the Tektite Man-in-the-Sea project.



I was not, I must admit, a seasoned diver. I had become certified with scuba two years earlier and had since made a few tentative dives in the southern Oregon surf zone, where we had hoped to employ underwater observation in our research of nearshore sedimentology. I suppose I had, all told, a total of 25 dives under my belt. My primary qualification for being a Tektite diver was probably my willingness to commit 60 days of my life to being the first geologist-aquanaut.

As I sat in the darkness, I could hear a steel band and shouts of revelry in the distance. The Navy Seabees, who had carved a base camp out of the jungle and who were providing logistical support for the project, were justifiably celebrating Splashdown Eve. I wondered what part of my subaerial existence I would miss most over the next two months. Would it be the stars? The feeling of a breeze on my face? The underwater world seemed dark and forbidding. What did it hold? How was all this going to work?



Geologist-aquanaut Ed Clifton collecting samples during the Tektite Man-in-the-Sea program. The Tektite habitat can be seen in the background.

As I mused, listening to the lap of the waves and the sound of distant partying, I became aware that there were other sounds in the night: splashes and the popping sound of feeding fish. The sea was alive! Suddenly my introspection dissolved into eagerness to explore this world in a way privileged to very few others. I sat there for awhile longer listening to the sound of life in the sea and then returned to the party.

The Tektite project proved to be a wonderful, rewarding experience. I returned to the Oregon coast the following summer and we put scuba to full use in the first comprehensive study of a high-energy surf zone. I was also an eager participant a year later in the Tektite 2 experiment, which gained me an additional 20 days of undersea habitation.

And what was it that I most missed while living underwater (other than wife and family, of course!)? It was something I had always taken for granted—the healing warmth of the sun.

- Ed Clifton



Ed Clifton (2nd from right) with the other Tektite 1 aquanauts and Vice-president Spiro Agnew at a ceremony celebrating the successful conclusion of the Tektite 1 Man-in-the-Sea project. Model of the Tektite habitat on table.

“Descending into an abandoned Mexican gold mine via a notched log, then crawling along a drift so narrow, I had to remove the Brunton compass from my belt.”

- Arthur Socolow



Dinosaur Bones

In 1952, I was a graduate student at the University of New Mexico (UNM). Not yet having chosen a topic for my thesis, I gladly accepted an offer by the U.S. Atomic Energy Commission (AEC), Division of Raw Materials, to make a stratigraphic study of the Jurassic Morrison Formation on the Laguna, Acoma, and Canoncito Indian Reservations, west of Albuquerque, New Mexico. The AEC was interested in learning about the details of the Morrison in this part of New Mexico since an important uranium discovery had recently been made north of Laguna, New Mexico. This was the inception of my thesis.

I started my field work in June. While looking for a suitable location to measure a section of the Morrison Formation on the west side of Mesa Gigante, north of the village of Mesita, New Mexico, I was approached by a Laguna man on horseback. After explaining my reason for being there, he offered to show me something. At the foot of the slope of the mesa were several fragments of dinosaur bone. I checked the silicified bones with my Geiger counter and found them quite radioactive. Further investigation produced a few more bones farther up the slope. With the help of my Geiger counter I determined that the bones probably had weathered out of a claystone bed some 120 feet above the base of the Morrison. I collected a few of the larger specimens, including one that contained a joint. A few weeks later I gave my specimens to Dr. Vincent Kelley my thesis advisor. Completing my thesis, I graduated with a master's in geology in May 1953.

Unknown to me, Dr. Kelley showed the specimens to Dr. Stuart Northrop at UNM, who sent a few of them to Dr. Edwin A. Colbert, a dinosaur expert at the American Museum of Natural History. In January 1954, I was notified by Dr. Northrop that one of my specimens belonged

to a Stegosaurus, the first verification of this species in the Morrison Formation of New Mexico. News of this discovery was published by Dr. Northrop in 1961 in a UNM publication, "New Mexico's Fossil Record." In retrospect I realize that the unknown Laguna cowboy, not I, should have been credited with this discovery.

- William L. Chenoweth



"During the 1958 Dry Season, I found a tooth of a Carcharodon Megalodon on the Rio Chico in the Darien of Panama. It measures 10 cm in length by 7 cm in width."

- Frank Greene



"Seeing thousands (yes thousands) of Kangaroo, Wallaby and Emu, grazing on grasslands of N.W. Australia while mapping for Richfield Oil Corporation in 1947."

- Robert Maynard



Popocatepetl: A Retrospective

In August 1962, Bob Mixon (Emeritus, U.S. Geological Survey, Reston, Virginia) and I made a climb of Popocatepetl (5452 m/17,887 ft), the second highest peak in the republic of Mexico.

The most direct way to climb this peak is via the Pass of Cortes. In

1962 the road to the top of the Pass of Cortes was macadam (today it is well paved and a “superhighway” by 1962 standards). In those years an ancient climbing hut called Tlamacas (now replaced by a climber’s hotel) occupied the summit of the pass. As we were ignorant of the best routes, and Bob had no equipment (crampons, ice ax, and rope are necessary), Bob and I contacted a local shepherd in Amecameca, Guadalupe Guzmán, and contracted with him to ascend “Popo.” We were certainly naïve, since it ended up that Guadalupe could only provide a set of crampons for Bob and an ice ax, but no rope. I had purchased some crampons and an ax in Mexico City on the way to Amecameca. We spent the night at the old climbing hut at Tlamacas. At dawn the next morning Guadalupe met us, and we walked to the Pass of Cortes to begin the climb. After we began the ascent, we found that Guadalupe used a piece of bent iron reinforcing rod (re-bar) as an ice ax. In addition, all Guadalupe had for high-altitude clothing was his heavy serape. It certainly did not look like an auspicious beginning! We chose to ascend “Popo” by the Ruta de Los Tres Cruces. The beginning of this route traverses the various ash flows at the base of the peak and is marked by a small group of three crosses that Mexican Catholic pilgrims stop at to say penance for their sins.

By the time we reached the site of the three crosses the sun was rising. We could see across the Pass of Cortes northward towards Iztaccíhuatl. The “feet” and “knees” of this peak comprise false summits that were covered with snow and ice, glistening red in the early morning light. Halfway through the morning we found that we were not as well acclimated as we had thought. Although we had been doing fieldwork in northern



Popocatepetl from the village of Atlixco

Mexico for the past six weeks, we had only spent about two days in the Valley of Mexico, which is about 7,350 feet in elevation. Bob and I had to stop every 20 feet or so for a breath; however, Guadalupe just forged on ahead, breaking trail in the wet snow (remember it was summer, and the snow and ice were fairly well decomposed). By noon, Guadalupe, Bob, and I stood on the lower crater rim of the mountain. From this position we could gaze downward and southward across the crater, which is about a half-mile wide.

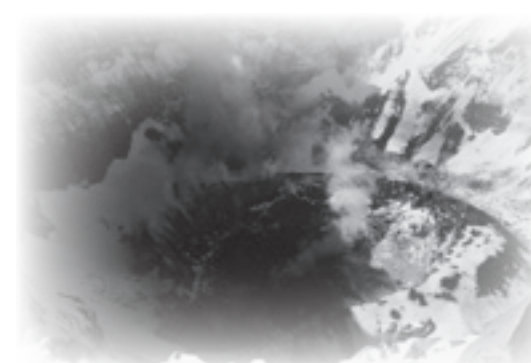
The precipitous walls of the crater were crusted with sulfur deposits from fumarole activity and we could see a subsidiary smaller crater in the bottom of the main crater. Smoke and steam were emanating from this small edifice.



Crater and inner crater of Popocatepetl with fumaroles and sulphur

At this moment, I wondered how difficult it had been for Cortés’ lieutenants to descend into this crater to collect sulfur. Prescott (1843, vol. 1, p. 351) tells us that in 1519 Cortés ordered his men to ascend the peak in order to impress the Aztecs at Tenochtitlán. Two years later, he sent up another party under Francisco Montano. His object was to collect sulfur for the manufacture of gunpowder during his campaign against the Aztecs in the Valley of Mexico. Nevertheless, without modern climbing gear, suitable clothing, and ropes (perhaps they used hemp salvaged from

their burned fleet at Veracruz), five Spaniards climbed to the crater rim. They cast lots. Montano lost and was lowered by his companions in a basket into the crater several times. They did manage to collect enough sulfur to replenish their exhausted



Inner cone within crater of Popocatepetl

supplies. Cortés later wrote a report to Emperor Charles the Fifth of Spain concluding it would be “less convenient, on the whole, to import their powder from Spain”! Of course, with their relatively advanced weaponry, the poor Aztecs didn’t stand a chance, and soon the city of Tenochtitlán was leveled. What remains of the city lies buried several meters under the Zócalo in downtown Mexico City.

In retrospect, I feel lucky to have made the ascent of Popocatepetl when I did. Presently, the mountain is again active, and is considered to be one of the most dangerous volcanic edifices on earth (Williams, 1999, p. 125). Today, high and low velocity lahars (debris slides lubricated with melted ice) have been sweeping down the mountain because of its renewed activity. Villages as far away as Santiago Xalitxintla and San Nicolás de los Ranchos are threatened by these flujos de lodo letales. Williams pointed out that many modern Cholulans now call Popocatepetl Zencapopoca, which in Nahuatl translates as smokes much. The great pre-Hispanic pyramid at Cholula, now crowned by a church, was constructed by the ancient Cholulans as a sign of reverence for the great mountain. The ancient Cholulan name for the mountain was Tlachihualtépetl, cerro fabricado.

- Paul R. Krutak



Guadalupe Guzman (standing, left) and Paul R. Krutak (kneeling, right) on lower lip of crater of Popocatepetl. Iztaccihuatl (Sleeping Woman) in background.

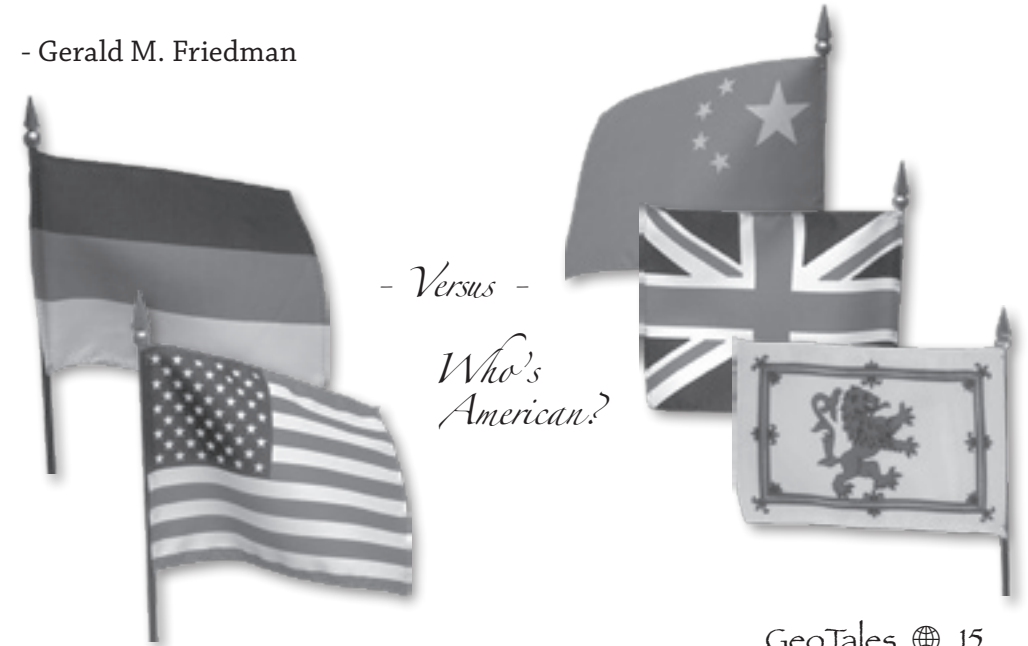
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Williams, A.R., 1999, El Popocatepetl, El Cerro de Mexico que humea: National Geographic, v. 4, no. 1, p. 116-137 (Spanish language edition).

A “Good American Citizen”

I transferred from Academia at the University of Cincinnati to industry doing oil company geologic research. Not liking my plans for departure, the dean accused me of “abandoning the department,” and stated, “You seem to think that this country owes you a living.” His remark recalled my experience in World War II when I was interned as “a bloody enemy alien” in England. The dean objected to my foreign (German) birth and accent with the statement, “Foreigners make enemies quicker than friends.” By contrast, he was born in Scotland, which was to him like being born in the United States. From Scotland he went to the University of Yenching, China, and became associated with the Geological Survey of China. He moved to the United States as an immigrant and joined the University of Cincinnati in 1938. In his mind, his residence in Scotland and China made him a “good American citizen,” but he always carried his British passport and showed it at every opportunity. His wife came from Brooklyn, New York, and put on a British accent. Both should have been listed as “aliens,” whereas I had become an American citizen.

- Gerald M. Friedman



The Extra Fault By Air

The floor of the Salton Trough west is flat, very flat. A few students and I went down there in the late 1980s to establish a leveling line across the Extra fault, a fault that had ruptured in the M6.2 1986 Superstition Hills earthquake. Just because the ground surface is so flat, we were unable to see any physiographic expression of the fault and so we had no idea where to place the leveling line. I was getting frustrated and said out loud “I sure wish I had a helicopter.” Not five minutes later, a helicopter appeared in the sky and landed just 200 m away from us!

Incredible! I jumped in the vehicle, leaving the students with their mouths agape, and drove over to the helicopter. The crew was an electric utilities lines inspection team and had stopped in the middle of the desert to relieve themselves.

“Could you give me a 15 minute ride?” I asked the crew.

“Where do you want to go?”

“Just up above us here a few hundred feet, no more than 10–15 minutes.”

They said the helicopter costs \$360 an hour.

“I have \$90 cash for 15 minutes, OK?”

“OK!” they said.

I paid the \$90, we went up, I saw where the fault was, we landed, and I drove back to the students, whose mouths were still agape.

- Arthur G. Sylvester



What's in a Name?

In the summer of 1958, my wife, Gretchen, and I spent six weeks camped at Crystal Peak, Utah, which I was mapping for my master's thesis. The north flank of Crystal Peak where we camped was crossed by an infrequently graded dirt road connecting Garrison, Utah, with Black Rock, Utah. The shortest route to Crystal Peak in 1958 required a 42 mile drive on that dirt road. Needless to say, the road was not heavily traveled. In fact, only two vehicles passed our camp during the six weeks we were there. The first held two rock hounds from nearby Ely, Nevada, and the second was driven by legendary Utah geologist Lehi Hintze.

For the first week, our dry camp was graced by a tent borrowed from my supervisor, Art Richards. But early in the second week, the tent was ripped apart and blown away by a Utah zephyr of slightly less than hurricane force. We spent the next five weeks under the stars.



Although the dark, star-filled sky of southwestern Utah was beautiful and romantic, our camp was also incredibly dusty. So dusty, in fact, that the highlight of our once-weekly, eighty-mile trip to town for water and supplies was a delicious shower at the Milford Hotel. Six weeks, six wonderful showers. I can still remember how good it felt to be clean—if only for a few hours.

It was during those six weeks that Gretchen became pregnant. As soon as the pregnancy was confirmed, we began to refer to the unborn child as “Dusty” in memory of the circumstances of his/her conception. Our first son was born in Dallas in the wee hours of the morning of March 20, 1959. That day, the headline of the Dallas Morning News was “DUSTY TODAY,” announcing the arrival of a major dust storm blowing in from west Texas! Surely, no child ever had a more apropos name than my son, Dusty Dunn.

- David E. Dunn

Making Time

In 1970, I was working on my dissertation area in the California Coast Ranges north of Clear Lake, under the direction of Dr. Eldridge Moores at the University of California at Davis. As I was examining an outcrop along a country road, Foyle Mason, a prospector in a battered pickup, stopped to ask if

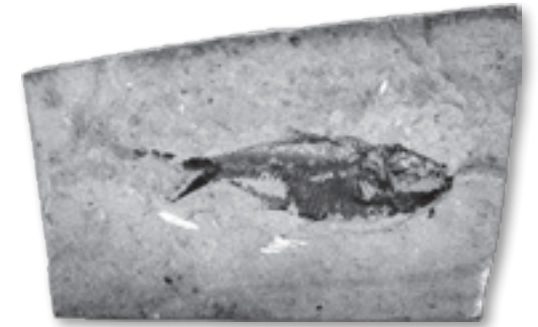


I was a geologist. When I admitted to it, he told me of some fossils he had found when a nearby road had been widened ten years earlier. I was especially interested in the site, because earlier mapping by others had assigned an unacceptable age of Eocene to that site, at the base of an open synclinal formation ranging from Lower Cretaceous to Paleocene (The Middle Mountain Sequence.) I had some Early Cretaceous *Buchia* fossils in the trunk of my car, and Foyle immediately said they looked like what he had seen, and he thought that he still had some examples. He invited me to follow him to his farm to see them. Unfortunately, they were nowhere to be found, but while he was searching he came across a “dike” rock he had picked up a few years earlier and wondered if I could “see any values in it.” At first sight it did resemble a sample of aplite, but under my hand lens I could see it was a fine-grained quartz arenite resembling Eocene rocks in the Mother Lode. I was unprepared for his certainty that he had taken it from an outcrop in a remote area of Franciscan semischists south of Lake Pillsbury; however, I was intrigued when he mentioned that it was in contact with serpentine, which suggested that it might be a faulted outlier of Tertiary rocks such as those found to the north at Round Valley and to the south near Lower Lake.

Two months of inclement weather delayed my checking out his story, but when I finally found my way to his locality at Rice Valley, I was amazed to see in the midst of Franciscan terrane a previously undescribed synclinal outlier of strata that contained fossils later identified by Warren

Addicott of the U.S. Geological Survey as ranging in age from Early Cretaceous to Paleocene (Rice Valley Outlier).

I had expected to spend less than an hour here before continuing to my dissertation area, but instead, I stretched out my provisions for three days and spent my time excitedly mapping the outlier and collecting rocks and more than 30 species of invertebrate fossils.



This was the first such outlier to be recognized in the Franciscan terrane of the Northern California Coast Ranges since the nineteenth century, and it has attracted the attention of many other geologists for its academic interest as well as those considering the remote possibility of a new source of petroleum. The outlier has important ramifications in structural history, erosion rates, and plate tectonics.

