

Geo "Hall of Fame"

by Ted Bornhorst

A new Geosciences Hall of Fame visibly acknowledges the accomplishments and contributions of alumni, students, and faculty of the department. The hall of fame is located in the hallway next to the department's main offices and consists of a number of plaques decorated with rock slabs.

There are currently three sections on the walls: Academy of Geological Engineering and Sciences, Gift Recognition, and Student Awards. For each member of the department's academy there is a plaque with the member's picture and a short citation. I often show visitors and prospective students and parents this section to illustrate some of the successes of our 1200+ living alums.

The Gift Recognition section is described below. The Student Awards section consists of several plaques listing the names of recipients of department awards and department designated scholarships. For example, there is a plaque for the Kiril Spiroff Book Award given to the outstanding student in field geology, field geophysics, and mineralogy. The department has been giving this award since 1973. There are endowed scholarships designated specifically for undergraduate and



graduate student majors that are recognized with a plaque and names of the recipients.

To put a true geo touch on the hall, Bob Barron, department facilities manager, was instrumental in getting five rock slabs to highlight the wall. The slabs are amygdaloidal basalt with native copper from the Caledonia Mine, sandstone with native copper from the White Pine Mine, conglomerate from the Minnesota Mine, specular hematite from the Champion Mine, and banded iron formation from Wakefield.

The hall of fame is a work in progress as we add several new sections, more members to the academy, more recipients of student awards and more endowed scholarships or awards. We look forward to the day when we fill the existing hallway and must expand elsewhere. ■

Recognition of Alumni Investment in the Department

by Ted Bornhorst

Those of you who invest in the department really do make a difference and the department truly appreciates your generosity. The department has added recognition for those who designate their gifts to the department.

Currently, Michigan Tech recognizes you when your lifetime giving reaches a certain level and you are "inducted" into a gift society. For those who have designated their support to the Department of Geological Engineering and Sciences and/or "our" students, the department, too,

will "induct" you into a department gift society. This is just another way the department can say thanks to those who invest their hard earned resources in us.

There are now five plaques in the Geo "Hall of Fame" for each of our gift societies. The department recognizes several levels of lifetime giving and each society is given a geologic name.

The Native Copper Lifetime Gift Society recognizes lifetime gifts of \$10,000 to \$24,999

The Banded Iron Lifetime Gift Society recognizes lifetime gifts of

\$25,000 to \$49,999,

The Gold Nugget Lifetime Gift Society recognizes lifetime gifts of \$50,000 to \$99,999,

The Black Gold Lifetime Gift Society recognizes lifetime gifts of \$100,000 to \$999,999

The Diamond Lifetime Gift Society recognizes lifetime gifts of \$1 million or more.

In future communications we will announce those "inducted" into the gift societies. The department is also preparing plaques to be sent to the members in special

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From the Chair: By Ted Bornhorst



Ted Bornhorst

The heat and humidity of the summer season will soon be replaced by the cool days and beautiful colors of fall. With the onset of fall we here in the department begin a new academic year. There will be new faces of first-year undergraduate and graduate students anticipating their educational journey. There will be those students who are back to continue on their journey. Some have completed their journeys and are now among our alumni.

Our challenge is to provide a relevant quality educational journey for each and every one of "our" students and be the gateway to their future. For some this gateway leads to more education in geoscience, for others it means employment in industry, and still others use their Tech degree as a stepping stone for a career in another field. Regardless of your path, the department's guiding principles is that the accomplishments of our students will always be the most important measure of our success.

As students partake in their individual educational journeys, Michigan Tech and the department are also part of a journey. The department's journey has been dramatic and we continue to make progress towards our vision - "to be nationally recognized." If you were to sequentially read department newsletters of the past I think you would agree that we have made and continue to make great progress forward. This issue of the newsletter provides yet another snapshot of the department's journey to change the lives of people through education. ■

Student Awards Banquet with Glen Zinn as Guest Speaker



The department held the first annual student awards banquet on April 26, 2001. The purpose of the awards banquet is to celebrate and recognize the hard work and accomplishments of our students. All students were invited to attend the banquet (a free meal).

The department was honored that W. Glen Zinn, B.S. 1966, came all the way from Oregon to be the guest speaker for the banquet. Prior to his recent retirement, Glen held high-level management positions with a number of mining companies and most recently as President and CEO of AMT, Inc.

Glen is a member of the department's academy and he gave an inspiring talk on the business side of geology and starting your own company. His talk was well-received by both students and faculty in attendance.

