CONTACT

Newsletter of
The Geology and Environmental Science Department
Wheaton College

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Newsletter of the Department of Geology and Environmental Science
Wheaton College

Greetings again from the college formerly known as Crusaders. It really does appear that the school mascot will be changed. Some of us might favor, "The Mastodons" as an alternative. Perhaps you have other mascot candidates with a Geo-theme? Let us know. Who can tell what might be chosen?

DEPARTMENT NEWS

Wheaton's alumni magazine and other sources are surely keeping you aware of changes on campus, such as the new student-recreation center. However, it remains for us to fill you in on the truly significant news. It is rather amazing how much can occur around the department during a single year. The second year in a row has passed with the graduation of a record number of majors, that is thirty-six Geology and ES grads in two years! Few of the larger universities currently show such production. There has also been the loss of two valued colleagues to other employment. That's 50% of the full-time G&ES staff. This is a compact but very dynamic unit. It is still obvious to us and hopefully to you as well, that the department is meant to continue on. Thanks so much for all your prayers and communications. Please keep 'em coming. You can always contact us through e-mail, and soon there should be a G&ES home page within the larger college web section. Until we get that up and running, have a look at the Science Station page under academic programs.

PERSONNEL CHANGES

Our dear Brother, **Michael Guebert**, has taken a position at Taylor University in Upland, Indiana. In his five years in the department, Mike established a wonderful presence as instructor in our environmentally-oriented classes (Process Geomorphology and Hydrogeology), as overseer of the ES program and as research mentor for several student investigators. Mike did not want to leave us, but the suburban sprawl and lifestyle in this area became too hard on his family. We miss Mike greatly and wish only the best for him and the Guebert family in their new lives. Mike was to have been on a sabbatical leave from Wheaton

this school year. As a result of this anticipated schedule, we have been able to employ part-time replacements and conduct a full-year's search for a permanent replacement. There is never a real abundance of qualified evangelical geoscientists out there looking for academic employment. As always, the Lord has provided for all our needs, this time, with a few high-quality candidates. By the time you receive this issue, **Dr. Jim Clark** should be under contract as our new faculty colleague.

We are a bit shocked that Jim Clark will be joining us here. He is well known and respected for many years of service to Calvin College in their Geology, Geography and Environmental Science Department. It is indeed difficult to imagine anyone more capable to step right in and pick up where Mike left off. Not only can Jim teach all the needed classes, but he also has additional expertise in computer modeling (including GIS technology), geophysics and glacial geology. He has a strong record of externally-funded research involving undergrad investigators. One of his main interests is in geologic evidence of global climate change. It certainly is surprising that someone so well established would be available to us as a candidate. In a later issue, Jim can tell you his own story including his family's mission term in Paraguay, but we can just say now that like the Gueberts, the Clark family prayerfully decided that it was time to make a major change. Jim's relationship with the good people at Calvin remains strong in friendship and mutual admiration. I (Jeff) must confess that I feel bad for my friends at Calvin College, for their great loss will be our gain. We can only believe that they will find an excellent replacement as well. All this calls Romans 8:28 to heart.

Since 1986, the department has been served by seven different secretaries. That average of two years per secretary sounds like we are one tough place to work. Actually, our position has always been part time and does not seem to inspire loyalty. Most of our secretaries have moved out of the area for new employment opportunities. Unfortunately, the lack of continuity has inflicted a good deal of hardship on our functioning. Please pray for some type of better arrangement. It takes about one year for a new secretary to really become an effective colleague. We also hate to see these who become our friends leave so frequently. There is some chance that the secretarial position may be converted to a full-time departmental associate, who would serve as curator, lab coordinator and office manager.