The chance encounter with an old prospector led to the most exciting and rewarding discoveries in my long and varied geologic career. The paper describing this work was published in the July 1973 *Geological Society of America Bulletin* (v. 84, p. 2389–2406.)

The whole experience encouraged me to be open-minded in dealing with unlikely possibilities from questionable sources. Ground truth cannot be established until you cover the ground.

- Jim Berkland

“1948 – Mapping surface in Arkansas in hot summer with Hugh Miser – he picked a watermelon and threw it in a creek. We had only a small knife. Undaunted, Hugh cut circles in the rind, inserted a string, neatly cutting the cold, welcome treat!”
- Robert J. Lantz



Learn to Duck

In the summer of 1951, I went to work for the Humble Oil & Refining Co. and was sent to Redding, California, with two other junior geologists to try to establish the stratigraphic sequence of the Cretaceous sandstones and shales on the west side of the Sacramento Valley. The play concept was based on the fact that tens of thousands of feet of these Cretaceous and Upper Jurassic rocks were overlapped somewhere in the Great Valley, and Eocene rocks were resting on basement on the east side of the Sacramento Valley. There was a real possibility that a huge regional stratigraphic trap might exist in California that would rival the East Texas Field.

Very little was known about the onicropaleontology of this section, so we were charged with collecting shale samples throughout the section so that a correlation could be made if exploratory wells were to be drilled. We quickly learned that these samples had to be collected in the creek bottoms since the fossils were leached from the weathered material.

This, combined with the canyon-like terrain through the conglomerates and the very hot temperatures (over 100 °F by 8:00 a.m. and reaching 115–122 °F at noon), made the progress slow. We often had to climb up cliffs to find our way, and I vividly remember one afternoon. I was climbing a cliff when suddenly I heard a rattlesnake rattle. I looked up to see the snake, and as I ducked, he struck and hit my hat.

He and the hat went tumbling 30–40 feet into the canyon. I carefully climbed down and, not seeing either my hat or, more importantly, the snake, I decided to quit for the day and go back to Redding to buy me a new hat!

- Thomas D. Barrow



Science and Economics

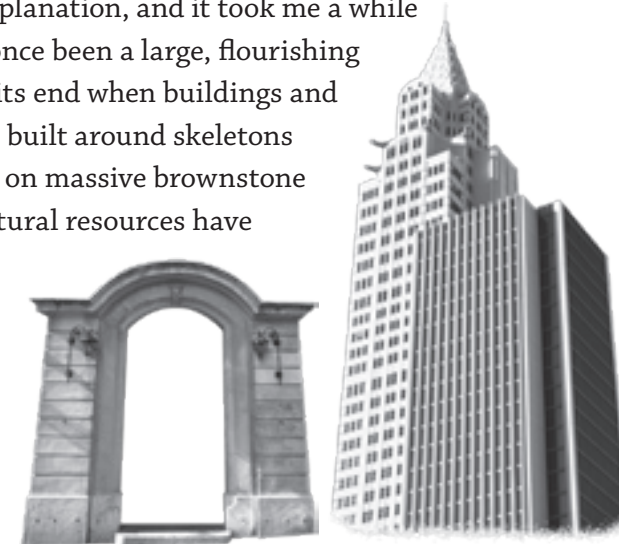
In 1947, I was an undergraduate student chosen to be the last field assistant to Dr. Frank F. Grout, an eminent petrologist at the University of Minnesota. His field area had been Cook County, northeastern Minnesota, since 1913 when he first visited the region with Indian guides. In the 1920s he switched to graduate assistants. Field work among the border lakes required transport by canoe. Grout in the rear steering and the student in front supplying motive power.

One day as we cruised the shore of Saganagaw Lake, he steered into an outcrop and asked me what kind of rock it was. I broke off a small sample, looked at it casually and pronounced that it was a granite. I then passed the sample to him. Using his hand lens, he examined the sample carefully, and then pronounces: “There is a glassy vitreous mineral, without cleavage, probably quartz; a pink mineral with cleavages at right angles, probably orthoclase; and a flaky mineral with silvery luster, probably muscovite. Until we get to the laboratory and make a thin section, we will call this rock a granite.” A perfect putdown for an over-confident student.

In late September, we left the field area for Minneapolis and shortly arrived at the small town of Hinkley. We pulled off on a side road for a mile or two then hiked along some railroad tracks for another half mile until we came to a gigantic hole in the ground, the Hinkley quarry. We stood looking, silently, for a few minutes and then returned to our car.

Dr. Grout offered no explanation, and it took me a while to figure it out. What had once been a large, flourishing industry came abruptly to its end when buildings and other large structures were built around skeletons of steel rather than relying on massive brownstone walls for support. Some natural resources have value only as long as they are useful, or popular, and competitive in price. The abandoned quarry offered a lesson in economics.

- Robert K. Berg



Eat Chalk, Sonny

Steve Herrick, paleontologist, was Chief of the Water Resources Division district office in Georgia, circa 1940s and 50s, round face, slanted eyes, round body, stubby legs—looks a bit oriental. He had a great personality, loved to tell a joke, but often forgot the punch line. It didn't matter; it was just as funny "his telling it."

Herrick is a micro-paleontologist, and was laid off by Shell Oil Company during a low in the energy economy when gas was about 25¢ a gallon. "The good old days."

I was on loan to the Georgia Ground Water Office because Alabama had run out of cooperative money again. My assignment, thanks to Georgia State Geologist Captain Garland Peyton and U.S. Geological Survey Chief Geologist Vic Stringfield, was a groundwater study in east-central Georgia: Washington, Wilkinson, Twiggs, Hancock, Glasscock, and Baldwin Counties, to be exact. The area was right smack dab on the fall line. That's a geologic contact not too difficult to map.

This assignment, to the center of Governor Talmadge's political stronghold, was one I never will forget. I did not know it at the time of my appointment, but we were to live in Irwinton, population at most 500, the County Seat of Wilkinson County. Headquarters also of the *Wilkinson County News*—Joe Boone, editor, publisher, printer, typesetter, janitor and his dog, Spot. The *News* was in a wonderful ramshackle building with a press. The paper was always two weeks late, but it didn't matter because that was about in time with national and international news reaching the area. Local news, however, got around much faster at the barbershop or café.

There were two paved roads going into Irwinton, a church on one corner, the courthouse on another, and a general store on the third. Maybe there was only 1½ paved roads; I don't remember. But I do remember



the owner of the general store had a long, crooked stick that looked like a snake, and he used to scare strangers, including my young wife, Bunnie. Being a geologist's wife, however, she got used to these kinds of shenanigans after awhile.

I remember we lived in an add-on apartment to Mrs. Wilkinson's house, which, incidentally, was Sherman's headquarters during the Civil War. I'm corrected, the War Between the States. We had an old G.E. refrigerator with coils on the top. This was Phil Jr.'s first home away from home. We let Phil Jr. run around barefooted and made headlines in the *Wilkinson County News*. This was when Mrs. Perkins was Secretary of State under Franklin Roosevelt, and was making brash statements about "those poor kids in the south without shoes". Joe Boone, editor, made a special issue on the front page with pictures showing "those d--- Yankees from the north letting their child run around barefooted".

These were not easy times. There were gasoline stamps, sugar stamps, and lines at theatres and restaurants. Furthermore, I was traveling in the deep and redneck South (of course, now I am one) in a confiscated (ABC vintage) Mercury Coupe, with a spotlight on top. We entered the local society and joined a non-denominational church. Joe and Edna Boone became close friends; we learned to eat chitlins and black-eyed peas from the Sr. Boone.

Once, for experience, Bunnie and I sat in on a moon shiner's trial at the County Courthouse. We knew the moonshiner had been caught red-handed by a state trooper with pictures, samples, jugs, copper coils, sugar, and all the makings. As we sat on those hard, wooden court benches, Bunnie and I felt sorta sorry for the culprit, for no way would he get off. Verdict—not guilty!!! Later, we found out he was the judge's source of supply!!

Another time down at a spring in the Sandersville limestone quarry, at an outcrop of the Tivola Tongue of the Sandersville limestone, we had the



spotlight on our government car shot out! It was just a warning, and was daytime with no one around. However, Herrick and I decided to measure the spring later!!

Steve and I, at the time were inventorying wells we came to a traditional old weathered, wooden-framed house with a wide, open walkway between the living and sleeping area, and the kitchen. A sweet little old lady in a blue bonnet sat rocking away in the cool breeze out on the porch. I think she was shelling black-eyed peas for supper.

Steve and I drove off the dirt road into a bare yard and parked under a big old oak tree. A dug well bucket and rope with pulleys, showing heavy use, was in plain sight. The pail was shiny clean. The little lady rocking was just as shiny and neat.

We were especially polite, particularly as Steve did look a little oriental. We asked if we could measure her well and explained we were with the government doing a water study. She said go ahead.

The time was just after the Japanese had bombed Pearl Harbor and toward the end of WWII. Steve took out the light blue carpenter's chalk that we used to coat the tape, so that when it was wetted it would turn dark blue at the top of the water, thus being able to measure the water level. We proceeded with our measurements. Upon looking up at the porch, there still rocking away was our sweet little old lady; but, now she held an old double-barreled shotgun. From her lips came, "Now Sonny, y'all eat that blue stuff cause ya ain't goin to pisen my well." We each "done so purty fast like and left rather quick like!"

- Philip E. LaMoreaux



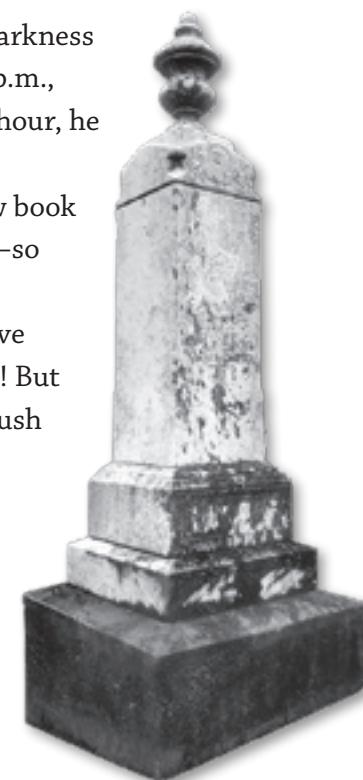
A Small Thrill of Discovery

The Harrington 1883 biography of Sir William Logan (1798–1875), founder (1842), and first director of the Geological Survey of Canada, records that his grave is in the churchyard at Llechryd, Wales. In 1963, I discovered it is not there; the wife of a relative, who was not aware Logan is buried in Wales, said the grave may be in the churchyard at Cilerran Wales, about two miles from Llechryd.

My search started in early evening, but as darkness increased, the grave had yet to be found. At 11 p.m., the rector returned home, and even at this late hour, he insisted the burial book be examined.

Sir William's name is the first entry of a new book started in June 1875—Logan died on June 22—so the grave had to be in the churchyard! The next morning, attention focused on a large, impressive monument of grey granite, which bore no name! But careful inspection and scrubbing with a wire brush eventually revealed Sir William's name. Layers of dead, grey, black, and white lichens and moss had totally obscured the name of this most famous Canadian geologist, so he was in an "unknown" grave. It was a thrill to see Sir William's name revealed.

- C. J. Winder



"Most memorable geologic experience – and one NOT to be duplicated. (What did I know when I was 7 years of age?) As a child during WWII, I tasted water bailed from an oil well, found it salty, and thought there had to be an ocean down there. I've been looking for ancient oceans ever since!"

- Don Woodrow



Toby

In the summer of 1968, while working for the Wisconsin Geological Survey mapping Keweenawan volcanics and related rock units, we rented a house in the village of Mellen in that state. Our dog Toby, a mischievous Brittany spaniel, accompanied us to Mellen and occasionally joined us in the field. Toby was not popular in Mellen as gardening is an important summer activity there, and we were visited by the local constable almost upon our arrival and told that Toby must be kept tied lest he find his way into the dog pound. Toby also had an obsession for skunks and managed to find one every now and then. Of course, this upset me to the point of making him run home behind our slowly moving truck on at least one occasion.



At the end of the summer, with our vehicles packed to leave for home, we spent an enjoyable evening with newly-acquainted neighbors. Toby spent the evening on their porch. At one point, I went outside to get something out of the car, and of course, Toby followed me. I didn't notice that he failed to follow me back to the house. About ten minutes later, the aroma of fresh skunk drifted through the screen door and on looking, there was Toby, the loyal best friend.

As our plan was to leave early the next morning, we were quite upset with the prospect of traveling with such an odoriferous dog in the car. At one point in the morning as I was leaving for an unrelated errand, my wife, Rosemary heard me say, "I'll get some shells downtown and shoot him." Of course, I had no such intention, but she understood how upset I was. When I returned, sans shells, there were two ladies across the street bathing Toby in tomato juice, the universal remedy for skunk smell. As I drove in, Rosemary was standing by the drive with a triumphant smile on her face, saying, "I gave Toby to Ruth."

Toby was a young dog, and he lived for over ten more years to the ripe old age of about fifteen. Each fall, he was treated to a month or so of bird

hunting with Ruth's husband and son, and in my estimation had a good life with wonderful people. On later visits to northern Wisconsin, Toby always seemed to recognize us as his long lost friends, but his real loyalties were now with his new people. However, one thing was clear: Toby always spent the summer gardening season on the end of a chain.

- Jim Olmsted

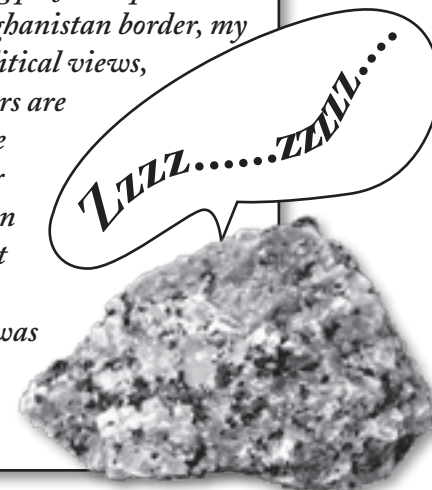
"Hot, Windless Fieldwork East of Berkeley, with the class of 1953 – Overenthusiastic to garner virgin specimens, I slipped over a precipice. While in free fall, I noticed leaves quivering on a tree that I passed in my descent. After careening atop the talus, ascertaining my wholeness, and rejoining the class, I learned that I had missed an earthquake — an extraordinary embarrassment for a budding seismologist!"

- William Adams



"In 1972 on a systematic geological mapping project expedition in the eastern Iranian desert close to the Afghanistan border, my illiterate party cook, who had very good political views, told me that: 'Geologists with their hammers are disturbing the everlasting tranquility of the rocks which have slept eternally!' The poor cook, whose name was 'Free, the Famous' in Persian, was killed in a tragic auto accident while selling a flower pot in the 'Freedom Square' of Tebran in 1988, where his soul was freed and his body joined the earth."

- Manuel Berberian



Talk Fast

The late 1950s and early 60s were a time of intense study of dolomite at Shell Development Company. Approximately 60 professionals were involved in the study of carbonate rocks. One major type of study was the horizontal and vertical limestone-dolomite transition. The Franklin Mountains outside El Paso, Texas was one of the study areas.

Jerry Lucia, Ed Cotter, and I would often drive to the El Paso Police Pistol range, leave the car, and walk up the mountain. Unknown to us, someone had been shooting into town from the mountain a few days before one of our field trips.

We were just starting up the mountain when two police officers arrived and made it rather clear that they wanted us to go with them. Jerry and I had our snake protection pistols taken, and Ed had to give up his pocket knife. The three of us were placed in a police car for the trip to the El Paso police station. I am told that on the ride into town I gave a pretty good lecture on the geology of the Franklin Mountains.

Once at the police station we proclaimed our innocence and explained how important it was to study limestone-dolomite transitions. A lot of fast talking and papers from our wallets finally convinced the El Paso Police that we were superior citizens doing an important task for civilization. They gave us back our guns and knives and returned us to the mountain.

Jerry Lucia went on to use the information he gathered from the Franklins to make important contributions to our understanding of the dolomitization process. Ed Cotter, a summer hire from Tufts at the time, went on to become a faculty member at Bucknell, retiring a few years ago. I write books on police, crime, and geology and remember the fine Mexican food which Jim Wilson introduced us to in Juarez.

- Ray Murray



I'm Sorry We're Late

About 25 years ago I was teaching a summer field course for 15 adult students, all of whom were either teachers or retired persons. One of our stops was an active-on-demand quarry with some interesting stratigraphy—Galena Dolomite (Ordovician) overlain by two Wisconsin till units. I had visited the quarry with colleagues on several earlier occasions without any problems. But I had heard that the quarry was under new ownership and that advance permission to enter was now required. When we arrived, it was obvious that some changes had taken place. A no-trespassing sign had been posted, and the entrance road was blocked by a chain padlocked to a post. A sign hanging on the chain gave the name of the new company owner and a phone number. As we climbed over or ducked under the chain, I informed the group that we did not have permission and warned that we might be evicted.

After about 20 minutes, a car roared in and came to an abrupt stop in the middle of the quarry. A man jumped out, started running toward our group, shouting, and wilding waving his arms. I advised the group to remain where they were, and I started slowly walking toward him, thinking of course that he was ready to read me the riot act, or worse.

As we approached each other, he yelled, "Where have you been? I've been waiting for you for the last hour." And from the tone of his voice, it was apparent that he was expecting a group. I never thought so fast in all my life and replied apologetically "I'm so sorry we're late, sir, but we were delayed in getting started this morning." This reply seemed to placate him; he returned to his car and left without another word. I returned to the group and suggested that we leave immediately. I later learned that he was the local gentleman designated by the owner to open the road for visitors who had received permission to enter the quarry, but I never did learn the identity of the group that he was expecting. To this day, we still wonder what his reaction was when the authorized group arrived.



- Allan F. Schneider

Getting Paid in Gold Nuggets

In the mid-60s, while a junior faculty member at the University of California at Davis, I took on a three-month consulting project near Medellin (Department of Antioquia), Colombia. For years, an American gold mining company there had been using classic “Yuba-type” bucket dredges to exploit placer deposits. Gold values, however, were declining, but there was hope, for the company president heard that geomorphologists could find ancient, auriferous channels. And so, as a budding applied geomorphologist, off I went.