Following Glen's talk, over 60 awards were presented, including the Kiril Spiroff Book Awards and Department Scholar. Students who received scholarships were given a certificate of acknowledgement. Graduating seniors were given a piece of native copper mounted on birds eye maple as a recognition of their hard work towards earning a Tech degree. The department looks forward to many more annual awards banquets. ■

Geophysics for Archaeology at MTU

What does geophysics have in common with archaeology? Archaeological field work is often glamorized by the occasional find of the golden vase, but more often it is very labor intensive, involving scraping soil from a site, centimeter by centimeter, and sifting the soils, in the hopes of finding artifacts indicating human habitation.

The same geophysical tools that were developed to find buried tanks and drums, to search for oil, or for buried tunnels are being used to help archaeologists find the most favorable spots to concentrate their painstaking work. These geophysical tools can indicate conditions in the soil that may signify buried cultural resources. The archaeologists can then choose either to excavate or preserve the site for future generations.

For example, an interdisciplinary team from Michigan Tech ventured to St. Croix in the Virgin Islands in February of 1999. The expedition was led by Tech social science professors Patrick and Susan Martin.

The site was the Whim sugar plantation, which operated in the 18th and 19th century and is now an outdoor museum.

The work supported the research of MS candidate David Hayes, who lives in St. Croix. The geophysical team consisted of Charles Young, associate professor of geophysics, and undergraduate geophysics majors Seth Lemke and Len Mankowski.

The site had several generations of sugar refineries; the cane crushing machinery originally was powered by animals, but evolved to steam power. The team would use geophysical measurements to locate buried remnants of factory buildings and other structures, such as a slave village.

The team made measurements using ground penetrating radar, magnetics, and resistivity. After returning to Houghton, Lemke and Mankowski worked feverishly on the data to prepare maps and charts to present at a conference.

Later in 1999 members of the team returned to the plantation to conduct excavations guided by the geophysical results. The excavators reported that they were very happy to have their excavations guided by geophysics because they came up with no "dry holes." David Hayes combined the geophysics data with

historical records in his MS thesis to explain the history of the site.

Also in 1999, Mike LaRonge, then a master's student in Tech's industrial archaeology program, used geophysics as part of his investigation of an unmarked cemetery in Hancock. The location of this cemetery had been forgotten until a city crew found human bones at the surface.

The same set of geophysical methods used in St. Croix were used at the cemetery site, and were reported in Mike's MS thesis. In this case, even though the geophysical methods were applied correctly and analyzed with care, the data did not reveal previously unknown graves.

Dr. Young reports that geophysical methods applied to archaeological sites are very site dependent. This illustrates what every user of geophysics should realize, that geophysics usually does not directly detect the thing you are looking for. Geophysics detects only contrasts in physical properties, and sometimes the variations at a site due to natural causes are greater than the variations due to human activities.

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recognition of their support of the department.

Michigan Tech also recognizes annual gift levels with various clubs e.g., the Presidents Club recognizes an annual gift of \$1000 to \$2,499. Now the department recognizes annual gifts, too. We will post new names for the past fiscal year (July 1 to June 30) in a plaque located near the lifetime giving plaques. The department has given each annual gift club a geologic name. The clubs are

- ▶ the **Lake Superior Basin Annual Gift** for an annual gift of \$100 to \$249
- ▶ the **Keweenaw Rift Annual Gift** for an annual gift of \$250 to \$499
- ▶ the **Craton Annual Gift Club** recognizing an annual gift of \$499 to \$999
- ▶ the **Pangaea Annual Gift Club** recognizing an annual gift of \$1,000 to \$4,999
- ▶ the **Whole Earth Annual Gift Club** recognizing an annual gift of \$5,000 and above.

We will publish the names of those in the annual clubs.

There should be no doubt that your generosity is appreciated by students today and tomorrow. ■

Young has created a graduate class in archaeology and geophysics, primarily for the benefit of the master's students in industrial archaeology. The first class had seven students, including Dr. Susan Martin, who sat in on the class and came to every class meeting.

The class has been taught in the spring, and ended with a short project during the last weeks of the semester when the ground is free of snow. In the future, Young will teach the class in the fall semester when it is possible to carry out field measurements for a longer portion of the semester.

The equipment for archaeological geophysics consists of a modern Geometrics magnetic gradiometer, our standard resistivity meters and a Sensors and Software Pulse Ekko IV radar. We hope to upgrade the radar to something more appropriate for archaeological studies and to obtain a radar unit that would also be useful to study pavements and other concrete structures, which would facilitate joint work with the Department of Civil Engineering. ■

Alumni Highlights

Alumnus Wins Goldich Award

Dr. John Klasner, 1972 MTU Ph.D., was the 2001 recipient of the prestigious Goldich Award of the Institute on Lake Superior Geology. The Goldich Award is given for particularly noteworthy and meritorious contributions to the understanding of Lake Superior geology and mineral deposits.