CURRICULUM AND OTHER PROGRAM CHANGES

Like Microsoft we continue to revise our offerings (courses), but unlike Microsoft, we do so out of real need. Wheaton's full slate of general education requirements does not leave room for our majors to get all the background desired by grad schools or some employers. Of course, most of you realize this from your own experience at Wheaton. Our constant challenge is to keep a balanced curriculum which covers all of the important subdisciplines with at least an introduction. The latest advance is to require half semester overviews of geochemistry and mineralogy as well as a full semester of general petrology. Half a semester (a "quad") of mineralogy is a long way from the full year of the stuff many of us had to endure in the olden days. It does make a lot more sense now to avoid the seemingly endless detail on crystallography and memorization of mineral formulae.

G&ES is finally at a time in which each major can take on a significant research project or internship as part of their personal curriculum. Not all students are motivated in this direction, but it is wonderful to have the option of concentrated experience. The down side of encouraging research is that faculty must provide the opportunities and usually supervise/mentor the project work. Three full-time faculty can easily get spread too thinly across all of the responsibilities. The greatest need at present is for an actual faculty position to be allocated for Environmental Science. It is rather easy to justify such a position based on our teaching, research and administrative load. The ES students more than deserve to have someone fully devoted to their major. The Science Division has proposed a new position to serve as ES Coordinator and to bridge the related disciplines. We received two applications for the Geology replacement that were much better fits for this proposed ES position. One individual is an outstanding geography instructor with significant experience in land-use planning. Pray with us that the opportunity to search for this new position will open in the near future.

DEPARTMENTAL ACTIVITIES

It seems like a long time since we had a functioning Geoclub. Faculty have attempted its resurrection, but student interest and leadership have just not made it happen. Last school year, several of us enjoyed a sledding trip to Devil's Lake. Similar events will be planned for the near future. The Earthkeepers group on campus and the department are

sponsoring a two-day workshop for students in environmental (creation care) ministry. Organizers and speakers from the Target Earth organization will provide the agenda for the workshop. The second annual "Jungle Love" concert of campus bands took place in February as a fund-raiser for Earthkeepers ministry to the poor in Guatemala. At the end of March, the 30th to be exact, G&ES hosted the annual Science Symposium on campus. Steve arranged for two excellent paleontologists to give separate presentations on the nature of the fossil record. One talk demonstrated the presenter's position that geological history is well understood in the context of evolutionary change. The other presentation focused on inconsistencies between fossil evidence and current evolutionary dogma. A panel of respondents followed the speakers. We found tremendous interest in the proceedings, as Steve describes below.

STAFF

Dr. Guebert sends his regards from Taylor University. Perhaps we should think of him as a bit of a missionary, in that he is there to establish geology as an important component of a large environmental studies program. At least Taylor has recognized how essential geology is in modern science education.

Patrick Kelsey has completed his third class teaching Introduction to Soils Science for us. Pat is an excellent instructor as well as the lead soils expert at the world-class Morton Arboretum in Lisle, Illinois. The soils course is taught in alternate years for two credit hours (per quad). This serves as fine background for those with environmental interests.

Dr. Peter Vagt, our own fine alumnus and Vice President of Montgomery-Watson, is teaching Hydrogeology as a night class. Pete served at Wheaton as a leave replacement in the early 1980s. He does a great job covering this class that was one of Mike Guebert's staples. It is a terrific blessing to have Pete around to share his extensive understanding of professional geology.

Lisa Heidlauf, wife of alumnus David, is one of our Physical Geology Lab Instructors. Lisa has her Geology Master's Degree from the University of Illinois. She enjoys the opportunity and challenge of guiding the gen. ed. students through all the minerals, rocks, maps, etc.

Diane Greenberg, Jeff's wife, is our other regular Lab Instructor for Physical Geology. Diane has a great deal of experience in medical professions (research, clinical assistance and EMT), but she also has a minor in Geology. She appreciates the time to get acquainted with the students during the lab periods.