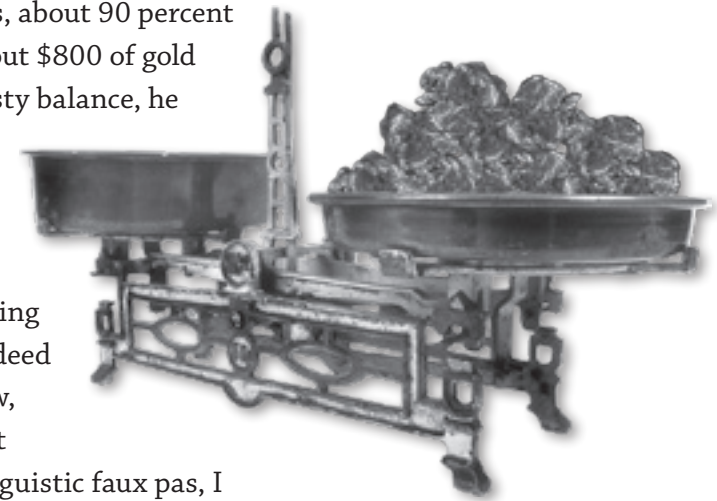
The mine manager, a practical, well-experienced engineer, immediately sensed that I knew nothing about the mining business. So upon my arrival in camp, via a decrepit DC-3, he made an offer: “Accept the three-month equivalent of my university salary, then about \$600/month, or, alternatively, receive one percent of all gold recovered within one year after submission of my report.” This was my first dilemma. Making house payments at the time, and having little confidence in my exploration skills, I opted for my university salary.

The first two months in camp were frustrating, for I couldn’t make any sense out of the hundreds of 150-ft deep cores drilled into the floodplain during the previous 50 years. Gold values were seemingly random, and the dredges were being used as expensive exploration tools. But one night, during fitful sleep, it dawned on me that, as a geomorphologist, I was there not to find gold, but rather to find old channels. With this “insight,” I reinterpreted the data, recognized that “red beds” were buried terrace deposits, that high gold values were associated with superposition of discrete channels, and that I could now predict the location and depth of other buried channels. My report written, I went back to university life.

A few years later, the now “Colombianized” mining company informed me that that the previous owners had implemented my recommendations, had brought in a deep-digging dredge, and had obtained who knows how much gold (including my “one percent fortune”) from the deep channels. And, therefore, would I return to Colombia for a week to update my report? This I did.

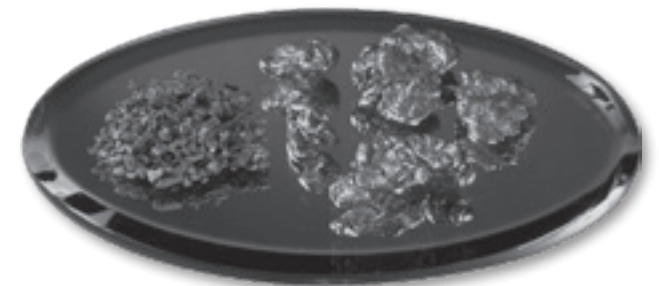


The new mine manager immediately told me that, owing to my lack of a Colombian work permit, I could not be paid in pesos, but would I mind accepting gold nuggets? Thinking this was perverse Colombian humor, I jokingly responded in my quasi Spanish that I would accept “solamente oro nuevo, y no quiero oro viejo.” The manager shook his head knowingly (otro gringo loco), and I went to work. One week later, with my report updated and with the never-dependable DC-3 standing by, the manager brought in a small sack of nuggets, about 90 percent gold. Weighing out about \$800 of gold (at \$35/ounce) on a rusty balance, he informed me that because I didn’t want old gold, they hydraulically mined the nuggets that morning and so the gold was indeed fresh! No dilemma now, for although somewhat embarrassed by my linguistic faux pas, I readily accepted the nuggets, fresh or not, and toted them around in my shaving kit for a few weeks while doing other projects in Colombia and Peru.



After returning to California, I must have showed the gold to friends, for several years later, when gold reached \$850/ounce, I was asked where the nuggets were. I had totally forgotten, but upon ransacking the house found them in an old shoe box. They now reside in a safe deposit box, and are brought out on occasion when telling “gold mining tales.” Their worth now lies not in dollar value, but rather in the story about their acquisition!

- Roy J. Shlemon



First Class Field Trip

In 1968 while working for the Kerr-McGee Corporation, I had the opportunity to visit the newly discovered uranium deposits in the Tin Mersoi basin of Niger. The French C.E.A. (Commissariat à l'Énergie Atomique) approached Kerr-McGee for an evaluation of their deposits in Niger because they were looking to interest a partner in their exploitation efforts there. Phil Ellsworth and I were given the job. I suppose we were privileged, to some degree, for being the first Americans to visit the project area.

We had a superb first-class flight on Air Afrique to Niamey. A couple days of sightseeing in Niamey on the shores of the Niger river was introductory before boarding a two-engine prop plane bound for Arlit via Tahoua and Zinder. Landing in Tahoua for fuel was routine, and here we saw the ubiquitous Coca-Cola signs and many Tuareg (Taoureg in French) natives wandering about.

Somewhere on the leg to Zinder, we sucked a buzzard into the starboard engine and the pilot had to feather the prop. Either we were flying low or the buzzard was flying high! Anyway, it was a bit of a white-knuckle flight into Zinder. There, they extracted the pulverized buzzard, including fecal matter, from the air cleaner, and we were on our way again.

Arlit, the built-in-the-desert-from-scratch town, was just under way with a handful of shacks. But the French know how to enjoy life in the desert! We had a grand Olympic-size swimming pool we could use; it was really a water supply for the town. Our lattice-covered bar served whatever the heart desired: Pernod, pastis, Johnnie Walker, etc. After a scorching day in the field, we would jump in the pool to cool off, then retire to the bar prior to a delicious meal of ostrich or gazelle with locally grown vegetables and good wine. The best apple I ever ate was served there—a reinette de Canada.



Now, to the purpose for which we went to Niger. We found the deposits to be very interesting and an analog to Colorado Plateau deposits. They were not in the Mesozoic, as are ours in the United States, but in the Carboniferous. However, the lithologies, colors, and modes of deposition



were quite similar. Even the topography, though subdued, reminded us of Monument Valley and similar areas: “mushroom” rocks, standing sandstone pillars and vast areas of gravel pavements.

We had a chance to visit deposits in surrounding areas and see some unusual sights. One area, Teguida in Tessoum, meaning spring of salt, was fascinating. An area the size of a football field was covered with almost contiguous, round depressions filled with water of various colors, ranging from yellow to buff to brown. We were told the colors were due to various concentrations of camel urine. That apparently had little effect on the production of salt from the basins.

We both found the Tuareg people charmingly fascinating. At one settlement we were serenaded by a lady playing her imzad, a one-string violin. A recording of the event revealed that the flies buzzing on the mike made an interesting accompanying sound.

It was a great experience.

- Lowell E. Bogart

Cargo Cult of Papua New Guinea

In May 1985, a M7.1 earthquake hit the Island of New Britain, Papua New Guinea, triggering a huge landslide that dammed the Bairaman River. For the next 16 months the lake behind the 210-m-high natural dam slowly filled. In early September 1986, the U.S. Geological Survey sent me to New Britain as an advisor to the Geological Survey of Papua New Guinea, which was trying to protect the people downstream from a possible outburst flood from failure of the dam. At that time, the dam was close to overtopping. Because we felt that the dam would fail soon after overtopping, we recommended that natives in the village of Bairaman, some 30 km downstream from the dam, immediately be evacuated because the possible flood posed a serious hazard to the village and its occupants.

However, there was one hitch. The villagers belonged to a “Cargo Cult,” a semi-religion that formed during World War II when natives saw goods such as food, Jeeps, and weapons fall via parachutes from Allied aircraft passing overhead. They felt that these “goodies” came from God. In late summer 1986, several aircraft related to the hazard-reduction strategy were again overhead. Because of this, the natives thought that a “second coming” was upon them and that gifts would soon rain from the heavens onto the village of Bairaman. Fearing that they would miss out if not in the village when the “manna” was to come from the skies, they did not want to be evacuated. It required strong persuasion from army units of Papua New Guinea and Australia to get them to move to higher ground.

On September 10 the landslide dam overtopped and failed catastrophically, sending a 100-m-deep debris flow down the canyon of the Bairaman River. When it reached the village of Bairaman, the flood was about 10 m deep; it obliterated the village. Fortunately, because of the army units, the people had remained on higher ground, and there were no casualties.

- Robert Schuster



Paid to Play

During the wonderful summer of 1965, while working as a party chief for the Vermont Geological Survey, I had the privilege of working with the late Paul MacClintock. He was then professor emeritus at Princeton University, an eminent glacial geologist, and more than 40 years my senior. Paul was mapping an adjacent quadrangle so we were able to meet at noon once a week to compare notes. Each of those times we sought out a warm, sunny hillside for a field lunch, with the Green Mountains at our backs, tranquil Lake Champlain at our feet, and the hazy profile of the Adirondacks on the far horizon. Every time, just as he sat down, Paul would say, “Heh! And they pay us for this. We should be paying them!”

Each time, in the intervening years, when I was tempted to succumb, whether to swarming critters in a mangrove swamp, the stifling heat of an empty desert, or a reluctant northeastern summit, Paul’s words reminded me why I was there. Those words continue to guide my career.

- G. Gordon Connally



“Seeing magnificent exposures, near Kimberley, South Africa, in 1963, of late Paleozoic glacial pavements and tillites made me certain that I was right in strongly advocating continental drift against the then-powerful stabilist consensus.”

- Warren Hamilton



A Matter of Time

In 1958 on completion of my A.B. in Geology from the University of California at Berkeley, I was immediately fortunate to be hired as a field assistant by Alan Cox for his Ph.D. studies in paleomagnetism in Idaho sponsored by the U.S. Geological Survey. Thanks largely to that experience, I soon obtained a full-time position with the Survey. The following summer I spent three months working with the USGS in the Brooks Range of Northern Alaska. When I returned in September, I found another dream job awaiting me, as Edgar Bailey needed a field assistant for his continuing work in the Franciscan Complex, near Cazadero in the Coast Ranges of Northern California.



For decades Edgar was a marvelous mentor for many young geologists and always had time to explain patiently some geologic nuance or expand on some basic mineralogic or structural relationships. I still consider Edgar to have been the epitome of what a true scientist should be, equally at home in the laboratory, in the field, or in the lecture hall.

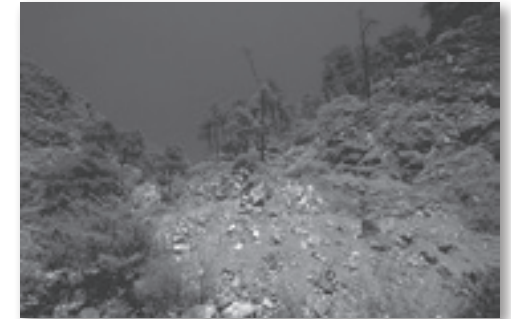
For the first week of the Cazadero field work that fall, I was most content to follow in his footsteps in mapping the geology and soaking in his words. And then he informed me that we would be splitting up the field work in order to accomplish more during the limited time before the rains began. (Cazadero averages 70" of rain, mostly between October and April.) This meant that I would be on my own much of the time, and I had feelings of inadequacy as to just where to draw the lines (forgetting Professor Ed Wisser's wise words that, "A geologic map is mostly an expression of personal opinion").

At the start of the second week Edgar drove us in our Jeep up to the ridge top and then turned the keys over to me. He pointed out on the contour map where he would be "geologizing" and then indicated the

ground to the north that I should cover. I was to pick him up at 5:00 p.m. near his starting point. Then, with his cheery whistle, (to alert rattlers, he said), he started slowly down the hill, and I was truly on my own.

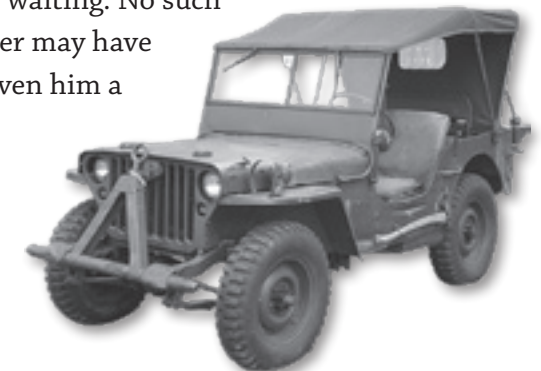
I drove a mile farther up the ridge, parked the Jeep, checked my Brunton, altimeter, map, and knapsack, and off I went. I felt so free, so responsible, and I marveled that for this pleasure, I was actually being paid (GS-4). I covered several miles, and by 4 p.m. in 90-degree heat, I found myself at the bottom of the canyon and realized I was supposed to pick up Edgar in less than an hour.

I hurriedly started up the next spur ridge and, part way up, noted a rare block of limestone. It was questionable as bedrock, but it was unmetamorphosed and contained small fragments of shell. I attacked it with my hammer. Tantalizing



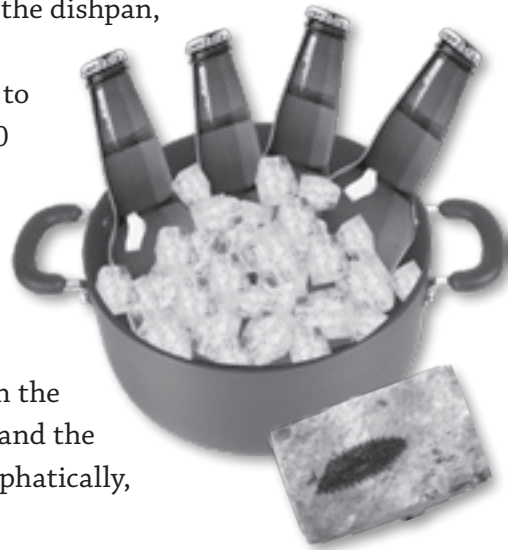
organic traces encouraged me and sweat poured off me as I sought to find a diagnostic fossil. When I checked my watch, I found that it was already 5:00, but I kept pounding, as I was sure that Edgar would approve of my devotion to duty; I also rationalized that HE might be late. Suddenly, there it was, an entire turreted gastropod! I bagged it, made a quick note on the map, and hurried with my prize up the slope as fast as I could. I found the Jeep and headed for the meeting point, raising a cloud of dust behind me. It was 5:20 and in my rush I failed to see Edgar sitting against a tree near the road and camouflaged by khaki. One half-mile beyond was a gate, where I was now sure he would be waiting. No such luck! I then reasoned that a rancher may have been heading for town and had given him a ride. Wrong again!

When I reached the motel where we were staying, everything was just as we had left it that morning. Thinking quickly, but getting



A Flight by the Seat of Our Pants

increasingly concerned, I picked up the dishpan, poured water and ice cubes into it, added 4 bottles of beer and hurried to drive back up the mountain. At 6:00 p.m. I saw Edgar, walking through the gate with fire in his eyes. I had placed the cold beer on the front seat of the Jeep, with the fossil beside it, and was preparing for the worst. When he yanked open the car door his eyes fell upon the beer and the fossil (in that order) and he said emphatically, "You just saved your skin!"



While driving him back down to Cazadero, with a second beer in his hand, Edgar brought home to me the importance of meeting commitments to your partner. "The limestone can wait for another day." With just the two of us working miles from help, it was vital that we rely upon each other in everything, including meeting where and when we plan. Even prior to Edgar Bailey's counsel, I had recognized that I was relatively slow in reaching professional maturity, but had always known it was just a matter of time.

- Jim Berkland

"This was an eventful summer, and my first experience as a field geologist while an undergraduate at Dartmouth College: Field assistant, USGS, Aleutian Islands, 1953. George Fraser, excellent party leader, teacher, and mentor. Emil Meitzner fractures leg in a rock fall. Cook jumps overboard, drowns. First mate dismissed for drunkenness."
- Lawrence D. Taylor



In the late 1950s on a trip to Bolivia to evaluate petroleum in the foothills belt of the Andes, we landed in La Paz at 12,400 feet and traveled to Santa Cruz by plane and car. Santa Cruz, population 45,000, with not one paved street, years later became infamous as the capital of the heroin trade in Bolivia.

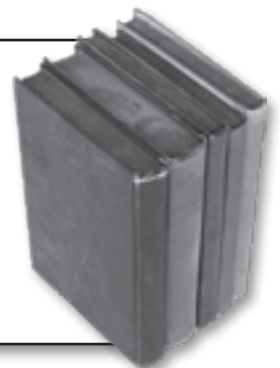
To get to Camiri oil field, we rented two WWII AT, sixes, which were part of the Bolivian Air Force, probably most of it. Each plane would carry only one passenger. However, the pilots said that two persons could fly in one plane by one sitting on the other's lap. Only one of the planes carried a radio.

As we flew south toward Camiri, the clouds increased and the planes had to keep climbing to remain above the overcast. Suddenly the lead plane found a hole in the clouds and dove for it, with the other following. We were in a valley with ridges on both sides. The lead pilot seemed to know where he was and followed the valley until he spotted the landing strip. He landed safely into the wind. The other plane circled the field and tried to land down wind. He bounced several times, headed off the strip and ended in the brush off the runway. The two fellows appeared a little white around the gills when they hopped off the plane.

That ended all our flying with the Bolivian Air Force.

- George Theodore Schmitt

"Other than introductory courses in geology, my most memorable early experience was attending the 1950 meeting of GSA (Washington D.C.) where I learned that the authors of my textbooks were real people, many of whom later became teachers, colleagues and friends."
- Kurt Servos



Undersea Investigation

No event in the history of the offshore oil industry had a more profound negative effect on its viability than the blowout, in January 1969, at the Union Oil platform a few miles off Santa Barbara, California.

I had scarcely learned about it when John Forman at Mobil called me. The fact that Mobil and Union were partners exploring and producing oil off of California heightened his concern.

"Hey, Jim," he started, "the oil spill at Santa Barbara is raising a terrible stink. Union is on the ropes trying to figure out what to do. They can use all the help they can get. You should be up there right now with your submarine, Nekton, to help bail them out. Call the engineer in charge and tell them about Nekton." He gave me a name and telephone number.

A harried-sounding man answered my telephone call. When I told him of Forman's call and that our submarine could be available the next day, he rattled, "Get the sub up here right away. We've got a hell of a mess. We gotta see what's going on at the seafloor. We've got as many guessers as we have oil leaks and the state and federal government hotshot engineers and geologist are on my ass to do something."

"Our day rates are..." I began.

He cut me off! "I don't give a damn about your day rates; get the sub up here now!"

"We'll be there early in the morning." He had hung up.