John completed his Ph.D. on structure and metamorphism of the Early Proterozoic rocks of the western Marquette range under the direction of Professor Jo Kalliokoski. He joined Western Illinois University, where he taught for 27 years until his recent retirement.

John continued research and publishing on the geology of the Lake Superior region in addition to his teaching and administrative load at an undergraduate university. The department is proud that John is one of our alums. ■



Newfield Exploration Founder's dinner on May 3, 2001 in Houston brings together six geological engineering alums of department: (from left) Bill Holman, Todd Stone, Matt Holman, Shannon Bair, Paul Cunningham, and Gary Bajgier.

Bill Holman, BS geo engineering, 1986, worked three years for Tenneco followed by six years with Shell Offshore in New Orleans. Bill was with Newfield for six years, but recently left Newfield to join Bois d'Arc Offshore in Houston.

Todd Stone, BS geo engineering, 1985, worked four years for Tenneco followed by two years with Amerada Hess. Todd was with Newfield for eight years. Recently Todd left Newfield to form a new company, Arena Exploration, with two other Newfield employees. So far, they have been successful drilling offshore wells.

Matt Holman, BS geo engineering 1989, worked two years for Buchart-Horn, Inc., York, PA as an environmental geologist followed by nine years with Shell Oil, first in Bakersfield, CA and later in New Orleans. Matt has been with Newfield for a little more than a year.

Shannon Bair, BS geo engineering, 2000, has been with Newfield since her graduation a little more than one year ago. Shannon recently married another department alum, Seth Lemke, BS applied geophysics 2000.

Paul Cunningham, BS geo engineering 1981, worked eight years for Tenneco, nine years for Fina and one-half year for Coastal Oil and Gas from April 1998 through August 1999. Paul has been with Newfield Exploration for two years exploring the onshore gulf coast area.

Gary Bajgier, BS geo engineering 1982, MBA 1987, worked seven years for Tenneco Oil Co. in Houston, followed by ten years with Virginia Indonesia Co. in Houston and Indonesia. He spent four years in Jakarta. Gary has been with Newfield in Houston for a year-and-a-half exploring onshore Gulf of Mexico. ■

Copper Boulder

On July 12, 2001 Bob Barron, department facilities manager and avid scuba diver, played the major role in recovery of a spectacular 17-ton piece of fissure vein copper offshore of Great Sand Bay near Eagle Harbor, Michigan. Bob discovered the piece in 30 feet of water many years ago.

The piece measures 19 feet long and over 8 feet wide, making it the largest piece of native metal ever recovered from a body of water. The copper was first strapped underwater with two 50-ton nylon straps and lifted off the bottom with the help of the U.S. Army Corps of Engineers' barge and crane. It will become part of the new A.E. Seaman Mineral Museum which is looking to relocate to the historical Quincy Mine complex near Hancock, Michigan.

Department Alum, Faculty, and Students in MTU *Alumnus* Magazine

Patricia Henderson, class of 1977, was featured in the July 2001 *Alumnus* magazine for her entrepreneurship. Patricia credited Tech for a quality education.

Two undergraduate students were featured in an article titled "Geo Skiers." Both Amanda Shanight and Chris Seaman made the 2001 NCAA nordic skiing championships. They both cited the department for a great educational experience.

Dr. Judy Budd, research assistant professor, was highlighted in an article about remote sensing of Lake Superior.

Lastly, the back cover of the magazine included a picture of undergraduate student Craig Johnson, now class of 2001, and Associate Professor John Gierke installing a gauge on the Silver River. Maybe that issue should have been renamed the *Geo Alumnus* magazine?

Mayer in Netherlands

Associate Professor Alex Mayer spent the last academic year at the Technical University of Delft (TU Delft), Netherlands. Alex was awarded the prestigious and very competitive Fulbright Fellowship for his visit as well as a Visiting Scholar award from TU Delft.

Alex worked on new ways for estimating dissolution rates for nonaqueous phase liquids (NAPLs), a class of groundwater contaminants that is prevalent in the US and the rest of the world. The work will lead to more accurate predictions of the impact of NAPLs on groundwater quality and to improved designs of groundwater cleanup systems.

Alex also initiated collaborative projects on saltwater intrusion modeling, landfill monitoring system design, and mitigation of arsenic contamination of groundwater. The major accomplishment of the year in Delft belongs to his two sons, Peter (age

10) and Arthur (age 7), who attended a Dutch school and are now fluent in Dutch.