Jeff Greenberg

Dr. Jeff Greenberg is thankful for a new year (if not millennium) with an addition to the family. Adam the Dog was purchased from a pet shop in Rapid City that specializes in ranch dogs. Adam is a Border Collie mix and provides a lot of exuberant exercise for everyone. Jeff has continued on as department Chair. His teaching responsibilities are fairly routine except for the new regularity with which he and Steve team teach the Geochemistry and Petrology classes. Jim Clark's arrival should allow the GIS classes to change hands. This summer, Jeff will again teach the six-hour geologic mapping course for majors at the Science Station. He is teaching the Structural Geology course this semester, as prerequisite for the summer field experience. Jeff wishes that a "Donath" or similar triaxial rock-deformation apparatus could be found to use in the structure class. The search thus far has not been successful. One innovation has been added to this course, a "basement" mapping lab, in which students spend time in the Armerding Hall basement lab measuring strike and dip on oriented textbooks. The books are color coded to indicate different rock types. After observation and recording all the data, students prepare a map and interpretation of this pseudo-region. The exercise was first tried out in 1998 and was a crowd favorite.

Jeff has somehow found more time to pursue limited scholarship. The college administration provided funds last year, which enabled science majors to conduct some quality research projects. Two of his students, **Erik Mickelson** and **Joel Moore**, became involved in a study of Proterozoic sills that intruded the metamorphosed sedimentary rocks near the Science Station in the Black Hills. This work consists of field observation, petrography and some whole-rock chemical analyses conducted at Northern Illinois University. Jeff and the boys presented the work at the special undergrad poster session of the Northcentral Section of the GSA in April (see the abstract below). Another major, **Craig Perciante**, also presented his project on groundwater dynamics (with Mike Guebert) at a highly-attended session on wetlands reclamation. Jeff is also one of the authors of a volume of

papers explaining the positive interaction of evolutionary theory and Christian scholarship. The proposed book has been accepted by the publisher, Eerdmans, with a hopeful 2001 completion date. Jeff's contributions will be on the topics of geologic history and environmental issues.

Other professional activities continue to help Jeff keep a balanced perspective. In May, Jeff and Diane will be back in Kona, Hawaii for a week's teaching on environmental geology. This takes place at YWAM's (Youth With A Mission) University of the Nation. The students there are from all over the world with the one goal of mission outreach. It is a joy to teach such zealous disciples. Of course, Hawaii's not too bad a place to share the passion for God's creation. At the Science Station, Jeff will lead journeys to the 8,000' level of the Homestake Gold Mine and to Yellowstone, Tetons, Beartooths, etc. again. After the Science Station, he has plans to attend the International Geological Congress in Brazil. Intentions are to travel with Calvin College buddy, Davis Young, stay in Rio for several meeting sessions, field trip to the local gneissic rocks and remnant of coastal rain forest, and also to visit with friends (missionaries and Brazilian geologists). All the details remain to be resolved. Next October, the Christian Environmental Council holds its annual conference in southern Wisconsin. The meeting theme is sustainable agriculture. We hope that a large contingent of Wheaton faculty and students will participate. Jeff is the Chair of CEC's Issues Committee and is responsible for the conference program. Locally, Jeff's main diversions are soccer, Sunday school and working with various school groups to spread the value of earth-science education.

One final word from Jeff (me), is that sudden excitement has overtaken us as a famous Wheaton alumnus is producing a video program with us as its "stars"(?!). **Mr. Bill Jersey '51**, has brought his substantial talent for documentary programs to campus. His goal is to complete an hour-long segment as the last in seven with evolution as theme. Bill believes that Wheaton is one place where people openly and earnestly struggle to understand the relationship between God's revelation in scripture and in Creation (nature). Again I ask that you pray for us, this time that we honor the Lord by our statements and portrayal of academic life as believers. It is possible to do good orthodox science and do good orthodox theology. The production will eventually be aired on PBS stations.