The next morning, as I drove up the coast toward Santa Barbara, I began to see black streaks of oil on the beaches and rocks, and men trying to clean it up. At the Santa Barbara Harbor, dozens of men cleaned rocks and boats, some scattered straw on the water then skimmed it off, loaded with oil. Many gawking people milled about to watch the creeping calamity.

I walked toward the slip of our surface support vessel, Dawn Star, along a row of pleasure boats, each with its ragged, black, oily waterline



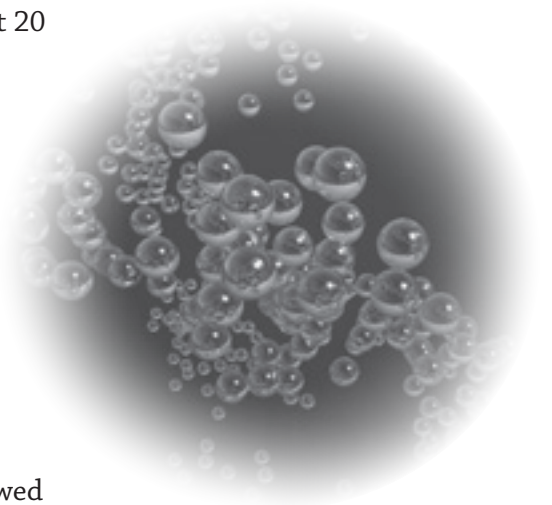
ring. My attempt to lighten the scene by asking, "Which way to the disaster area?" met numbing silence. Nekton arrived. We were ready.

A group of men showed up, a Union Oil engineer and government representatives. We put to sea towing Nekton. Within an hour we were near the platform at the center of the spill. We could see oil and gas floating to the surface at some distance from the platform. That stimulated much speculation. A trip to the seafloor might explain it.

A geologist from the U.S. Geological Survey was assigned to take a look around. He seemed somewhat apprehensive but bravely climbed into Nekton and slid down into the observer's place. The deck crew cast off the mooring lines, I closed the hatch, flooded the ballast tanks, and in a few minutes we touched bottom. Visibility didn't exceed 40 feet, but good enough to do some effective snooping.

Without moving far, we saw small craters from which gas bubbles and oil droplets trickled. We had scarcely moved when we discovered a crater about 20 feet long, six feet wide and deep, and surrounded by scattered fragments of rock, some as distant as 20 feet. Something powerful had happened here.

We loitered around it ruminating until my communication system cut in, "Nekton this is Dawn Star. You had better clear the area; a side-scan sonar device it being towed through here." Ordinarily that device operated at 20 to 30 feet off the bottom, posing little threat to us. To make it a bit safer I decided to drop Nekton into the crater where we would project only a foot or two above the seafloor. We settled into the crater where we watched gas and oil float past our viewing ports and speculated on how the crater had formed. Beneath a few inches of recent seafloor silt we could see fresh surfaces of consolidated strata, sandstone, and siltstone.



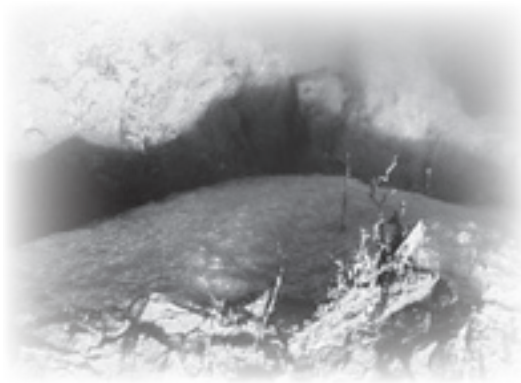
The Man With the Wooden Leg

It seemed clear to us that gas and oil under high pressure had risen from below and blown away the overlying strata to form the crater in which we sat. The question seemed to me to be, "Where did the gas and oil come from?" We were a quarter mile from the platform where the well blew out. We had only this one, but important, piece of the puzzle. We spent a couple of days cruising around the bottom checking out targets discovered by the sidescan sonar.

The remaining pieces of the puzzle came from the sidescan sonar and the drilling records from the platform. The blowout was believed to have resulted when gas and oil, under high pressure, traveled up the drilling well where, near the seafloor, they encountered porous and permeable strata into which they flowed. Those strata sloped upward toward and into the seafloor where the pressure released, forming the craters we found.

This oil spill spelled temporary tragedy to everyone and everything involved: beaches, rocks, bird life, fishing, and boating. All slowly recovered to normal within a couple of years, except offshore leasing on which our company depended. Exploratory budgets of oil companies were cut. Prospects for our kind of work remained poor off California for several years. We must look elsewhere.

- James W. Vernon



The Ground Water Branch of the U.S. Geological Survey (USGS) had a terrifically high morale and a family relationship. Even though few deadlines were imposed, the 8 to 5 schedule of work was often exceeded.

Some of the USGS district offices were known for their practical jokes with particularly notable talents in Texas, Arizona, and Arkansas. One must realize these were engineers, geologists, and scientists with many special talents, capable of instigating a large number of exotic practical pranks.

Geologist Herbert Skibitzke and associates, in the Arizona office, were particularly talented with smoke bombs, tin cans, sirens wired to the ignition, and placing dead fish on the engine or some other nefarious act. Dick Sneigocki, in the Arkansas office, was not far behind.

Now the Tuscaloosa office was not to be outdone and had some special talents of its own. For example, during District Hydrogeologist Bill Drescher's visit to Tuscaloosa, Bill Powell and I prepared a special greeting. On one occasion, as Drescher was known for his prowess as a ping pong player, Powell and I rigged up a set of lights that would send a sharp shadow going off at an angle from where the ball actually hit the table. The deflecting shadows upset Drescher's game so badly that Powell and I were able to easily beat him.

Sometime later Powell and LaMoreaux were invited as district chiefs to Glenwood Springs, Colorado, for a national meeting of the senior officers of the Water Resources Division. Luna Leopold and Ray Nace were present. During our first evening some good friends snuck into our room and



"I was held hostage in a tree by a large bull during the 1941 field season in the Ozarks."

- Herbert E. Hendricks



short-sheeted the beds and also set up a trap so that a bucket of water would dump onto a person entering the room. We were properly dowsed with water. Powell and I had an idea who the culprits were but couldn't prove it.

By chance, the next morning we learned who the culprits were, as during the first part of the meeting Dr. Leopold announced that Phil LaMoreaux would become the new chief of the Ground Water Branch. From a far corner of the room came the groan from Sneigocki, "Holy Hell."

When Sneigocki returned to his office a week later, he found a very official looking piece of paper announcing his reassignment to Nome, Alaska—my first official act on taking the new job.

Needless to say, the practical jokes went on during my entire tenure as chief of the Ground Water Branch. Later in life, Dick Sneigocki wrote a book, which contained all the jokes he had heard around the table conferences of the Division. Unfortunately, even published, the book would have to be rated XXX.

In previous vignettes I have written of the experiences with John Ivey and John Newton with the Alabama office; however, there is one other experience that needs to be documented. Tom Simpson, who was assistant state geologist and one of the finest persons I have ever worked with—loyal, hard working, productive, always available to help—accompanied me many times on the trips to Montgomery to appear before the Legislature. In those days it was a real problem sometimes appearing before either the Ways and Means or the Finance and Taxation Committees of the Legislature to justify the State Survey Oil and Gas Program. Tom Simpson was a great help because he never met anyone he could not make friends with. He and Bill Powell were my right-hand men in helping with the survey and legislative justifications.

Tom was a WWII Marine veteran. He was also a major and the highest-ranking officer in the Marines in Alabama. He was proud of that



accomplishment as were all of the rest of us, even though some of us sang the Marine song to chide him a bit. Besides being an outstanding staff man, he was a close personal friend. In the later stages of Tom's life he had lost a leg and had a couple of prosthetic legs that he could attach. He was quite agile. Later on, Tom was confined to a wheelchair.

On one occasion he created quite an impression on a young woman visiting our home for a party. Bunnie and I were hosting a get together for state and federal survey employees and a few friends. The party was in full swing when Tom arrived and I helped wheel him around the side of the house, down a slight hill, and into the back family room where the party was in full sway: We got to the back door safe and sound, however, the back door had a slight raise along the bottom of the door. We almost made it through the door when the wheels hit this raised portion and off came Tom's false leg, tumbling through the door and onto the floor in front of the whole group. One young woman observing the situation fainted on the spot. Tom calmly recovered the lost limb, replaced it, and we entered a scene where the young woman was being revived.



- Philip E. LaMoreaux

"The best advice that I ever received, as a young geologist starting my Ph.D work, from Professor Douglas Shearman in 1958: 'Base all your work on the reality of the field; there lies the truth if you are clever enough to extract it.'"
- John Dewey



The Price of Integrity

In 1958, I began an assignment as geologic advisor to South American government atomic energy organizations for the U.S. Atomic Energy Commission, headquartered in the American Embassy in Lima. During my acclimatization, I made friends with Dr. Giesecke, Cultural Attaché there for many years. He was versed in a broad range of science and was socially active with many influential and wealthy members of Peru's uppermost class. He knew Dr. Daniel Ruzo, a successful dentist and self-educated amateur archaeologist who was very enthusiastic about Prehistorical Peru. Dr. Ruzo had for years been studying unusual rock sculptures on the Andean summit near Lima, which he considered carved by a mysterious pre-Inca race of giants. He had presented an invited paper describing this La Masma Culture to the National Science Association of Mexico in 1954. Now he had invited two prominent English archaeologists, expert in pre-Inca culture, to examine the sculptures at his expense and was organizing an expedition. One was famous for having deciphered the calendar excavated at Tiajuanaco, Bolivia. I was the first geologist to work in the embassy for some years, and Dr. Giesecke recommended me to Dr. Ruzo, suggesting a geological input. My avocation had long been archaeology, and I had studied Inca culture. Much to my pleasure, I was invited.

This real introduction to the Andes and Peruvians proved phenomenally memorable in all aspects. The site is on the small, flat Marcahuasi plateau high on a shoulder of 4665 m Cerro Shirapampa above the Santa Eulalia Valley, which joins the well-known Rimac Valley near Chosica, east of Lima. The stone ruins of a 14th (?) century Inca army camp occupy part of the plateau, but Dr. Ruzo was far more interested in the neighboring rock formations. Ruzo and the English archaeologists had already been in camp there several days. His chauffeur drove me to end of the road, and a Quechua native guided me on horseback to the luxurious camp—a whole day's journey. The trip was spectacular throughout. The walls of Santa Eulalia Canyon are phenomenally steep for over 2500 vertical meters and shear for several hundred where it is only about 50 meters wide and crossed by a bridge high above a dam and power plant. I closely followed the geology through Cretaceous sediments into outliers of the Andean granodiorite batholith.

Just below the plateau summit, I marveled at the beautiful exfoliation, small domes, pillars, and spires supporting the rough plain. They are very similar to the formations at the Bosque de Rocas (Forest of Rocks), alongside the Trans-Andean Highway to Cerro de Pasco and are small versions of the spectacular domes at Rio de Janeiro. Other than the army camp ruins, which included small burial chambers constructed in typical Inca stonework, with complete skeletons lying on narrow benches, I saw nothing I would have considered a ruin.

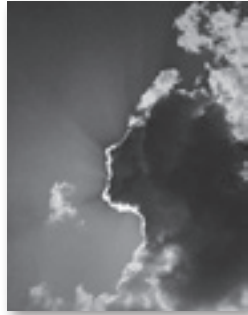
I joined Ruzo and the archaeologists for three days of examining Ruzo's sculptures, which were my small exfoliation forms. Ruzo had interpreted a Mexican lion, African lion, elephant, toad, turtle, human head, and other animals, as well as carved walls and floors, all in uniform coarse granular granodiorite. There were no tool marks or irrefutable shapes; only the typically weathered granitic surfaces and argumentative forms. Each sculpture was recognizable only from a single viewpoint and Ruzo had discovered them from horseback, explaining his assumption of



*Our Quechua native guide looking at one of the many
“rock sculptures carved by a mysterious pre-Inca race of giants.”*

Full of Surprises

giant carvers. My situation became socially awkward. I was being royally entertained as the guest of an amateur enthralled by a concept completely contrary to good geologic evidence. Yet he had persuaded the two archaeologists (who had no geological training). I considered the forms flights of fancy, like imagining animals and people in clouds floating by. If voiced, my opinions would quench his ardor and humiliate him before two renowned guests. In innocuous conversations I may take a conformable or noncommittal position to avoid insulting a convinced host, but at Marcahuasi, my professional integrity was on the line. I couldn't agree, but rather obligated myself to educate these people about exfoliation weathering. Needless to say, the remaining time was embarrassing for everyone, and a potentially rewarding friendship was sidetracked to oblivion. Dr. Ruza remained a true gentleman, politely receiving, but not accepting, my remarks. He stuck by his guns and invited me to see additional photographs and specimens in his home. There I saw virtually all of the hundreds of photographs he had taken over many years, but saw nothing to change my mind. I empathized with Dr. Ruza, who was out on the limb with publications, but I remained obligated to professional honesty. It was one my rare distasteful geologic experiences, yet the geology I learned from it still ranks near the top.



- John W. Gabelman

"In 1934, as a student in a geology party in North Quebec, I killed a 1200 lb moose with my Dad's 16 gauge gun. I had just one shell containing a double charge of powder and one spherical ball made of molten tea leaf wrapping. I was so scared that I closed both eyes and pressed the trigger!! We had food for one more month."

- Paul-Emile Auger



In the summer of 1954, I had my first real geology job. We were a party of four employed by U.S. Steel to look for iron ore on Vancouver Island. Our leader was Jack Gower, a Ph.D. student at MIT. The others were myself, a senior-to-be at MIT, and two beginning geology students from the University of British Columbia. After we gathered our camping supplies in Victoria, we left for a remote area in central Vancouver Island. On our first day in the area, Jack sent me off on a traverse with one of the UBC students to look for outcrops and to practice using a dip needle (a magnetic compass mounted in a vertical plane). He explained that I should carefully record any small changes in the needle's horizontal orientation. I felt very important as the leader of this two-man party. About two hours into the traverse, the needle, which hadn't moved at all, suddenly pointed straight down. I moved around, trying various positions, but it kept pointing straight down. I had two thoughts: either I was doing something wrong and was not going to be a very good geologist or finding iron ore was not nearly as hard as I thought it would be. As it turned out, we were on top of a mass of pure magnetite, located at the contact between an intrusive and a band of limestone. Our further investigation proved it to be too small to be mined economically. I sampled the area rocks, however, and was able to use the deposit as my senior thesis the following year at MIT. I learned a great deal that summer, not the least of which was that geologic field work can be full of surprises.



- A.H. Brown

"A field trip by Dick Jahns – Upon emerging from underground, we discovered fire-fighting planes dive bombing a grass fire our field vehicles had started."

- Thomas L. Holzer



The Magnificent Pumping Machine

We should have known with the first light of day, when John Newton missed our breakfast meeting with Vic Stringfield from Washington at Lucy's Café in Linden, Alabama, that something had gone astray. It was a beautiful Tuesday morning with a blue sky and white clouds. The sun had just come out, and out of the east from Montgomery came our visitors from Washington; Mr. V.T. Stringfield and a couple of associates to see the magnificent pumping machine invented by the Alabama district office of the Water Resource Division Ground Water Branch, U.S. Geological Survey.

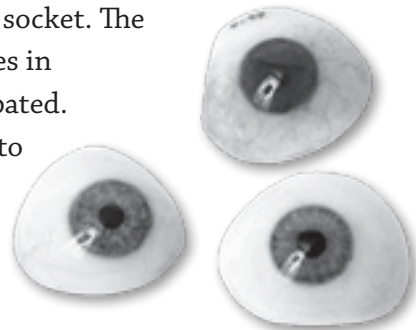
The pumping machine was a figment of the imagination of two or three senior citizens of the local district office, mainly, George Swindle and Phil LaMoreaux. The machine had been built with surplus parts obtained by George Swindle from the Air Corps: a pump, tubing, and a drum, plus small pieces of equipment used to lift the flaps of an airplane.

The submersible pump was attached to a long flexible hose, then wound around an old gasoline drum mounted on a trailer. The Rube Goldberg was mounted in the trailer, and attached to the mechanical parts was a transformer, switches, bells, and a generator.

But I am getting ahead of my story. Our first alert of the disaster came with the absence of John Newton, project director, Marengo County study. He was supposed to meet the dignitaries from the Washington senior staff and Tuscaloosa at Lucy's Café in Linden. The café was part of the old railroad station. The meeting time was 7:00 a.m. It came and went:

7:30 a.m. came and went: 8:00 a.m. came and went: 8:30 a.m. came and went: 9:00 a.m., and who should appear but John Newton with a black patch over his left eye. And here was his story.

Newton, a tank commander, had lost his eye in the conflict in Korea. The government had generously outfitted him with several eyes as standbys plus one that was installed in his socket. The standby eyes included one that had red lines in it that could be worn when John was dissipated. Another was a decoy eye that allowed him to keep Janet, his wife, on one side and look at good-looking girls on the other—or so the story goes by John.



He reported that when he got up, the first thing he did was go to the wash basin to wash his face, brush his teeth, and shave.

Unfortunately in washing his face, his false eye had dropped into the sink and down into the trap below. All attempts to recover the eye had failed. John dismantled the trap, still no eye. He then called for help from the sewage and water manager of Linden, who arrived and suggested that they arrange to have all John's neighbors flush their toilets at the same time, thereby moving the eye from the line beneath John's house into the sump across the highway. John remarked that he learned who his friends were at that moment. By this time it was almost 9:00 a.m. and John felt that further exploration was not warranted. He put on the black patch over his left eye and left.

On arriving at Lucy's Café, John went into a full explanation of the situation before Mr. Stringfield. After listening to John, Mr. Stringfield stated that he believed it must be a true story because John could not have made it up.



After Newton's lost eye escapade, we traveled to Monroeville to investigate John Ivey's project. Now Ivey had on his project the newest invention from the Alabama office. Actually, this invention was used by the Alabama office and had obtained a glorious name for itself. It was known throughout the country. At any rate, Mr. Stringfield and his associates from the Washington office traveled to Monroeville, the home of Harper Chambers (author of *To Kill A Mockingbird*), the object being to inspect the pumping equipment newly developed by our staff. The machine had been built so that it could be backed up to a well, lowered, and in a few minutes be able to run a preliminary pumping test. After the pump was fabricated, many maiden flights with the equipment were made to ensure it was functioning properly. Having Mr. Stringfield and his staff with us, after the fiasco with Newton, we arrived at the pumping site where John Ivey greeted us. A few minutes later, George Swindle, in a USGS truck with the trailer and pump in tow, arrived and backed up smartly to the observation well. Then with great flourish, George Swindle and I asked everyone to approach the trailer where the equipment was installed and to watch carefully as the test proceeded. George turned the engine on, flipped

A Natural Explanation

the switch, lowered the pump into the well, and then turned to the group to advise that he was ready to throw the switch for the pumping to begin.