Undergraduate Student Receives NSF Fellowship

Katie Keranen, a 2001 applied geophysics B.S. graduate, was honored this past year by being awarded a NSF Graduate Fellowship. This national fellowship is very competitive and with it Katie can pursue a PhD degree at any institution. The fellowship provides five years worth of support. The award demonstrates that graduates of the department can compete with the best in the nation.

In addition, Katie presented the results of her undergraduate research, done under the direction of Associate Professor Jackie Huntoon, at the annual national meeting of the Geological Society of America held in Reno, Nevada in November 2000.

Comments Welcomed on Department Mission Statement

The department has recently adopted a mission statement: "We prepare students to understand and safely manage Earth and its resources." The department would appreciate your comments and feedback about our mission statement. Please send comments by email (tjb@mtu.edu) or by regular mail to Ted Bornhorst.

Summer Workshops

The department hosted two workshops this summer. The department has excellent computing facilities, which are underutilized in the summer when most students are away. This provides an opportunity for workshops needing computer resources.

Professor Bill Rose was the principal organizer of an international workshop on remote sensing of volcanic eruption clouds, held July 29-Aug 3, 2001, and sponsored by NASA and the USGS.

It was attended by 46 researchers which represented six of the nine

Volcanic Ash Aviation Centers (Washington, Anchorage, Montreal, Darwin, London, Toulouse), 11 countries (US, UK, Australia, Canada, France, Mexico, Ecuador, Iceland, Guatemala, El Salvador, Belgium), and 9 universities (Michigan Tech, Bristol, Buffalo, Cambridge, Arkansas, Maryland, Cal State, San Bernardino, Rutgers), and several government meteorological and volcanological organizations.

The workshop had a variety of goals including improving and expanding the use of satellite based remote sensing data

for hazard mitigation and other research purposes.

Professor Wayne Pennington organized a summer institute seismic interpretation and geological analysis held August 5 to 18, 2001, and sponsored by the Society of Exploration Geophysicists with software and data provided by numerous different organizations. Fourteen geophysicists from across the U.S. attended the workshop to learn paper-section techniques and use high-end software suites to evaluate integrated data volumes. ■

Interview: *Chris Pascoe*

Chris Pascoe is learning something about the core values of geology. Boxes and boxes and boxes of them.

Pascoe has been going through 30 years worth of core samples at the Cleveland-Cliffs warehouse facilities in Ishpeming. "I'm developing a three-dimensional model of what they call the Cascade deposit," he said. The project will, in turn, help the company decide whether to mine the area.

As a starting point, he reviewed logs from all the core samples drilled between 1950 and 1979, re-logged some of the data, and put all of it into an electronic format. He then took portions of leftover core test samples and put them through an x-ray diffraction machine.

"This deposit has a problem with gypsum, which is a big problem with the mineral processing," he said. The x-ray diffraction will detect any gypsum in the

samples. "We can see where the gypsum is and where it isn't. We take that data set and put it into the three-dimensional model."

The model will cover an area of three or four square miles. "That's a lot of data, so it has been challenging," Pascoe said. He spent two-and-a-half years splitting his time between Houghton and Ishpeming to get the project completed. He started the project as an undergraduate.

"Now Cleveland-Cliffs will take the data and run geostatistics on it and try to figure out the iron resources," he said. "Then they will have to decide if it is economically feasible to mine."

Pascoe just finished his master's degree at Tech and has taken a geological engineering position with Newmont Gold in Elko, Nevada. But he hadn't intended to go into geological engineering at all, let

alone pursue a master's degree.

"I was looking at environmental engineering. At the time, it was very competitive to get into that department. Odds are that I wouldn't have made it. When I was up here getting a tour, I was told, 'Well, geological engineering is close to environmental. They are concerned with groundwater, too, for example.' So I gave it a shot."

After finishing his bachelor's in geological engineering, he wanted a better background in mining, so he completed a mining engineering degree, as well.

During five of his year's at Tech, he also competed in the SME student chapter's mining team, attending competitions every spring. "We always had a good time," he said, "and we always tried to arrange mine tours and other sidelights on those trips."

Good Trip Gone Bad

by Paul Kimberly, MS 1995

In July 2000 a group of colleagues and I from the Smithsonian's Global Volcanism Program (GVP) attended the International Association of Volcanology and Chemistry of the Earth's Interior conference on the island of Bali, Indonesia. After presenting our work, we attended a workshop, then three other attendees and I headed over to the island of Java to hike up Mt. Semeru.