Steve Moshier

The 1999-2000 academic year was as hectic as any I have experienced in my 9 years at Wheaton! In the Fall I did a rare turn with my own Physical Geology section. That meant preparing all new lectures on things I don't teach very often, like cirques, sinkholes and schists. I also took it upon myself to write new labs for the Physical course. We introduced a new lab that features the rocks, stratigraphy, structures and fossils of our beloved Black Hills. It takes the students two weeks to complete and boy do they hate it. We like the way that this new lab integrates and synthesizes information from several subjects in the course. In the Fall, I gave my Saturday mornings to a similar introductory course at Judson College.

The Spring semester saw another new course for me to offer, Earth Resources and the Environment. I used to teach the course before Mike Guebert joined us, and he sort of passed it back to me on the way to Upland. I decided to focus on Earth Systems and Global Change. We used brother **Karl Turekian's** fine text, "Global Environmental Change." I recommend the text to any of you who want a solid introduction to the subject. During the A quad, I co-taught Marine Biology with biologist Nadine Folino. She, biologist Ray Lewis and I took 18 students to the Belize barrier reef during Spring Break. The students collected baseline sediment and biota data along a transect and presented it at a student science symposium of local colleges.

It was our turn as a department to host the Spring Science Symposium. Jeff and I wanted to pack the house, so we chose the hot topic of "The Fossil Record in Geologic History." A hot topic at Wheaton, that is. We invited two speakers with different perspectives on the interpretation of earth history. Keith Miller of Kansas State presented a continuous creation view (i.e., God used evolution to create species over a geologic history of hundreds of years). Kurt Wise of Bryan College presented a special creation view (i.e., God created species distinctly/specially over a brief period of creation in the recent past). We invited two others to serve on a panel for the Q & A session: Wheaton Old Testament Professor Richard Schultz, and Wheaton Philosophy Professor Robert O'Connor. We were pleased with the turnout (it was packed) and the quality of the two presentations and discussion.

In May 1999 I joined Dr. Jim Hoffmeier, now at Trinity Evangelical Seminary, in Egypt's Sinai for more geoarchaeological investigations.

We identified a new site, some 15 km from the Suez Canal and some 20 km south of the Mediterranean coast. The excavation began in March 2000. They have uncovered a settlement that probably included a fort and temple from the time of Rameses II. Could this be the Migdol of the Exodus? I will visit the site in late April and meet with an Egyptian geologist in Cairo who will expedite my plans for field work there during Spring 2001. During my sabbatical, I want to map the Quaternary sediments and work out the recent paleogeography of the area when the forts were inhabited. There have been a couple of millennia of global change to take into account!

The Science Station program went well last summer. Mike Guebert and I directed. Mike and Jeff initiated the construction of a new garage/shop with two roomy apartments for faculty or guests. My introductory students were full of spirit (including the Holy Spirit). They even got me to play my guitar, again.

I had a good experience with students and research this year. Dan Wolbrink worked on some Precambrian metadolostones near the Science Station. He mapped the complex outcrops and did petrographic analysis, including cathodoluminescence (see his abstract in this issue of Contact). If those laminated rocks are stromatolites, they would be the oldest fossils in the Black Hills. Joel Moore, our second year senior, helped me set up my data from Egypt on ArcView GIS. Joel is an avid reader and he inspired me to do more pleasure reading; something I had neglected in the past fifteen years. I also completed a report for the St. Charles Park District based upon some sedimentological work of two students during the previous year (see our abstract in this issue of Contact).

Annual Report of the Affiliation of Christian Geologists 1999

The year 1999 marked the end of the first decade for the Affiliation of Christian Geologists. It also marked a transition in leadership. Steve Moshier moved from Vice President to President, succeeding Paul Ribbe (VA Tech). Ward Sandford (USGS) became Vice President. Keith Miller (Kansas State) remained in the position of Secretary Treasurer. Newsletter Editor is Steve Schimmrich (Ulster Co. CC). Official membership in the ACG stands at 347.