George threw the switch and there was a singing hum that emitted from the switch box containing the controls for the pumping equipment. As the hum grew louder and the instruments hotter, pretty soon smoke began to exude from the cracks in the switch box. In the box was an old transformer—surplus equipment of the navy—and insulators and switches had been installed. The humming increased as did the smoking, when all of a sudden, with everybody leaning forward avidly looking at the instrument box, the damn thing exploded! Because the transistors were old and wrapped with paper and asphalt, everyone examining the experiment was properly tarred and feathered.

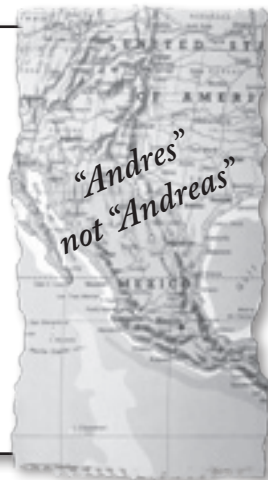
Again I will have to compliment Mr. Stringfield for his only reaction was to say, “Hummm, that’s interesting.”

- Philip E. LaMoreaux



“1954 - One of my early geologic memories: “With Geopick in hand, at the toe of escarpment, San Andres Mountains, south-central New Mexico, 7,500 feet of Paleozoic strata above, tier upon tier, awaiting exploration!” The beginning of NMBM&MR’s Memoir 1, Stratigraphic Studies of the San Andres Mountains. It is San Andres, not Andreas – named after Saint Andrews, not after the misnamed California town of Andreas.”

- Frank E. Kottowski



In 1960 I was investigating the foundation conditions of an important dam site on the Grande River, State of Minas Gerais, Brazil.

The topographic survey crew was headed by a former Polish Army officer named Sergiuz, who was a strict disciplinarian. One morning he informed me that he had invited for dinner a nice couple he had met in Passos, the nearest town, who, although white, had adopted a very bright four year old black boy with large, expressive eyes.

Seated at the long dinner table in our company’s mess tent were Sergiuz at one end, the couple with the boy on one side, I on the opposite side and at the other end Justino, the diamond drill foreman, who was a very tall, quiet, jet-black man who must have been a pure descendant of African blacks. I noticed that the boy kept looking intently at him.

After grace was said, soup had been served and everyone was enjoying it when suddenly the boy asked “Mama, why am I black?” Almost everyone lowered their heads somewhat and concentrated on the soup, except Justino, who very quickly and naturally said “Come on boy, what kind of question is that? Don’t you know that people who are born at night are black?”

I firmly believe that the impromptu and almost reasonable explanation lasted quite a number of years in the boy’s mind.

- John G. Cabrera



“At Columbia University, in the spring of 1942, Professor Douglas Johnson, geomorphologist, marked up my M.A. thesis on underfit meanders. One note read thus, ‘Horses are gentle. Dips are not.’”

- Robert J. Wright



A Beautiful Gem

In 1943, Allen F. Heyl and I were splashing through six inches of mine-water drainage existing in a tunnel from an underground lead-zinc mine in southwest Wisconsin; the mine had been shut down for more than a decade. We were walking, single-file, between the narrow-gauge iron rails, along which the mules and miners pulled the cars filled with ore or waste-rock or supplies used in the mining operations.

It was totally dark inside the tunnel after we had gone around the first bend, several hundred feet from its portal, so the only light was that from out of two carbide lamps and flashlights. We swung our lights around, focusing on the tracks (for our footing), on the roof (for slabs of rock hanging precariously), and on the walls (for sparkles of the lead-zinc-iron and accompanying gangue minerals).

As we focused our lamps on the roof ahead, we saw a faintly glittering, multifaceted reflection—like a diamond—which got brighter as we approached and seemed even more glittering. We were spellbound, because we had not expected to find such a diamond-like gem in a Wisconsin lead-zinc-iron mine constructed in a bedrock of limestone and dolomite.

When we got within a few feet of it, we discovered that it was not a gemstone, but a bat, hanging upside-down in its daytime slumber pose. The humidity in the tunnel had permitted tiny droplets of water to gather on the bat's body, and its slow breathing and expanding body caused them to glitter in our lights, looking for all the world like a multifaceted diamond.

We were entranced by the beauty of this experience and both of us have recounted the tale of our discovery of the “bat that looked like a diamond” many times during the past 60 years.

Allen Heyl and I saw many gorgeous sights underground in our several



years together in southwestern Wisconsin mines, including geodes with monstrous laths and cabbage heads of calcite scaleno-hedrons and rhombohedrons, gorgeous cubes of galena with tiny pyrite crystals all over them, and masses of sphalerite encrusted and shot through with other minerals—but nothing as unique as “the bat that looked like a diamond.”

- Allen F. Agnew

“A memorable experience for me was collecting Ordovician fossils with A.K. Miller at Silliman’s Fossil Mountain, Baffin Island, the result of which was GSA Memoir 62, Ordovician Cephalopods of Baffin Island. The mosquitoes were so thick that when you waved your arm, you left a streak in the air!”

- Walter Youngquist



“1979 – While working on the soil survey of East Millard County, Utah, at the boundary of the Colorado Plateau and the Basin and Range, I was on the high-angle apex slope of a large alluvial fan just as the sun was setting. This was in late December, near the solstice, and the effect of the rose-colored light, shining from below on the pinion pine and juniper forests, and on the large boulders of the fan was striking. I have not seen it since.”

- David L. Cremeens

First Time Very Lost

It was 1962 and a difficult time for finding a job in geology. I had just completed my M.S. degree and was looking for work. My cover letter said I was willing to go anywhere, and this attracted a major oil company. I was hired as an exploration geologist trainee to be stationed in Tripoli, Libya. After my first week in the office the company decided I should go into the field to learn to sit a well. I went out under the tutelage of Roger. My assigned wildcat well was located south of Tripoli, in the Hamada el Hamra. The Hamada is a very flat tableland expanse of stony desert several hundred kilometers north-south, longer east-west. It is bounded on the north and south by high escarpments running east-west. The Hamada looks the same no matter where you are: no roads, no trees, no anything, except for very sparsely scattered bushes (reminded me of tumbleweed) and some gazelles. I can't imagine what the gazelles ate.

The morning after we had been flown to the rig, the well had not yet spudded. Roger asked if I would like to take a drive to see the south scarp. We packed a lunch and took a company Land Rover for the 50 km drive. Because there are no roads leading from one place to another and because the terrain is so flat, the driving is cross-country. We had two full gas tanks and one jerry can of gas and one of water. The drive south took about an hour and led to a spectacular view of the Ubari Sand Sea beyond a pediment of dry washes leading away from the base of the scarp. Roger said that there is a road leading down the scarp to an oasis, Auenat Uennin, to the east, he believed. We drove east for some distance along the scarp and couldn't find the road, so we went back west. We still couldn't find it, so we drove further east and eventually found the way down. The oasis consisted of one acacia tree and a deep open well, with green water, floating algae, and dead beetles. We had lunch there and headed back to the rig.



Unfortunately, we had not paid any attention to how far east or west we had gone from our path south. We were not worried, as we just had to

go north about 50 km and we could see the rig from 18 km away. However, after a while of driving north, we could not see the rig. So, we drove a little east, then north some more, then west, then north some more, then east, etc., never spotting the rig. We knew we were in trouble and had no clue which way to go. After much wandering we came across some reasonably fresh tire tracks, however, we also knew that tire tracks, which appear as breaks in the lag surface of the Hamada, usually last for years. We reasoned that they might belong to the seismic crew working for our company, as there was no one else in that part of the desert as far as we knew. We thought that if we followed them, they might lead to the seismic camp. Which direction? We chose the northerly one.



It was 5 p.m. and we were down to using our jerry can when we arrived at a very surprised seismic crew. Now, how to get back to the rig? The seismic crew gave us some gas and showed us a map with their location and that of our wildcat well. We were 164 km northwest of our rig. I laid the map on the ground and oriented it to north using our Brunton compass. Then I took a bearing to our rig. Next, I placed the open Brunton on the vehicle seat (the Land Rover had an aluminum body) and steered to the bearing we needed. The next few hours brought a tense drive straight across country on our Brunton bearing, not knowing if we would be lost yet again. Just as it was turning dark, we spotted the rig on the horizon and twenty minutes later two very relieved and hungry geologists rolled into camp. This was my initiation into Sahara field work.



- James G. Kirchner

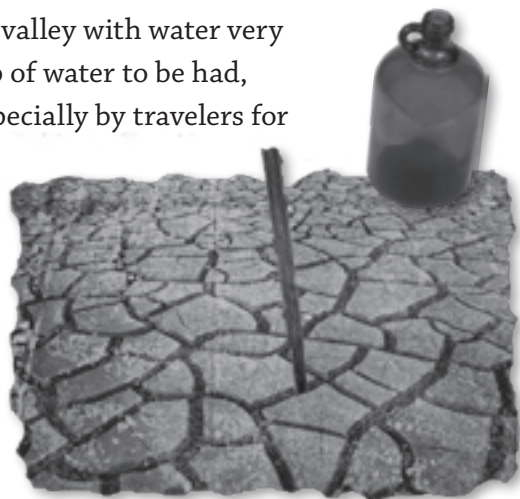
Encounter With Manson Gang, 1969

During my reading of the book, *The Family*, I noted with some interest how Charles Manson's gang had terrorized an old man and woman in Saline Valley, and then drove out the north end of the valley. I got to thinking that I was in or around Saline Valley that summer, and I remembered an encounter I had with a bunch of dune buggy driving hippies.

Months later I checked my field notes to find that, yes indeed, the day I encountered the hippies was the same day Manson's gang did their deed in Saline Valley. Scary, because of the belligerent attitude I almost assumed with them.

About three miles outside the town of Big Pine in Owens Valley is a sign on the Saline Valley road that says "No Services—76 miles." I don't know where those services could be. Certainly not in Saline Valley itself which is a very inhospitable place. The length of the valley is traversed by only a single gravel road, and few people ever drive it, particularly in the summer. Temperatures soar over the 100° mark nearly every day all summer. Some hot springs are located several miles off a side road, and I know of one abandoned ranch at Willow Spring, also off at the end of a side road. The valley is so deep that if it were possible to fill it with water, the resultant lake would be 3000 ft deep before it would spill into the next valley.

But the chances of filling the valley with water very soon are zero to none. Not a drop of water to be had, especially along the road, and especially by travelers for their automobiles. For that reason, a fellow calling himself "The Desert Samaritan" buried one-gallon bottles of water at one mile intervals along the road, each marked with a stick. Charles Manson's gang took a perverse offence to the



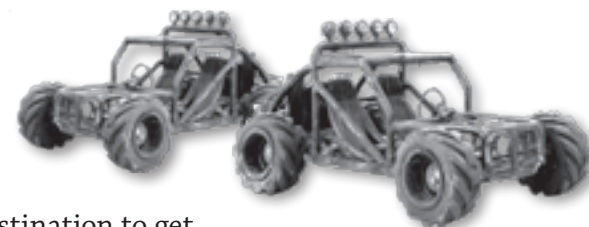
bottles and had shot each one, so that when an old couple broke down in the valley in the summer of 1969 and sought water from one of the Desert Samaritan's caches, all they found were the shattered remnants of the bottle. Soon after, part of Manson's gang encountered the couple, scared them into the car, and then terrorized them by beating on the car, jumping up and down on it, yelling threats and epithets. Eventually they tired of this sport, however, and headed north out of the valley to their encounter with me.

I drove south from Big Pine to Saline Valley along a narrow gravel and dirt road through Waucoba Wash and Jackass Flats. I came around a corner where the road was in a narrow canyon to find five or six dune buggies parked in the middle of road, blocking my progress.

No one was in sight. I was griped, I had a great distain for dune buggy people, I

was in a hurry to get to my destination to get to work, I knew nothing of the Manson gang, I didn't even know such maniacs existed, and I certainly had had no encounters with nasty people in the desert. So, just as I was about to get out of my vehicle and make a big fuss, I saw two people in the bottom of the canyon below the road. They saw me and realized that their vehicles were blocking the road, and it was immediately apparent to me that they were going to come up to the road and, I assumed, move the buggies so that I could get by. I remember the scene just as if it happened this morning. I sat in the car and fumed, they came up the bank, moved the buggies, and then I continued down the canyon. Nothing more.

But I think back to what it could have been if I had expressed my disgust with how they looked, how griped I was that they were so irresponsible as to pay no attention to the possibility that someone else might come down the road and would be inconvenienced by them parking in the middle of the road, what I might have said as I drove away.



- Arthur Sylvester

Edelweiss, Edelweiss...

In July 1993 we were invited by Drs. Erik (GSA Honorary Member, 2001) and Erintraud Flugel of Erlangen University to accompany them and about 7–8 of their graduate students to examine the late Paleozoic–early Mesozoic reef-building communities and their stratigraphic settings in southern Germany and the Carnic Alps along the Austrian-Italian border. We were also joined by Dr. Karl Krainer of the University of Innsbruck. The weather was perfect, which added greatly to our enjoyment!



The Rattendorfer Alm: the hand-driven butter churn was located on the left side of the doorway and the cheese was aged in the lower level basement. We ate on the second floor and slept on the third/top floor.

The highlight of the trip was the two days we lived at Rattendorfer Alm (similar to a chalet) in the Carnic Alps. The alm was a dairy cooperative owned by a group of “valley-dwellers” who shared the milking duties on a rotational basis but was operated by a family of “cheese-makers” who also provided breakfast and dinner to the small

number of visitors like us. Each morning we awoke to the smell of a large wood fire that was warming the previous day’s milking in a huge shallow vat. After careful stirring, when the temperature was correct, rennet was added to the milk, and stirring continued as the cheese began to form. During our day in the field, the family continued the cheese-making process, separating the curds and whey and placing the former into large, flat wooden molds to begin the on-site aging. Surplus milk was hand-churned into butter because the alm had no electricity. Each night we fell asleep under feather comforters with our windows wide open to allow the gentle sound of ringing



cowbells from the nearby hills and valleys to enter our room.

Self-made lunches of cheese sandwiches, etc., were eaten in the field as we viewed the distant snow-capped peaks and sat among fields of blooming edelweiss. At any moment we half-expected to hear the voices of the von Trapp family singers drifting upward from one of the adjacent valleys!



- Al Fagerstrom



*“Sitting out an August mini snowstorm on a 12,000 foot ridge of fossiliferous Paleozoic (Mississippian?) Limestone near Pitkin, Colorado, watching a DC-3 fly below me.”
- Frederick Klinger*

*“Exploring and mapping the geology of never before visited mountains of the Tran Antarctic Mountains, a few hundred miles from the South Pole.”
- Willis H. Nelson*



Cretaceous Cannonballs

On a late November day in 1950, I saw the cannonballs of the Second Frontier Sandstone for the first time. I was about to lose my oil company job in Casper—no master's degree. The last days I mapped were in the Tisdale area of the western Powder River Basin where small, low-gravity (20°API) fields were found a few years later. It had been spitting snow for a week. The cannonballs were wet, and they glistened at those infrequent times when the sun shone. It was bitterly cold.



In shape, they were oblate spheroids. The largest cannonballs were 28 feet in diameter. The smallest ones were less than an inch wide. Many were one to three feet in width. They occurred in three horizons that cropped out for miles, giant beads loosely strung.

"Cannonball" is applied to any large dark concretion. The words cannon and ball are applied to any missile suitable for a cannon. The Frontier cannonballs, moderate and yellowish brown in color, were not missiles.

They had grown in fine-to-medium grained sand and sandstone by calcite cementation, probably in less than 5 million years. Some were twinned or grown together, and there also were enormous dumbbells.

The strata were marine shelf beds formed about 95 Ma, so I discovered years later. Not all of them grew progressively from their centers. Rather, growth had been complex; there was much displacive calcite cement.

That night, I told my mother, who was in Casper attending a teacher's meeting, about the cannonballs. We were eating dinner and about to dance at the Riverside Club on the Platte River. She listened attentively to an account she must have known she would hear again. As the evening wore on, I drank a considerable amount of Orange Crush and the concretions grew. By midnight they had become as large as flying saucers. "You must see them," I said. "Can we go on Saturday?"

"Sure."

More than half a century later it is a good thing to still have those cannonballs. They have weathered slowly and well.

- M. Dane Picard



"In 1959 in the Bristol Bay area, Alaska, I was attacked by a huge mother eagle when I approached her nest containing three chicks."

- Harold Sullwold



Fossil by the Sea

In the summer of 1937, as an oil company field geologist, I was using the alidade to determine the elevations and geographic locations of core holes that were being drilled to make structure maps of an area near Dodge City, Kansas.



As I walked away from the alidade to examine a large ammonite fossil that was clearly exposed by recent heavy rains, the local land owner approached me and said, "Young man, do you know what that thing is you are about to stand on?" I replied, "Yes sir, that is the fossil of an animal that used to live in the sea." The man replied, "It's not no such a thing—it was put there by God to fool non-believers like you!" Since that comment pretty well ended any further discussion, I returned to the plane table to take my shot of the rodman standing at the next turning-point of the traverse.



- Rizer Everett



"A mule trip along the spine of the Peruvian Andes to examine a porphyry copper prospect. The ability of my guides to trot along on foot uphill and down, at elevations above 10,000 feet impressed me. The goat soup we had for lunch was not as impressive."

- Joseph G. Wargo

Goldthwait, Goldthwait, and Goldthwait

I was a Harvard graduate student, and I presented my first paper at an annual meeting, the one held in Boston in 1952. I was on the program in a glacial geology section. My subject was a critique of a paper written by Goldthwait, Goldthwait, and Goldthwait. (Professor Goldthwait, the senior author, was on the Dartmouth College faculty and the other two were his sons.) Their paper located and described numerous erosional and depositional marine features in central New England, especially southern New Hampshire, that the Goldthwaits regarded as marking the postglacial marine limit. I had just finished mapping the New Hampshire coastal area as part of my Ph.D. dissertation, and I suggested that the features described by the Goldthwaits were formed by melt water along margins of stagnant ice.