The volcano is the island's highest peak (3676 m) and one of Indonesia's most active volcanoes. I was looking forward to photographing Mt. Semeru's eruptions, which occur at the summit crater every hour or so. GVP has a collection of nearly 20,000 images of Earth's active volcanoes, mostly in a quiescent state, and I was hoping to add eruption shots to it.

The trip from Bali was quick and uneventful. Our pre-arranged meeting with volcanologists from the Volcanological Survey of Indonesia took place as planned. They were going to be doing some work and were glad to have us accompany them to the summit.

The next morning we would rise early and begin the two-day trip into Bromo-Tengger National Park and up Mt. Semeru. By 9:00 that morning, we were on our way into the park—four of us from the conference and a dozen or so Indonesians. The hike to the base of the volcano took eight hours, then another two up to the tree line where we set up base camp. After a quick meal and a four hour sleep, we rose at 2:00 am and began the ascent to the summit. Hiking up at that hour is necessary because in late morning the wind changes direction and begins to deposit ash on the summit's viewing area.

I reached the summit at 4:30 am. Shortly thereafter an eruption occurred lasting only 30-40 seconds. The next explosion occurred at sunrise (see photo). I clicked off a couple of photos but wanted to wait for the next eruption to have better lighting.

The explosions were emanating from a vent that was out of sight, behind and slightly downslope from the inactive crater that we were looking across. As we stood waiting for the next eruption, a small group of people began to head towards a ridge that leads to the active vent. Spontaneously, more people followed.

A group of about 12 of us stood peering into the cloud-filled



active crater anticipating the coming eruption. Four or five rock falls occurred over a five minute period and then suddenly the clouds dissipated. The eruption began from a vent located on the right side of the crater—steam and ash mostly, just what we had anticipated.

Within seconds, a small volcanic tremor was felt and a larger explosion began emanating from a vent on the left side of the crater floor. This plume was much larger and darker than any of that morning's other events. Small blocks, up to approximately 15 cm in diameter, began raining down very rapidly. The eruption lasted 40 to 60 seconds.

In the end, two Indonesian volcanologists lay dead and I was seriously injured with a smashed hand, broken shoulder blade, compound fracture of the arm, and third degree burns on my legs, arms, and torso. A half dozen others suffered minor fractures and burns. There was no rescue effort. It took 42 hours to get to the nearest medical facility and another 14 before I was in Singapore for a two-week hospital stay.

What went wrong? There was no communication prior to the ascent as to exactly what parts of the hazardous area we would or would not enter. When we reached the summit we were sleep, food, and oxygen deprived and were in no shape to make such critical decisions. Nor were we wearing helmets. I am convinced that had we been wearing helmets the outcome would have been different. ■

Interview: **Katie Keranen**



Katie Keranen's roots run deep with the soil. She grew up in farm country in Dassell, Minnesota. She worked on farms and thought about attending the University of North Dakota for a degree related to agriculture.

But somewhere along the line, that love for the ground turned toward the underground and a Michigan Tech degree in geophysics. Now the recent graduate says she plans to earn a PhD in the geosciences.

She will do so with a prestigious National Science Foundation graduate fellowship. The award provides tuition, a stipend, and the freedom to choose her

own research project.

"It is different than going in as a research assistant," Keranen said. "If you do that, you are already tied to a project. This is for three years, and I could take time off, if I want."

Keranen will take her Michigan Tech degree in applied geophysics and her NSF fellowship to graduate school at the University of Utah.

"I'm still not exactly sure what my thesis will be," she said. "I already know some of the faculty at Utah and their interests match mine, so I will be able to work something out."

Her interests relate to heat flow within the Earth and how it relates to plate tectonics—"sort of large-scale heat flow" she said. "It is a general area and I'll take classes for a semester, read journals, and talk with my advisor. He has some projects going on right now that I could jump in on, if I like."

Keranen has roots in the Copper Country, which eventually led her to Tech.

"My dad grew up in Traprock (outside of Lake Linden)," she said, "so I've been up here on and off all my life."

But she started her academic career at the University of Minnesota, majoring in English.

"I like writing, but I wanted to do something more quantitative," she said. "It was either go to the University of North Dakota to do something agriculture-based or go here. I wasn't enjoying downtown Minneapolis too much, and I like this area better than North Dakota, so I switched to MTU."

During her senior year, professors Jackie Huntoon and Jimmy Diehl talked with her about applying for the NSF fellowship.

"I said, yeah, fine, whatever," she laughed. Then she decided maybe she should look into it. "I got my application sent in just a week before it was due. I wasn't even thinking about graduate school, but the faculty here are close to the students and were really encouraging. Now I want to get a PhD and teach."