A small group of ACG members gathered during the ASA annual meeting at John Brown University in Siloam Springs, Arkansas

from July 30 to August 2. Keith Miller reports that, "...one topic of discussion was the current effort to establish a speakers bureau.... A second issue raised was the perceived widespread need for quality Christian educational materials for children that present geologic and biologic history as the expression of God's creative action..... Regardless, we need to be discussing how to take practical and concrete steps to meet the great needs before us with the resources and talents God has given."

The ACG met officially at the Geological Society of America Meeting in Denver Colorado in October. About 30 people were in attendance. Ken Van Dellen (Macomb CC) provided a brief history of the organization. Most of the meeting was a discussion of what we can do to improve our outreach to both the geological and Christian communities. There was much discussion of the short course at the convention, "The Evolution-Creation Controversy II: Perspectives on Science, Religion, and Geological Education." Moderators and speakers in the program included ACG members and many ACGers were in attendance. It was proposed that there be an unofficial field trip for ACG members at next year's meeting in Reno, Nevada. It is being organized by Wayne Belcher (USGS).

The ACG website was upgraded and the URL moved to www.wheaton.edu/acg. The site includes membership information, recent newsletters, several essays from past newsletters, and links to other resources on the net related to geology and faith-science issues. Visitors to the site can "Ask a Geologist" and receive a response from a member. There have been over 100 questions to "Ask a Geologist" since the feature was established in June, 1999. Most new members are finding us via the website. The ACG sponsored internet discussion group (list serve) has included some lively discussions during the year, most concerning dialogue between YEC and OEC positions (young vs. old earth creationism). Two issues of The News (our newsletter) were issued during the year. They featured op eds, essays and book reviews by ACG members.

WHEATON COLLEGE SCIENCE STATION
http://wheaton.edu/blackhills

STUDENT NEWS

The record graduation of thirty-six majors in 1998 and 1999 has left a dent in our population. It is ever more difficult to recruit majors from the ranks of the undecided or lightly committed. As you are probably aware, each year begins with very few freshmen intending to major in Geology or Environmental Science. We hope that most of these stick with us and that a healthy group of others will join the family. The number of research and internship opportunities for majors continues to grow. If you have any insight concerning recruitment or know of any prospective majors, please tell us. Something this good shouldn't be so hard to share.

Our 2000 graduates include the seven below:
Rachel Arriola; she hopes to join Americorps in using her ES degree.
Bethany Armstrong; she will begin a hydrogeology graduate program as a Fellow in the Dept. of Geoscience, University of Idaho.
Daniel Meadows; he is our Outstanding ES major for 2000 and will likely work for a year or two before seeking a graduate program.
Erik Mickelson; he will work with Dr. Walker on a volcanology thesis at Northern Illinois University.
Joel Moore; he wants to complete a graduate degree in applied geology after gaining some practical experience in community development work.
Craig Perciante; he has been working for a GIS consultant as preparation for graduate study in geography, either at NIU or Michigan State University.
Christian Skoglund; he is bound for a term of service with the Army and hopes to follow with employment in the broader area of environmental work.

You should also be aware of some of the exciting activities involving our majors. A few of these include the following:
Josiah Engblom spent all of last school year serving aboard YWAM's Mercy Ship, *Anastasis*. He sailed from England to West Africa and on to South Africa. Onboard, he was a crewmember; on shore, he was a stevedore and helped build a medical clinic.
Lauren Powell took part in an archeological excavation in Israel last year. She had the time and initiative to study the geology of Hezekiah's well in Jerusalem. Lauren is also continuing to work on a geophysics project with Los Alamos Lab in New Mexico. She has designed software to model the performance of an advanced gamma-ray probe to be used in drill-holes. (Wow!).

Mercy McBrayer is preparing to serve a HNGR internship in Kenya, beginning this summer. She will live among the Masai people and study wildlife populations.

Donovan Paschal, Beth Wieland and **Micah Ingalls** are also potential HNGR interns for next year. **Lesley Ediger** is planning to study in Costa Rica with the program of the Coalition of Christian Colleges and Universities.