I didn't realize until shortly before I was to speak that the late Richard P. Goldthwait of Ohio State University (the middle author) was to chair the session. And there he sat while I gave my paper, presenting much of my evidence on slides and maps. I must have repeated "Goldthwait, Goldthwait, and Goldthwait" many times.

When I had finished, R.P. Goldthwait remarked that as chairman he was supposed to call for questions, but since his name had been mentioned, he would like to comment first. He said that he "agreed with Mr. Tuttle", and that "My father, my brother, and I were probably incorrect in attributing these features to marine action."

Needless to say, I became a fan forever of R.P. Goldthwait and I remain, to this day, grateful for his kind public acknowledgement and endorsement of my research when I was a young graduate student.

- Sherwood D. Tuttle



The Bear Facts

Having devoted many summers to field work in the Sierra Nevada of California, the Upper Peninsula of Michigan and Ontario, Canada, I became quite acquainted with black bears. One occasion I have not forgotten had to do with a large blackberry bush at Johnnie Lake, north of Georgian Bay, Ontario. Imagine our mutual surprise as, feasting on berries, I worked my way around the bush, only to meet a bear similarly occupied coming around the other way. Though similar encounters were frequent during those Ontario summers in the early 1960s, none equals a frightening experience that took place north of Wapawekka Lake in northern Saskatchewan in 1963.

Following three tough summers of doctoral field work along the Grenville Front, all travel by canoe and portage, I agreed to serve as senior assistant on University of Wisconsin classmate Bill Padgham's Saskatchewan Department of Mineral Resources field party. Although there were now motors for the canoes, field work here was even tougher, requiring long traverses, mostly across muskeg, out from and back to large lakes accessible by canoe. Bill and I often debated about which of us would do the next day's traverse and who would enjoy doing lakeshore geology; I usually won, as I would remind him that he was party chief and therefore responsible for the summer's results. I nevertheless carried out a good share of the dreaded traverses accompanied by one of the junior assistants, who was responsible for packing lunch and rocks, and keeping us on the assigned pace-and-compass traverse. One such traverse involved the bear encounter referred to above. Don Sawehuk and I were moving through a dense stand of dwarf spruce when a she-bear made her presence known in the inimitable audible fashion characteristic of those beasts. Not actually visible in low brush, she



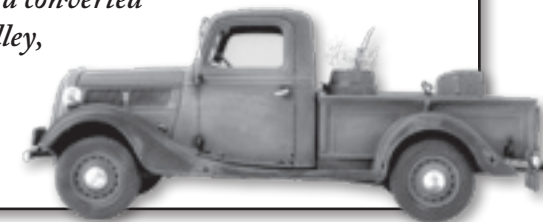
made several charges, retreating each time to her cubs. Having enough of this, I decided to climb an adjacent spindly spruce. After managing to get a few meters up the tree, I realized that I had the only climbable tree, leaving Don to fend for himself on the ground. Since junior assistants did not carry metal objects that might interfere with their compasses, he was indeed defenseless. So, having realized further that I had somehow climbed the tree with pick in hand, I tossed it down to Don in case he had to sink it into the bear's skull. Well, as is always true of angry black bears, at least in my experience, we parted ways before Don had to use the pick. But it took several more miles of traverse before I stopped trembling, and Don and I decided to go out an extra half mile before heading back to Wapawekka Lake on the return traverse.

- Elwood Brooks

"Naming glaciers on volcano Popocatepetl in Mexico, which are now melting due to hot ash falls as it erupts every 2 to 3 months!"
- Sidney E. White



"A Memorable Early Geologic Experience – Driving west in 1928, as a student, with R.C. Moore, in a converted open farm truck to Monument Valley, the Grand Canyon, and other geologic sites."
- Norman D. Newell



The Discovery of the Bautsch Zn-Pb Deposit

I worked for the U.S. Geological Survey for 48 years. I was just starting my career as a geologist in Newfoundland when World War II started. Having very bad eyesight, I could not join the armed forces, so I joined the U.S. Geological Survey early in 1943. I was assigned to the Upper Mississippi Valley district in Wisconsin and Illinois with orders to look for zinc-lead deposits that could quickly supply ore to the United States war effort, the two metals being needed for brass casings, bullets, and many other uses. The lead from this district is ideal for bullets because the galena is very lean in impurities such as arsenic, antimony, and bismuth. The zinc-lead deposits in this district are also located near to the surface, and they could be put into production within a year or less.



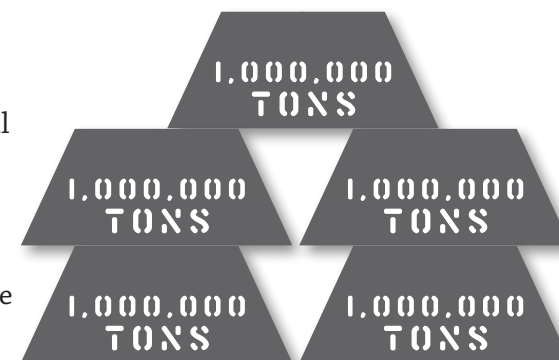
I arrived at Platteville, Wisconsin, during a very cold, snowy winter in February 1943. Shortly thereafter, Dr. Charles H. Behre, Project Advisor, Dr. Allen F. Agnew, Project Chief, Owen Terry, U.S. Bureau of Mines Project Chief, and I, Project Economic Geologist, met one evening to discuss how to find geologically a major new zinc-lead deposit south of Galena, Illinois. During this period of time the U.S. Geological Survey was given funding for exploration programs, including prospect drilling.

Three zinc-lead deposits had previously been found along a north-northwest trend about 1.5 miles long south of the Wisconsin-Illinois border. The northernmost deposit was very large; the two southern deposits were smaller. They were aligned parallel to the trend, but all three had a somewhat more southeast elongation than the main trend. For all three of the ore bodies, exploration for reserve expansion by prospect drilling was directed at the southeast ends of each ore body, but always with poor results.

So we decided to drill an east-west row of holes a half mile south of the southernmost ore body targeting on a line drawn through the centers of the three ore bodies. This line had a trend more northerly than



the trends of each ore body. On drilling the row of holes in an eastward direction, the fifth drill hole found the huge Bautsch ore body. This deposit had a high grade, 5–6% zinc, and 1% lead. Over five million tons of ore were mined from the ore body, the largest in the district.



This huge deposit and its high grade encouraged several major companies to enter and successfully search for ore in the district. It was one of the few discoveries made during the war that actually helped the war effort. Soon this district became the fifth or sixth largest zinc-lead district in the United States. It retained this importance for 35 years, all the result of the successful prospecting of the Bautsch mine, which operated from 1944 until the 1970's.

- Allen V. Heyl

"On July 4, 2003 I attended a meeting of the Geologists' Association at the Geological Society of London. George Leckie walked in. He had taken my short course in Maidenhead, England, in 1974, almost 30 years earlier. He recalled from the 1974 meeting that there was a terrible smell in the classroom, and he quoted me telling the class, "Do not worry about the smell—let us talk critters—the smell comes from the kitchen. For geologists, critters mean fossils in the rock which established stratigraphy."

- Gerald M. Friedman



Enough Excitement for One Day

In 1948, Hall James of the U.S. Geological Survey Michigan iron project hosted a two-day field conference in Iron and Dickinson Counties for USGS personnel, including Quentin Singewald and Jim Balsley from D.C., Walter White, Hank Cornwall, and Dick Stoiber of the Michigan copper project, Allen Heyl and Al Agnew of the Wisconsin zinc-lead project, and others, including Carl Dutton. On the second scorching afternoon, Carl Lamey, Lorin Clark, Jake Freedman, and I were to give a show-and-tell of our mapping in central Dickinson County. Unknown to me, the 28-person jury of experts had been assembled to reconcile a radical difference between Lamey and me concerning the relative age of a granite gneiss in direct contact with the Michiganammet metamorphosed graded bedded graywackes, then called “Huronian” (now included in the Bagaga Group of the Marquette Range Supergroup, Proterozoic).

Since 1933, Professor Lamey had traced his post-Huronian Republic granite southward from the Marquette Range, and since 1945, I had been working northward from the Menominee Range with my Archean granite gneiss, until he and I collided! Lamey thought that this granite had thermally metamorphosed the graywackes; whereas I thought that the contact was a fault separating Archean granite gneiss from regionally metamorphosed graywackes, on the evidence that metamorphic isograds were not parallel to the contact but were obliquely truncated by it.

I led the group to my originally highest metamorphic rank graywackes adjacent to the controversial contact. Here the biotite-muscovite schist was punctuated with half-inch indistinct lumps, which Lamey interpreted to be andalusite dioblasts, and which I interpreted to be staurolite dioblasts. All 28 members of the jury stood around in verbal Aristotelian disputation, except for Francis Pettijohn, who remained silent, but dropped to his knees to collect some metacrysts. By this time, Professor Lamey was explaining that in the UK, Harker and Tilley had shown that such andalusite was always a contact thermal



metamorphic mineral, at which point Pettijohn (1) rose to his feet and handed Lamey a hatful of *cruciform twinned* retrograded idioblasts of pseudomorphs of sericite, chlorite, and magnetite after staurolite, and, (2) asked, “Are these now or were they ever andalusite?” The jury found me “not guilty”.

To return to paved roads we had to drive over gravel roads, whose clouds of dust forced us to lengthen the spacing between adjacent vehicles, so that those following our 1937 Survey Chevrolet coupe did not see us jump a curve to total the car which flopped end-over-end 540 degrees to land in a swamp, when (as mining engineer Frank Pardee proved) our steering linkage suddenly suffered brittle failure. Thanks be to God, no one was seriously injured, but my field partner, Gil Dawe’s head was sticking out the window when we slammed to rest. If we had bounced 90 degrees to the left, he never would have lived to become the general manager of mines for Cleveland-Cliffs. I am grateful for the outcomes of that exciting day.

- Jim Trow



“1927 - A group of geology students from University of Kansas walked down to Angel Creek (Grand Canyon), camped, walked out next a.m. Moonlight so bright we read newspaper.”

- David M. DeLo

Early Field Geology Problem

The summer of 1947 was my first year of “real” field geology. The field methods course that occupied every Saturday for the school year prepared us for the Caltech 6-week summer geology field camp held that year in the Transverse Ranges of California.

Later that summer, Richard H. “Dick” Jahns (Caltech Prof) invited Gene Shoemaker and me to join him in mapping the metamorphic rocks that hosted the Ojo Caliente, New Mexico, pegmatite district. Needless to say, we accepted—Dick was one of our idols. Off we drove in the department’s former military jeep with trailer full of camping gear in tow. We left Pasadena in the early evening to cross the desert at night. Late the next afternoon, a second tire blew out in western New Mexico on US 60, at that time a gravel road. I lost the coin toss and hitchhiked with the tires to Pie Town (consisted of a gas station, store, and one house). After the tires were repaired I tried hitchhiking back to the jeep. In two hours, one car went by—and it didn’t stop! So I approached the bench full of locals and offered to pay one of them to drive me back to our vehicle. One volunteered. When we arrived at the jeep, he refused our offer of money. We thanked him profusely!

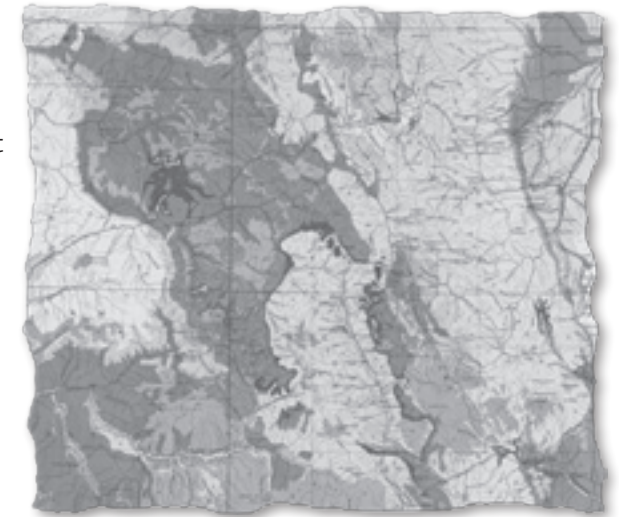
We went through Socorro the next day and picked up Clay Smith (New Mexico Tech faculty) to join us in the mapping project. We camped a few miles north of Ojo Caliente, a hot spring resort in northern New Mexico, at the Joseph Mine, the largest mica pegmatite in the district.

We made our own base map from a mile-to-the-inch photomosaic of the region. We gridded the mosaic at 1,000 foot intervals and copied off the drainage onto graph paper (each inch was 1,000 feet).

We assumed a base elevation and off we went with our barometers and Bruntons to make a topo sheet on which we also plotted our geology. Both Gene and I had barometers and concentrated on topography and plotting of key beds that Dick and Clay picked out. I don’t remember which of us dropped



and broke his barometer first. Anyway, by the end of the fourth day both barometers were kaput. Not cool! So we had to resort to triangulation using the Brunton for azimuth and vertical angles. Needless to say, the topo control gradually got worse the farther we got from the region covered by the barometers!



In the late 1950s, the U.S. Geological Survey 1:24,000 topographic map of the Ojo Caliente quadrangle was published. Dick found it impossible to transfer our map to theirs. So the Director of the New Mexico Bureau of Mines and Mineral Resources hired me for a month in the summer of 1960 to go in the field and transfer our geology to the new base map. I did and filled in the rest of the Cenozoic geology on the map sheet. This map went to Socorro for drafting with Dick to write the report (both Gene and I had done petrographic studies of the map units that were on file with Dick). This map vanished and was later found in Dick’s files after his death. In the meanwhile, Judson (Jud) May, a doctoral student at the University of New Mexico, mapped the region for his dissertation. His results were published in the New Mexico Geological Society Field Trip Guidebook of 1975. My map is now in my file drawers and will remain unpublished. Jud and I have compared maps and find they are essentially identical. He is a good field geologist!

- William R. Muehlberger

The Deep Blue Sea

The time was about 1966, and I was working for Shell Development Company in Coral Gables, Florida. I had the opportunity to participate in an oceanographic cruise on a research vessel out of the Marine Institute of the University of Miami. This was a time of continuing great interest in the origin of marine carbonates, with such players as Jerry Lucia, Bob Ginsburg, Gene Shinn, Paul Enos, Ron Perkins, and Bob Dunham. We were interested in the deposition and early diagenesis of modern marine carbonates, and the Bahama Islands were a wonderful natural laboratory.

The research vessel was a converted mine sweeper. It was small and old, and it reeked of diesel fuel. My role on the cruise was to conduct laboratory experiments to determine whether or not the shallow marine carbonates in the Bahamas were in chemical equilibrium with the sea water. I was particularly interested in the state of equilibrium between the marine water and so-called “whittings”, which were areas of cloudy water that apparently represented the spontaneous precipitation of very fine-grained aragonite needles. My main tools were scuba diving gear and the “carbonate saturometer” that Peter Weyl had developed.

It took only a few minutes after we had departed the cozy confines of the harbor for me to realize that this was going to be a rough ride. The ship was headed to the northeast, and a true nor'easter was blowing almost directly in our faces. The Florida Straits can be extremely rough when a storm comes in from the northeast and blows against the direction of flow of the Gulf Stream. To make a long story short, it was a VERY rough crossing. The waves were so high that they were still made up of blue-green water when they poured across the ship. It was a frightening experience for this landlubber to look out of the windows and see huge blue-green



waves coming across the bow and then crashing against the windows of the bridge.

Everyone on the ship was seasick, including the crew, with the single exception of the captain. I was sure that I was going to die, either from drowning or from seasickness. In fact, because I was so seasick, death would have been welcomed. I finally lashed myself to a workbench in the ship's laboratory and prepared to meet my maker. I also tied my seasickness bucket to the bench so that it would be handy for my constant use. One of the ship's crew came into the laboratory and lay on the floor, with his arms and legs outstretched. Every time a big wave would hit the ship, water would wash through the laboratory and across the prostrate crewman. His arms and legs would wash back and forth in the water as it poured in and out of the laboratory.

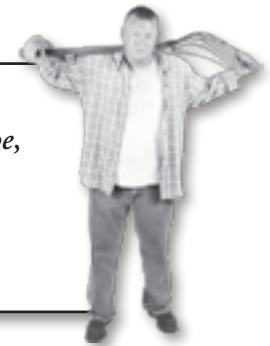
Well, to my surprise and relief, we survived the crossing, and after a couple of days of peaceful cruising in the Bahamas, I finally got my sea-legs and the sickness went away. It was a beautiful and interesting place to conduct carbonate research. However, when it came time to end my part of the work and head for home, I chose to take a seaplane back to Miami!

- Don Runnells



“Farmer watching us auger and examine sediment samples under binocular microscope, ‘did you have to go to college to learn how to do that?’”

- James P. Minard



Beginner's Luck

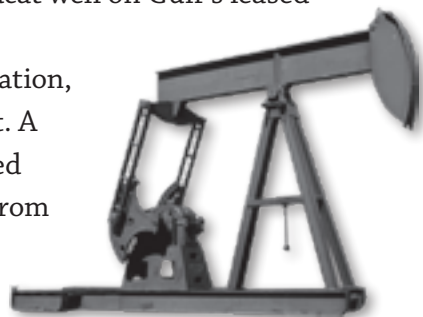
In 1955, after serving in the U.S. Navy as a Naval Air Intelligence Officer for 3½ years, I decided to pursue my geologic training. I was subsequently employed by Gulf Oil Company and assigned to help open the Fort Smith Arkansas office along with about twenty other geologists, landmen, and engineers under the guiding hand of Buck Miller. Gulf had sent me to Denver to convert my knowledge of military photo-interpretation to geologic applications.



My first assignment out of the Fort Smith office was to map the 30-mile-long Washburn Anticline which had had only a minimal amount of exploration. The Arkansas State map at that time showed that the rest of the structure at Pleasant Ridge was an exposure of the Jackfork Formation. At that time, it was a mental block to drill into the Jackfork because no one had found success in drilling the Jackfork Sandstone elsewhere.