Darren Breen and probably another major are studying the petrography and cathodoluminescence microscopy of post-tectonic granites from Egypt.

Anna Strong, Andrew Kulpecz and **Lauren Powell** are beginning a study of Mayan pottery. Samples will be from the research of Dr. Dean Arnold in the Yucatan. Each student investigator will focus on a research method including X-ray diffraction, thin-section petrography and scanning electron-microscopy.

Lacy Noetzel (student chaplain), **Don Paschal** and **Josiah Engblom** have been selected to study heavy mineral suites in certain streams in the Black Hills. They will collect sediment with gold pans and analyze the results by various separation/concentration methods.

Bethany Armstrong is completing a research internship with the St. Charles Park District as part of our continuing study of stream and wetlands dynamics.

ALUMNI NEWS

We have a tremendous wealth of information to provide about G&ES graduates. Some of this is already out of date, but it gives a good idea of all the changes in our lives. I wish we had something to say about each one of you (keep in touch! Please.)

Among the pre-1990 grads, we have received a visit from **Walt Eckelmann'51** during the Science Symposium. He continues to provide leadership among alumni supporters of the college. We are fortunate to hear frequently from **Pierre Biscaye'57** through e-mails and by way of the ACG discussion list. Pierre is active at Columbia's Lamont-Doherty Observatory in various types of research that analyze oceanographic, atmospheric and terrestrial data in terms of their paleoclimatic significance. **Rich Aram'76** has returned to Oklahoma from a delightful tour of service for Phillips Petroleum in Norway. One of his sons is considering Wheaton among other possibilities for college. **Gregg Davidson'85** tells us that he enjoying the challenge of work as hydrogeologist on the faculty of "Ole Miss".

Among the more recent graduates, environmental consulting employment, marriage and clustering in certain urban regions are notable trends. Our most current information indicates the following "news":

Andrew Adare, **Josh Cady** and **Greg Johnson** (all'98) are in the Denver area. Greg is now married and Josh has worked on projects detecting dangerous materials with geophysical methods over the Denver Arsenal property.

Andrea Balla'98 has moved from the Chicago area to Seattle in the employ of Montgomery-Watson.

Chris Baker'99 is on his way, trekking the Appalachian Trail, and we expect that he will head for some environmental grad school program after coming down from the mountain.

Matt Barner'98 is completing his M.S. at Wright State and work with the Miami Conservancy as Intern Hydrogeologist.

Glenn Bell'94 is out of the Army and into a Science Ed. M.A. program at Seattle Pacific.

Lara Bell'95 is a fine Earth Science/Geology teacher at St. Charles, IL High School.

Judith Berglund'92 has completed her Masters at U of South Carolina and is probably about to begin working as a remote-sensing expert with the U.S. government in Alabama.

Anita Deeg'94 is returning to Madagascar to serve with the Peace Corps after completing her Water Resources grad program at Colorado State.

Karil Dodds'99 has had a tough time deciding between geology grad school and a practical theology degree in an Australian seminary (we think seminary won).

Andy Fulton'92 and wife Wendy are now in New Hampshire where Andy is working for EnviroSense, a new consulting firm for him.

Jamey Fulton'97 is now married and finished with his graduate teaching degree from Ball State in Indiana.

Miriam Gage'98 got married last year and lives in the northwest.

Andy Gascho'93 has his M.S. in Geoscience from the U of Hawaii and is back on the mainland.

Ashley Inselman'94 finished her term of service with Mennonite Central Committee in Uganda and a graduate degree from the London School of Economics. She may soon be working on her doctorate in Community Development at Cornell U.

Randy Leonard'99 is married, ending work with research at the Smithsonian Institute and seeking employment with environmental consulting in the Washington, D.C. area.