After preparing a preliminary photo-geologic map, I went to the field and walked out many outcrops to explore this huge structure. Fortunately, I ran into Boyd Haley with the U.S. Geological Survey, who was mapping the structure, in even more detail than I, at the same time. Boyd was very kind to show me some of the evidence he had to prove that there was a major thrust fault running east-west across the center of the structure. Finding only a few crinoids of indeterminate age, I could only tell Gulf that the rocks, so-called by the state as Jackfork, were quite porous and encouraging in that, "If other rocks below are of the same nature, then there is an excellent opportunity that they will be gas-bearing." Reviewing my field work, I picked a location for a wildcat well on Gulf's leased acreage.

Ultimately in 1957, Gulf drilled my location, the #1 F.R. Borum, to a depth of 8,974 feet. A core was taken near TD and we encountered limestone with fossils identified as being from the Mississippi Pitkin Formation. The state map was only 8,900 feet wrong.



You've heard of missing things by a mile? Fortunately, Gulf didn't miss and at 4,900 feet encountered a porous Atokan sandstone that was completed for an initial potential of 1.8 MMCF opening the Booneville Gas Field.

Presently, there are three main gas fields on this structure from west to east being the Gragg Field, Boonville Field, and Chismville Field. The structure now has over 510 gas wells some of which have produced for over 40 years. Also, it is the most active drilling area in northwest Arkansas currently with 63 active permits. In 1968, I wrote a short article on the early activity on the Washburn Anticline that was published in the Natural Gases of North America, Memoir No. 9, Volume 2, of the American Association of Petroleum Geologists.

It has been a great pleasure to follow the continuing development of my lucky strike.

- Charles S. Bartlett Jr.



"As his field assistant, seeing the spectacular geology of the Las Vegas (Nevada) quad through the eyes of Chester R. Longwell, and discovering how beloved he was by all the local people who knew him." (1937)
- John Shelton

Nebraska Plesiosaur—A Rare Fossil

Recently employed by the U.S. Geological Survey, I was assigned to the Water Resources Division in Lincoln, Nebraska. In August 1963 two other geologists and I examined a rare Cretaceous Graneros Shale outcrop. The outcrop was rare because much of the bedrock in the area was blanketed by Pleistocene glacial deposits.

As we leaned against the outcrop, I idly threw shale fragments into the creek. While doing so I picked up what appeared to be a vertebra! We realized we had found a Cretaceous fossil—and possibly a big one!

We took the fossil to Prof. C. Bertrand Schultz at Nebraska University. At first he surmised it was a vertebra from a relatively common mosasaur. However, closer examination at the outcrop indicated it might be a plesiosaur.

The specimen was excavated during the winter by the Nebraska State Museum, with much help from the Lincoln Gem and Mineral Club. It proved to be a rare fossil indeed! It had the longest neck (23 feet) of any plesiosaur yet found! The 41 foot fossil, complete with head and two flippers, is now on display in Morrill Hall at Nebraska University.

As a green geologist from “invertebrate-fossil-rich” Kansas University, I did not realize at the time that many vertebrate paleontologists spend their careers looking for such a find.

- Phil Emery



White Shoe Wisdom

I was teaching freshman geology at the University of Houston. One of the students was at least 20 years older than anyone else in the class. I asked him, “It is not my business, but why are you taking this class?” He answered, “I used to roughneck on a drilling rig. One day in a rainstorm a car drove up and a guy got out in the rain and mud wearing white shoes. I asked the driller who it was.” He answered, “That’s the geologist.” I thought anyone comes out to a drilling rig in the rain and mud wearing white shoes—that’s what I want to do.” None of my business really.



- Fred Haeberle

“Tonight (19 Apr 98), I am listening to the HBO special from earth to the moon – 29 years ago. I remember precisely where I was and what I was doing. Geology summer field camp, Park City, Utah, nearly seventy students, usually dragging in, having finished supper, were jovially assembling around the television set mounted on a beam in the basement of the ski chateau. As Armstrong and Aldrin descended to the lunar surface the room was hushed. But, as the crew began to describe what they saw and began naming rock-types, the room broke into a chatter! We went absolutely wild when one of the astronauts announced seeing something that looked “like anorthosite”! Those of us who were witness to that event of events in humankind’s history will never forget it. Those of us who are geologists have it etched in stone!”

- John C. Jens



Fate on a Small Scale

In the middle 1960s I was employed as a geologist by the Ashville District of the U.S. Army Corps of Engineers. I was doing foundation investigations for the Martin Fork Dam in southeastern Kentucky, between Harlan ("Bloody Harlan", the license plates advertised) and the land along the creek bottoms; all the rest is hills and mountains rising above you. All the people lived down in the hollows. I always had the feeling that The World was on the other side of that ridge that you were always looking up at.

One afternoon—and I don't remember why I did it—I parked my vehicle along the level road in one of the hollows and struck out to climb a neighboring hill. I hadn't gone very far, less than 100 feet vertically I'm sure, when for some reason I stopped to examine something on the ground. Whatever it was, I found myself examining a hive of bees. In no time at all, I took at least five bites. Stunned, and feeling an allergic reaction coming on, I immediately turned and made my way down the hill toward the road. As I walked, I could feel myself getting weaker. I made it to the edge of the road, my car being on the other side, and I told myself, "well, I've got to get across." So, maybe limping, probably crawling, I started across the two-lane road. Somewhere out in the middle I dropped my cheap pocket watch on the pavement. When I realized that I'd dropped it, I was already a few feet further long, and I thought, "Better keep going and make it to the other side." I did, but I was exhausted; I could do nothing but lie there.

As I lay, with my watch somewhere out there on the road, there was at first the total quiet that was typical of those hollows. But then, from far down the road



(in the direction of Harlan) came the sound of an approaching vehicle. Faint at first, then louder bit by bit. I thought to myself, "I wonder if he's going to hit my watch." My logical mind said the chances were against it, and it was only a cheap watch anyway, so why worry. But as I lay there, I kept wondering to myself, "Will he hit it? Will he hit it?" It seemed the longest time from the first sound of the car till the time he finally passed me. When he did, sure enough he hit and crushed my watch.

Not long after, someone from the other direction spotted me, picked me up, and carried me to the hospital in Harlan. After a restful night I was discharged, feeling fine, and I went back to my duties.

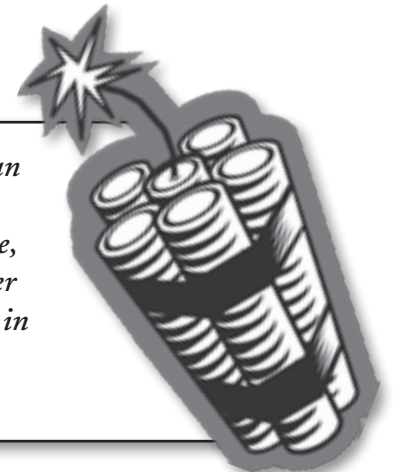
It has been 37 years, but I've always remembered that afternoon. I've never again had an allergic reaction such as that one. Perhaps I've been more careful. But it always seemed that it was fate that I should lose that watch. Fate, on a (very) small scale.

- Colin McAneny



"Watching the multicolored dust rise from an immense explosion at the Zonia porphyry copper mine in central Arizona. At the time, this was the largest controlled explosion ever done. The shock registered on seismographs in Phoenix, a hundred miles away."

- Joseph G. Wargo



From a Horse to a Donkey

In 1951 I was asked by the Geological Survey of Venezuela to map the structures around Ocumare del Tuy, 50 km south of the capital of Caracas. I received much valuable information from the local people, who volunteered valuable geological information. The survey supplied expenses and a panel truck. The people in their often open wooden shacks knew me as the only blonde person in sight in a mostly Mulatto population living in appalling poverty.

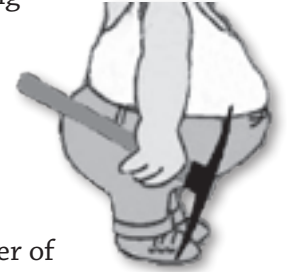
Some asked if I was looking for gold in streams. It was not easy to explain to the people the geological faults which formed the boundaries of the Ocumare Basin, then still uncharted along the Rio Lagartija, draining the highlands. A local peasant offered to have his teenage son guide me across the river and upstream—with no bridges of any kind in sight to guide me across the stream—if I would show the son his dream of gold nuggets in the stream. There was, however, a large warning sign, CUIDADO BILHARZIA (Liver Fluke), with many black snails visible through the clear water, which carried the microbes to this deadly tropical disease. The owner arrived with two mules (half-starved donkeys instead of the promised horses). The shallow, swift stream permitted easy crossing. I felt very uneasy, as I had never before sat on the bare back of a horse or donkey. The ride started across the river peacefully, but in the middle of the stream bed my animal started to buck and throw me into the cold, infested stream. My companion, son of the owner, laughed so hard that he also fell off his mule; he saw the reason for my dilemma—at each step, I poked the point of my geologic pick on my belt into the back of the poor animal. The one-day expedition for gold, respectively geologic mapping, ended in the morning of the same day. At the doctor's office, no Bilharzia in my blood was detected.



- Erhard Winkler

Tiny

I gave field trips to teach carbonate geology while working with the Pan American Petroleum Corporation in Tulsa, Oklahoma. A company marketing reporter came along on a group trip to West Texas. "Tiny", very tall and slightly obese, was not happy to have to climb up a big mountain carrying a hammer. When I realized his discomfort, I purposely pointed out exposures that might be of special interest to him and asked him to hammer them open. When he opened them and started to smell oil he became so excited that he was ahead of the group looking for more for the remainder of the trip.



After our return from the field the vice president called me to his office. I assumed he had a complaint since one is only called to the office when something is wrong. Not so, this time. He told me that he saw Tiny on the golf course on Sunday after the trip. He raved about the fantastic field trip we had taken and how much he learned. He also wrote it up for the company newspaper. After that meeting, there was a big raise in my next paycheck.

- Gerald M. Friedman

"As a teenager about 1940, during the first GSA meeting I ever attended, my friend, Irving Reimann, and I were invited to dinner at the home of Prof. Alfred C. Lane in Cambridge, Mass. After dinner our host excitedly took us to a dark room to look through a microscope at small flashes of strange green light. We were seeing African pitchblende scintillate! I didn't know it then but I was witnessing the dawn of the nuclear age."

- Rudolph Kopf



Borrow Your Ladder, Mr. Fireman?

As young geologists, Jim Williams and I were always looking for interesting challenges. One day, a call came in from a dairy farmer in southwest Missouri asking if the State Geological Survey could help. He had a spring that he used for watering his dairy cattle, and it had become seriously contaminated. That's all we needed to know, because after all, we were GEOLOGISTS, and we were also public servants.

So off we went to the small town of Republic, in a karst terrane with many sinkholes, springs, and caves. After visiting with the farmer and confirming that his spring was indeed foul, we began to look for the source of contamination. The town seemed to be a likely place—in the upper watershed of the creek running past the farmer's land—and it wasn't long before we found a soft-serve ice cream place that was discharging its sewage into an old cistern.



Then someone told us about a nearby farm that, it was rumored, had a well that opened into an underground stream channel. How exciting! We rushed to the farm, and sure enough, outside the back door there was a concrete pad with a lid over the "well", which was no longer in use because the home was now on city water. So we moved the lid and found a deep pit in which we could hear water running below.

We just HAD to get down there, but we had no ladder. Now where could we find a ladder? Maybe the fire department would loan us one? We went to City Hall and asked where they kept their fire truck. We found it in a small, garage-size building. They had a nice ladder, just the size we needed, so we said, "We're geologists from the State Geological Survey, and could we please borrow your ladder for a couple of hours?" Taken aback, the volunteer firemen said, "Well, we can't think of any reason why not; just be sure to bring it back as soon as you can. Nobody has ever borrowed our ladder before."



Armed with a fine ladder, we hurried back to the farm, went down the pit, and discovered a sizeable cave with sewage from the ice cream place running through. Later, we ran a dye trace to connect the cistern behind the ice cream place, the cave stream, and the contaminated spring. This was enough for the city to crack down on the contamination, and the farmer's spring recovered.

Only in a small town of long ago could one even imagine borrowing a ladder from the fire department, and all we had to do was say, "We're GEOLOGISTS!"



- Jerry D. Vineyard



"Traverses throughout my first field mapping area consistently revealed the same correlatable sequences of fossil faunas confirming geological principles in an exciting formative experience."
- Douglas Coombs

"One day in November 1963, while prospecting the boondocks for aggregate rock, I knocked at a farmhouse to get permission to go on their property. Opening the door, the farmer excitedly blurted out, 'They got him! They got him down in Dallas!' Bewildered I asked, 'Who got who?' 'Kennedy,' he replied. 'They shot him dead!' After such news, there was little concentration on rocks the rest of that day."
- William Ellis



A.J.'s Basement

Many young boys are dreamers. They dream about far off places: jungles, swamps, lions, elephants, or mountains. I did not because I had A.J.'s basement to explore, especially on gray, rainy, cold winter days.

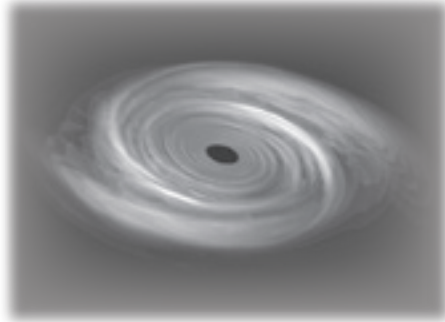
Grandpa Rhodes (A.J.) never threw anything away: nails (even bent), wheels, fenders, doors, traps, steel rods. Absolutely everything got stored "over there for a piece."

A.J.'s basement was like the proverbial black hole, spider's web, or Venus fly trap. Once an item entered the basement its doom was sealed, unless A.J. found a need for it, which did occur.

The basement was utilitarian. There were shelves for canned goods and of course Gramp's wines. The floor was dirt or more probably, geologically, a glacial clay. I could not tell at the time 'cause I had not gotten educated yet.

The walls of the basement were large glacial boulders cemented in place but not lined. As I recall, no water leaked in during the rain or snow of spring, summer, fall, or winter. The temperature was damp, but that did not matter to me and my friends. It was an absolutely, positively, unique, wonderful, exotic recess from the older society.

The center of the basement had a huge tin monster, an automatic coal feeder furnace. Not many of those around in those days. Gramp burned a good bituminous coal. Course, I did not know it was bituminous. I vividly remember A.J. shoveling coal into the hopper, turning on the automatic screw feeder to the fire pot, and hearing that growling dinosaur feeding coal and belching smoke and fire.



Beside the furnace area, there was a large storage and workshop area.

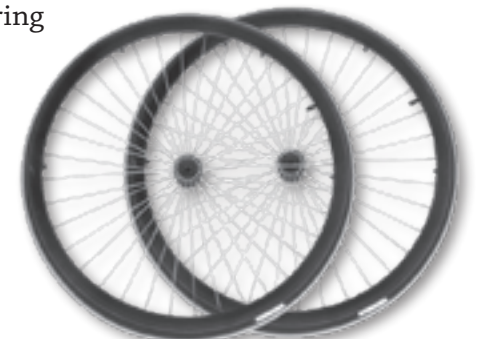
Over the years, A.J. had accumulated some old cabinets and desks. "He just put them over there for now." Seventy years later when I settled out his estate, those cabinets were still "over there."

Rereading what I just wrote sounds like I am disparaging, but it is not meant to be. In the cabinets was a treasure as valuable as gold. Bolts, nuts, screws, nails, brads, washers, staples, pins, hangers, hooks, and tacks, everything a young boy needed to make or fix anything and that is not all!

In time, the dirt floor became covered with paraphernalia of all kinds: a broken plow, just put "over there" for now, an old bear trap, wheels of an old wagon, gearbox from a Model T, horse's harness, shovels, picks, forks, scythes, and much, much more. There was a system and some pathways, and A.J. knew where everything was. They were "over there for now."

There is still another dimension that needs to be described. The ceiling. In A.J.'s basement, he had invented three dimensions. Looking back to 1926, I guess carpenters, architects, and engineers did not do a stress-strain analysis for a facility like this, for they would have predicted a total collapse.

An open-beam, floor-joists ceiling!!! I will just describe a few items: sled runners; bicycle wheels; and an old octagonal rifle with no stock (Phil II has it now and it has a hand carved stock), traps for animal trapping (skunk, muskrat, and mink), every spring cleaned and oiled, every fall soaked in bark and water to kill the scent; plowshares that survived "beating into swords" of the Civil War, WWI, and WWII. The items that hung from the ceiling could be used to make scooters, wagons, and sleds.



Just like A.J.'s wine cellar, the basement was a social place. The men nearby could borrow a piece of waterhose, a connector, a ladder, hammers, chisels, saws, draw shaves, screwdrivers, awls, levels, tri-square, or an ax.



Young boys today have all sorts of fancy toys. Some do not last longer than New Year's Eve.

A.J. and Gertie raised 27 children, two of their own. Frank, my mother Gladys, a grandson (me), and the rest were "take ons" from deaths or divorces.

Grandma Rhodes died first. Gramp lived with us and lasted until his 94th birthday.

At the time of Gramp's funeral, I snuck down to the basement, sat on an old crate, looked around at all the old artifacts and thought how fortunate was I to have A.J.'s basement as a hideaway as a small boy.

- Philip E LaMoreaux

As grad students at Penn State in the late 1950s, George MacKenzie and I spent a summer in Arizona doing the field work for a study of possible regional metal distributions in mineral phases of igneous intrusions. We trekked our way across much of the state south of the Colorado Plateau, usually finding ourselves in remote locations. So we let our beards grow and frequently camped out. We slept in our black university station wagon, which, except for Pennsylvania license plates, had no other distinctive identification or decals. To boot, we were towing a Jeep with Arizona plates (for rough country access) which obscured the rear of the wagon while in tow.

By summer's end we had shipped most of the thousand or so samples of a kilogram or so each and kept in nice cloth drawstring bags. Making our way back east from Arizona and still quite scruffy looking, we decided to visit a friend of mine at Texas Tech in Lubbock and were headed there when we passed through Hobbs, New Mexico, on U.S. Route 180. Less than a mile east of Hobbs, we were flagged down at a roadblock full of uniformed law officers, and immediately faced two shotguns two inches away. Next, out and over the hood, empty the pockets, watch while the station wagon is emptied, and all the sample bags are opened (remember this is 1950s).

A little later, after ID checks, finding only rocks in the bags, and nothing illegal in the car, civility was restored and we learned the bank in Hobbs had just been robbed by two guys with beards and a black get-away vehicle.

I don't know if those two robbers were ever caught, but for a few minutes back then there was not a lot of doubt. In such a situation geologists should know even rock samples may not be presumed innocent—they could have been decoy bags.