Mike Lowe'95 has his Masters in Environmental Health from Tulane. He and his wife are now off to serve the Peace Corps in Uzbekistan.
Aaron Kishbaugh'97 is Project Leader with Geographic Data Technology, a large GIS firm in New Hampshire.
Rachel Kuseske'98 is married and working as staff geologist with an environmental company in Delray Beach, FL.
Rob Mark'97 was involved in youth ministry but with an environmental emphasis. He is now living in the D.C. area.
Steve Moss'99 is thriving in a Masters program at the U of Montana. He should begin a study of magmatism in the Bear Paw Mountains this summer.
Mike Newton'99 is paying off some bills and enjoying travel as a flight attendant for American Airlines.
Rachel Peterson'99 is devoting her time and energy to helping young people in an alternative education program, Partners For Success.
Ken Roth'96 continues to work with the environmental consultants, ENSR and came to the college this spring to recruit 2000 graduates.
Ben and Becky (Jacobs) Sheesley'98 are both working on grad degrees at the U of Wisconsin-Madison. Ben is in Water Resource Management and Becky is in the Water Chemistry program.
Brett Swigle'93 finished his civil engineering degree at U of Colorado-Denver and is going on to complete an engineering Masters.
Jeremy Vaughan'99 completed a year at the U of Memphis and is transferring to the graduate Geology program at Clemson.
Doug Walter'98 is completing his Masters teaching degree at Wheaton. Doug helped lead the Honduras Project over Spring Break this year.
Christopher Williams'92 has moved to the Carbondale, IL area after serving with the Maryland Geological Survey. Chris's wife, Heidi has been hired by Southern Illinois U to teach in their Music program. Chris will begin work on his Geology doctorate at SIU.
Dan Wolbrink'99 is taking the year to volunteer in Christian community development projects in Costa Rica. He will either begin a medical school or a Geology program in the Fall.

That's an impressive lot of activity by a wonderful group of friends. There is of course, a good deal more that isn't reported here. We should note that because of the current job market in higher education (large numbers of retirements, finally), G&ES majors are now being more encouraged to consider pursuit of PhDs than before. Someone needs to be ready when they send us out to pasture.

ABSTRACTS

SURVEY OF BEDLOAD TEXTURES AND DISCHARGE IN OTTER CREEK AND FERSON CREEK KANE COUNTY, ILLINOIS

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Otter Creek and Ferson Creek drain a watershed that feeds the Fox River in Kane County, Illinois. This report reviews channel sediment textures and flow conditions in Otter Creek. Size and sorting (size distribution in a sample) for channel sediment in Otter-Ferson Creek are variable. Average sediment particle size along the channel thalweg ranges from very coarse sand (1-2 mm) to coarse pebble (20 mm). Most samples are poorly sorted. Channel bars are covered by poorly sorted pebbles and coarse sand with the average particle in the fine pebble class (2 - 4 mm). These sediments are only moved during peak flow (near bank-full conditions). This was corroborated by analyses of sediment collected above scour chains.

Measurements of stream discharge in Otter Creek at Silver Glen Road bridge compare with values from a USGS station downstream on Ferson Creek. Typical flow conditions at the Silver Glen Bridge feature gage readings of 1.5 to 2.5 ft. with measured discharge from about 15 to 35 cfs. High flow events, such as after a typical summer storm result in gage readings of 4 to 5 ft (near bank-full conditions) and measured discharge in excess or 140 cfs. At this discharge, currents are swift enough to cause bank erosion, move pebbles and actually shift the position of bars on the channel floor.

PRELIMINARY REPORT ON THE PALEOBIOLOGY AND PETROLOGY OF EARLY PROTEROZOIC DOLOSTONES IN THE NEMO AREA, BLACK HILLS, SOUTH DAKOTA

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Two different dolostone units of the Early Proterozoic (2.0 billion years BP) sequence in the Nemo area were examined for evidence of ancient microbial mats or other fossil-life using various observable indicators. No definitive evidence of life was found, but siliceous laminations within the Roberts Draw Formation are consistent with stromatolitic texture commonly seen in Paleozoic rocks. These would represent the oldest life evident in the Black Hills region. The diagenetic components of dolostones of the Robert's Draw Fm. and the Boxelder Creek Fm. were examined with light- and cathodoluminescence-microscopy. Cements for most of the study area consistently initiated with non-planar void filling non-ferrous sparry dolomite, changing to ferrous sparry dolomite and terminating with microcrystalline silica cement. A tentative explanation for this sequence and associated textures is offered in the report. Insoluble residues in the dolostone containing gypsum and/or anhydrite were found in fresh, intact samples from all localities, which in combination with other factors is indicative of a hypersaline depositional environment.

HYDROGEOLOGIC CHARACTERIZATION OF THE WEST BRANCH FEN, DUPAGE COUNTY, ILLINOIS

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Baseline geologic and hydrologic information is being collected and analyzed for future longitudinal studies for preservation of a unique fen in northeastern Illinois. The site, located in the West Branch Forest Preserve in West Chicago, Illinois, is surrounded by a golf course, a recently developed, residential subdivision, and farmland. Installation of farm drainage tiles over the past several decades has severely degraded the unique hydrologic feature. Recent and potential future changes in surrounding land use prompted the Forest Preserve District to investigate site geology and hydrology for implementation of a conservation plan.

Site-specific investigations were conducted beginning in 1998, in addition to site background information on land use and geology acquired from county archives and from the Illinois State Geological Survey. Fifteen 2-inch, shallow cores (15-20 ft.) were extracted using a track-mounted Geoprobe. Detailed stratigraphic logs of cores were prepared from each boring and selected cross sections were developed to relate the local stratigraphy. Water table maps for this site were developed from weekly measurements of groundwater levels in selected wells completed in the shallow borings. Seven slug tests were performed to determine shallow aquifer conductivities. Several water quality samples were recovered from surface drainage, wells, and the fen.

A Geographic Information System (GIS) was utilized with ArcView for topography, land cover, soils, and well locations. Well construction information is integrated into this computer-based system. In addition, hydrology, hypsography, and public land use coverages have been added to the database to enable an improved user interface.

Support for this investigation was received from the Forest Preserve District of DuPage County, the Illinois Ground Water Association, and the Alumni Association at Wheaton College.

COMPOSITION AND TECTONIC CHARACTER OF PALEOPROTEROZOIC BASALTIC SILLS FROM THE EASTERN BLACK HILLS, SOUTH DAKOTA

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Continental-margin metasediments are interlayered with Paleoproterozoic metabasaltic sills along the eastern Precambrian core of the Black Hills. Sill intrusion is consistent with a continental rift environment. Subsequent greenschist grade metamorphism and deformation likely occurred during some type of convergent tectonic stress along the same zone previously under extension. To better understand the history of the sills, field, petrographic, and geochemical evaluations were conducted on exposures from McGee Crossing (on Rapid Creek), along Hisega Road, and at Placerville; sills at Pactola Reservoir and Nemo were assumed to be cogeneric and used for comparison.

The sills at McGee and Hisega are composed mostly of actinolite with quartz, calcite, opaque minerals, chlorite, and less commonly clinozoisite and epidote. Country rocks consist of quartzite and phyllite with abundant quartz and muscovite. Wallrock up to a meter from sills also contains calcite, chlorite, and large euhedral porphryblasts of actinolite randomly grown over the foliation. Veins of quartz ± carbonate commonly transect sill and wall rocks at Hisega and McGee.

Original sill compositions seem to have been plagioclase and pyroxene with observed differentiation at Placerville and Nemo. The present absence of plagioclase at Hisega and McGee could be through efficient metamorphism from reactions such as di + H_2O + CO_2 = ac + cc + qz; an + cc + H_2O = cz + CO_2; an + cc + mt = ep + CO_2. These reactions require the introduction of groundwater, however, Precambrian carbonate rock is quite scarce throughout the region. Additional problems involve the timing of metamorphism versus deformation.