- George W. Putman



"Work on five continents, helicopter flights world wide were memorable. Finding the same fossils on location Texas to Newfoundland was unforgettable."

- Barney C. McCasland, Jr.



Mere Chance, or Not?

In early 1973 on a stay as visiting scientist with the U.S. Geological Survey in Menlo Park, California, I happened to read a report *Mars from Mariner 9* by Bruce C. Murray, published in the January issue of *Scientific American*. The article included the *Geological Map of Mars* prepared by Michael Carr, John McCauley, Daniel Milton and Don Wilhelms of the U.S. Geological Survey in cooperation with members of the television-experiment team of the Mariner 9 project. Looking at the map, I was nearly shocked. I immediately realized the significance of the radial pattern of extensional structural features dominating the Tharsis hemisphere, indicative of a large-scale lithospheric divergence. Obviously, the tectonic situation was comparable to the large-scale lithospheric divergences observed in large parts of the Pacific and African hemispheres.

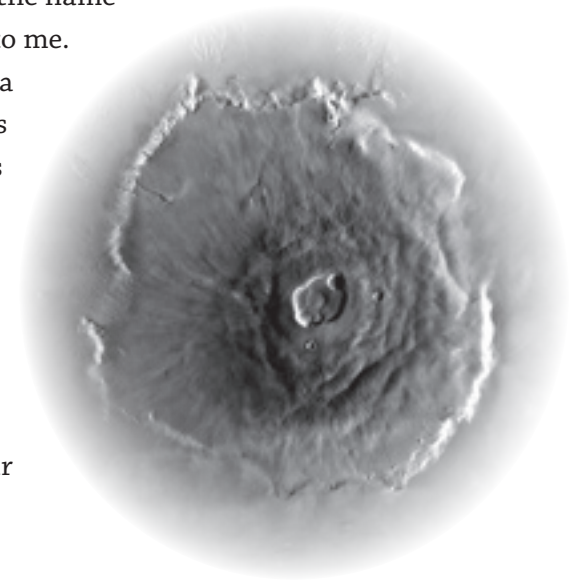
A brief explanation as to my extraordinary excitement about the *Geological Map of Mars* may be added here: Ever since the late 1950s, my special interest had been in the study of active tectonics, seismotectonics, and Mesozoic and Cenozoic crustal deformation within the Circum-Pacific and Eurasian orogenic belts. The aim was to work out the pattern of major active strike-slip faults and related, large-scale, horizontal movements of the lithosphere in order to arrive at a global kinematic picture of recent and late-Cenozoic movements. As a result, published in 1962, the young folded mountain belts were interpreted to represent a zone of intense crustal shearing and convergence extending between two large, expanding geotectonic units: The Pacific unit, centered in the central Pacific, and the Gondwana unit, centered in Africa. These findings were the first indication of the existence of a hemispherical symmetry, or bipolarity, in global tectonic processes. Later, the discovery of the magnetic lineations as well as the observed simultaneous, concentric growth of the Pacific and African plates strongly confirmed the idea of a Pacific/anti-Pacific bipolarity! The pattern of the newly discovered active oceanic ridges bordering the Pacific and African plates allowed to fix the Pacific pole P at 170°W/0°N, and the African pole A at 10°E/0°N. The two poles define a system of spherical coordinates with special reference to global tectonic processes, the so-called Geotectonic Reference System (GRS). With respect to the geotectonic bipolarity model, proposed in 1969, the GRS great circles

indicate the direction of sub-lithospheric flow away from P and A towards the GRS equatorial belt, the GRS small circles indicate the orientation of least horizontal lithospheric stress (extension).

The 1973 Mars map clearly illustrated a regular lithospheric extension of the Tharsis region due to diverging movements directed away from a spreading center located on the equator of Mars. Indeed, the situation seemed comparable to the geometry of the Geotectonic Reference System GRS! With the help of transparencies I tried to find graphically the optimum fit between GRS great circles and radial trends of the extensional structural features of Tharsis. The agreement was excellent! It allowed us to locate the center of the Tharsis radial system, the Tharsis pole T at 111°W/0°N on the equator of Mars.

The 1973 Mars map hid another surprise for me! It showed the positions of the three giant volcanoes of Tharsis ridge, but no names were indicated for these volcanoes. My special interest was directed to the middle volcano because it was located on the equator and very near to the Tharsis pole T. In 1973, the name of this volcano was unknown to me.

It came as a big surprise when a few years later I got to know its name: Pavonis Mons!¹ It seems very strange, indeed, that on a distant planet a single mountain to which you, for some peculiar reason, directed your special interest, was long time ago given the same name as the name of your family. Mere chance, or not?



- Nazario Pavoni

¹The name Pavonis Mons elicits the small classical dark albedo feature Pavonis Lacus described by E.M. Antoniadi (1930).

Seeing Through the Clouds

In the summer of 1968, I was traveling through Europe on leave from my teaching post at the University of Malaya and stopped in Zürich to visit Ken Hsü at the ETH. Ken kindly invited me to join an ad-hoc field trip through the Swiss Alps that Rudy Trümpy and he had especially arranged for several American geologists on their way to the IGC in Prague. Needless to say, I was happy to accept the opportunity of being guided through that geological wonderland by those experts.



The trip was a great experience. Each day we explored part of the complex of nappes and overturned sequences that make up those mountains, and each evening we stayed at a local inn. Trümpy knew the specialty dishes of each inn, and he knew which were the best local wines to order with our dinner. The evenings were filled with discussions—geological, cultural, and political—and the occasional heated friction between Trümpy and Hsü only livened things up.



Many of the place names we encountered were in the Swiss-German dialect and unfamiliar to the Americans on the trip. Trümpy was not always helpful with their struggles with the language. I recall one time John Maxwell of the University of Texas asked the name of the site we were examining. Rudy replied, “Schlyffitschuggen.” Maxwell asked, “How do you spell that?” Trümpy looked down his nose at the questioner and said, “Just like it sounds.”

One factor that did not cooperate, however, was the weather. Even though we did not get rained on too much, it was mostly overcast, and we were often completely beclouded. Trümpy had planned our route to include many points with marvelous views of the geology on mountain faces and ridges across alpine valleys. Sadly, most of the time when we drove up to these lookout spots, all we could see were gray clouds. But not to worry—Rudy was prepared. He would pull a large tablet of paper on an easel-like



backing out of the vehicle, get out his felt-tip markers, and proceed to draw. “If it were not cloudy,” he would say, “this is what you would see.” He would then construct a detailed and artistic portrait of the complex geology on the other side of the valley. In this way, though shivering in the cold alpine breeze on our exposed and beclouded viewpoint, we were able, thanks to Rudy’s intimate knowledge of the geology and his artistic ability, to see through those clouds.

- Peter H. Stauffer



“Mapping in the Darwin Glacier area, Antarctica, December 1962, being struck by the realization that we were the first humans ever to have walked there.”

- Charles C. Rich

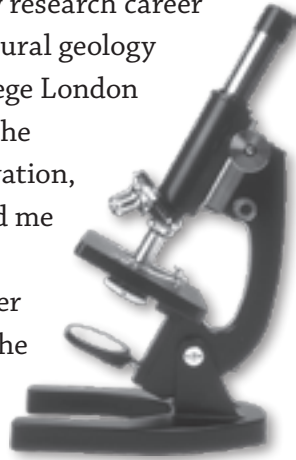
“Summer 1951, two awakenings: Black bear jumping on Joe Boyd’s and my pup tent at dawn... and George Kennedy exploding the stove in the dormitory cabin.”

- Priestley Toulmin



Thinking Laterally

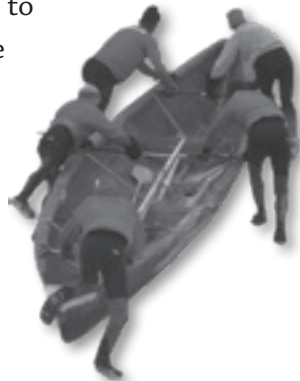
Four people have had a critical influence upon my research career in helping to shape my approach to field-based structural geology and tectonics. As a graduate student at Imperial College London in the late 1950s, Janet Watson impressed upon me the importance of meticulous field and laboratory observation, and its careful recording. Doug Shearman encouraged me to be interested in everything across the whole range of geology, to read widely and deeply, and to remember that the truth resides in the field if one can develop the skills and insights to extract it. As a young lecturer at Cambridge in the late 1960s, Teddy (Sir Edward) Bullard offered me profoundly important advice on how to do research. The advice occurred as I was emerging from being



obsessed with the minutiae of thin sections and outcrops to broader horizons. He told me to be bold and ignore the attempted dominance of older people in science and not allow them to tell me what to do. He instructed me to follow my nose and instincts, have lots of speculative ideas and then test them carefully, and not be afraid to be wrong.

Teddy believed that the young, indeed anyone, should be curiosity-driven and not follow fashion and proactively designed research programs. Finally, Tuzo

Wilson encouraged me to be simultaneously bold and humble. His advice was to push the boat out, have lots of ideas, and not to get exercised and worried if 95% of those ideas were wrong. How prescient and clever my mentors were in their insistence on wild speculation, careful hypothesis building, and meticulous attention to data and detail. Their advice may be summarized as follows: truth, whatever it is, is approached iteratively by thinking and careful data acquisition, but expect the goal to recede or, at least, never be



attained. The key is to constantly test what we think we know, to push the boundaries out. Random data gathering is not much use. Science works by carefully testing hypotheses in the field, by model building, and by experiment, all while challenging consensus paradigms. Our minds should be awash with ideas, and we should think laterally and work on a sliding scale from the nano to the infinite. We should dig lots of shallow research pits out of which one can see and network with others, rather than a deep pit out of which one can never see.

- John Dewey



"Spent 1940 Honeymoon mapping in mountains of Idaho... wife sat on cactus; had interesting evening in cave with tweezers, still together 58 years later."

- John C. Ludlum

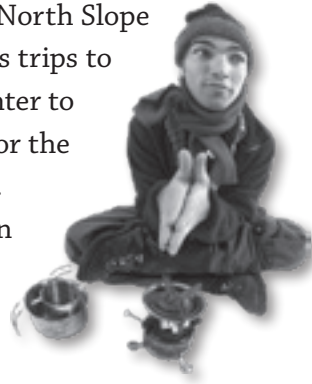
"An old joke's punch line was Jim Gilluly's response to his student's inept answers to his questions - "...so it may appear to the casual observer..."

- Harrison C. Jamison



The North Slope of Alaska

In December 1963, I had my introduction to the North Slope of Alaska in the dead of winter. I had made numerous trips to the Slope during the summer (which seemed like winter to a southern Californian!), but I was hardly prepared for the reality of a geophysical crew's existence in the Arctic.



In August 1963, I sent a memo to my boss, Mason Hill, strongly endorsing a proposal from Ben Ryan and Charley Selman in Richfield Oil Corporation's Anchorage office. The surprise was a five-month seismic reconnaissance program on the Slope to prepare the company for the anticipated opening of federal lands for leasing. The projected cost was \$760,000 plus a \$200,000 move-in. This was an enormous amount for Richfield at the time. My memo to "Mase" read, "Therefore, I strongly recommend that we secure immediate approval to initiate the proposed geophysical program as soon as conditions on the North Slope permit, probably early October. By so doing, I believe Richfield can ensure a solid, logical base for future exploration in the most promising region on the North Slope...." So I had no one to blame but myself that next December.

Ben and Charley and the United Geophysical Supervisor, Pete Gathings, and I flew from Fairbanks to a frozen lake near the junction of the Sagavanirktok and Ivishak Rivers to meet the helicopter from the crew and be ferried to the camp. We landed on the lake, met the chopper and both aircraft took off in different directions. Since the chopper could handle only two passengers, Ben and I elected to remain. It was afternoon in late December, dark, and our only protection from the -30 degree cold was an empty oil drum used to mark the landing spot on the lake—one among hundreds in the area. Obviously, the chopper came back, or I wouldn't be telling about it.

Two days later, we were in the mess hall wanigan as the camp was being moved north to a new location. The camp was composed of wanigans on sled runners, linked together in a train, and pulled by a D-8 Cat. We were playing bridge in the -15 degree wanigan, eating frozen peanut butter on frozen bread with unfrozen pickles and trying to stay warm enough to

avoid frostbite. We heard yelling and saw the cook running alongside. He was trying to stop the Cat-train because the cook shack was on fire. Pete Gathings grabbed a fire extinguisher, ran back to the cook shack and, as we watched from a safe distance, jumped into the wanigan and sprayed the fire and red-hot propane cylinder with CO₂. Obviously, he was successful, or I wouldn't be telling about it.



About a week later the crew was to go on break for Christmas. A Pilatus Porter would land near the camp on the tundra, and ferry several men out at a time. It was in white-out conditions. One man refused to fly without his full emergency gear aboard, and hiked back toward the camp. The pilot assumed he was in camp and the camp assumed he was on the plane. He had become disoriented and was later found frozen to death. The distance he had to cover was about 100 yards. This is one story I tell to warn others about the dangers and costs of Arctic exploration.

After various hazards and experiences, the crew succeeded in completing Line No. 1, which ran from south to north parallel to the Sag River, to the coast of the Beaufort Sea, and was the first indication of the Prudhoe Bay anticline. Richfield geologists Gil Mull and Gar Pessel had seen enough good geology the previous summer to convince their bosses that the potential was worth the risk, and our collective judgment was to reap its rewards four years later.

- Harrison C. Jamison

"Digging an extinct sea cow skeleton at the top of a cliff on Amchitka, while eagles performed a mating flight in front of me."
- Frank C. Whitmore, Jr.



Why I Became a Geologist

In 1958, I started my first permanent employment with the Pure Oil Company Research Center in Crystal Lake, Illinois. My project was mapping sandstone facies in outcrops of the Dakota formation in the Black Hills of South Dakota and Wyoming. It took me three field seasons to walk around the entire Black Hills.

One day during the first summer, I was sitting on a sandstone cliff, eating lunch and enjoying the view of a large meadow at the base of the cliff. Thunderheads were just starting to boil up. Into the meadow walked a doe pronghorn and two very young kids. The doe lay down while the kids chased each other around the meadow. Work was going well, the weather was perfect, and the sighting of the pronghorn family was spectacular. Furthermore, I was being paid. I couldn't have been happier.



I knew that many people on vacation had traveled many miles, spent a great deal of money, and still possibly never had an experience like this. I realized that, as a career, I had chosen a paid vacation.

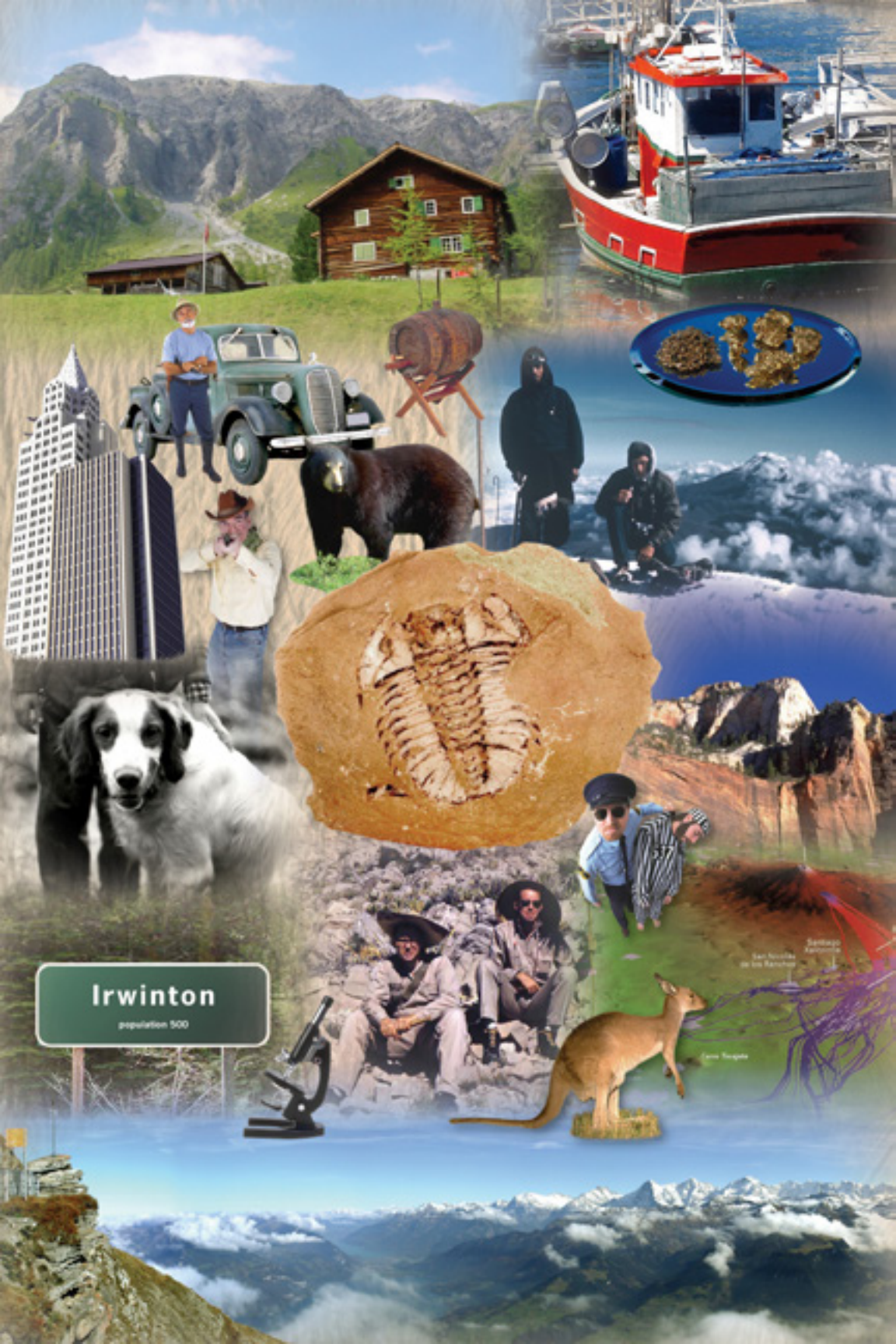
- Richard F. Dondanville

"I was deeply impressed by Table Mountain near Golden while I was the first Japanese student of Colorado School of Mines, sponsored by the GARIOA, (later Fullbright) Fellowship during 1949-50."

- Kenzo Yagi



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