

THE CONDUIT

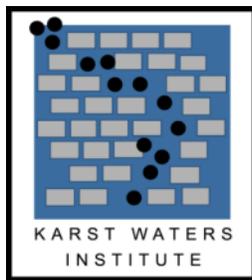
*Building understanding of karst
through interdisciplinary action*

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THE CONDUIT

Building understanding of karst through interdisciplinary action



The Conduit is an e-newsletter of the Karst Waters Institute, a 501(c)(3) nonprofit organization.

Karst Waters Institute, Inc.
P.O. Box 4124
Leesburg, Virginia 20177

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Front cover: Karst window of Cascade Cavern, Carter Caves State Resort Park, Kentucky. This cave is one of only two commercial caves currently open to visitors in the park; all others are closed because of White Nose Syndrome.
Photo by Annette Summers Engel.



Welcome to *The Conduit*

This e-newsletter is distributed twice a year to over 700 karst enthusiasts globally. This issue of *The Conduit* contains information about the upcoming KWI Awards banquet in March 2013. This year, we will honor Dr. Norman Pace. Also included in *The Conduit* are announcements for the Wilson Scholarship and upcoming conference in 2014. A short article, written by the 2012 Wilson scholarship recipient, Amanda Laskoskie, summarizes her research to date. Believe it or not, KWI first came into being November 9, 1991. To commemorate reaching another anniversary, I've included a brief history of KWI from Volume 1, Issue 1 of *The Conduit*. Here's to another 20-some years! Happy holidays!

-- Annette Summers Engel

2013 Karst Award Recipient – Dr. Norman Pace



The 2013 KWI Karst Award banquet will be held in Boulder, Colorado, the evening of March 2, 2013. Festivities start at 6:00 PM at Tangerine (2777 Iris Ave., tangerineboulder.com).

This year's honoree, Dr. Norman Pace, will speak on the topic of "The Microbes Below: Caves, Aquifers and Drinking Water Distribution Systems." Other awards will also be given.

Reserve your seat(s) by sending a check for \$60/person to the Karst Waters Institute, PO Box 4142, Leesburg, VA 20177. Dinner includes hors d'oeuvres, dinner with choice of entrees, & wine/beverages.



Dr. Norman Pace received an A.B. from Indiana University and the Ph.D. from the University of Illinois. He has held faculty positions at several institutions, including the National Jewish Hospital and Research Center, the University of Colorado Medical Center, Indiana University and the University of California, Berkeley. He currently is Distinguished Professor of Molecular, Cellular and Developmental Biology at the University of Colorado, Boulder.

Pace works in two scientific arenas. On one hand he is a molecular biologist, and his laboratory has made substantive contributions to our understanding of nucleic acid structure and processing. Noteworthy recent efforts have involved elucidation of the crystal structure and catalytic mechanism of the RNA moiety of ribonuclease P, an enzyme composed of RNA instead of the usual protein. On the other hand, Pace is a microbial ecologist. His laboratory has led the field in the development and use of molecular tools to study microbial ecosystems. This work has led to the discovery of many novel organisms and an understanding of some unusual symbioses. The results have expanded substantially the known diversity of microbial life in the environment. Current efforts range from high-temperature environments and human disease to the microbiology of the human-occupied indoor environment.

Pace is a member of the National Academy of Sciences; and he is a Fellow of the American Association for the Advancement of Science, the American Academy of Microbiology, and the American Academy of Arts and Sciences. He has received a number of awards, for instance the 1996 Procter and Gamble Award in Applied and Environmental Microbiology, the 2007 Lifetime Achievement Award from the American Society for Microbiology, the 2008 Lifetime Achievement in Science Award from the RNA Society, the 2008 Tiedje Lifetime Achievement Award in Environmental Microbiology from the International Society for Microbial Ecology and the 2001 Selman A. Waksman Award for Distinguished Contributions in Microbiology from the National Academy of Sciences. This is the Nation's highest award in microbiology. In 2001, he was appointed a Fellow of the John D. and Catherine T. MacArthur Foundation. Additionally, Pace is an expert in cave exploration. He has led and participated in numerous expeditions in this country and internationally. Pace has been elected a Fellow of the National Speleological Society, the Cave Research Foundation and the Explorers Club. He received the Lewis Bicking Award from the NSS for his contributions to American caving.

Announcement - William L. Wilson Scholarship Deadline

The William L. Wilson Scholarship in Karst Science was established in 2002 to recognize the significant karst science contributions of the late William (Bill) L. Wilson. Bill Wilson used a variety of techniques, and unusual creativity, to tackle some of the most difficult karst science questions in Florida and elsewhere. He developed a leading karst consulting company in the United States, Subsurface Evaluations, Incorporated. To stimulate the development of new, energetic, motivated, and creative karst scientists, and to remember the person of Bill Wilson and his dedication to karst science, the scholarship has been established in his memory. The value of the scholarship as a one-time award is \$1,000.

To apply for the William L. Wilson Scholarship, the following conditions exist: The applicant must be currently enrolled in, or have been accepted into, a MS degree program at an institution of higher education in the USA. PhD students are not eligible.

A written proposal of the planned karst study must be submitted. It is limited to 1000 words or less for the narrative, not counting figure captions and references. The research topic should be one concerning karst science, from the field of geochemistry, geology or hydrology. A very simple budget indicating how the funds would be used should also be included (it does not count in the 1000 word limit). Applicants are requested to *not* recycle master's thesis proposals as applications.

Academic transcripts of undergraduate, and any graduate work, should be submitted. Copies issued to the student by their institution are preferred. Two letters of recommendation, with one of them from the student's advisor or mentor, should be submitted. It is requested that these letters be submitted as e-mails by the letter writers.

Applications are due by February 15, 2013. They should be submitted electronically as a single pdf file, containing the application, transcripts, etc., to:

Dr. John E. Mylroie, Department of Geosciences, Mississippi State University, Mississippi State, MS 39762
mylroie@geosci.msstate.edu

Questions regarding the scholarship should be addressed to Dr. Mylroie. Applicants will be notified in early March of the decision of the Scholarship Committee. Publications derived from supported research should acknowledge the Karst Waters Institute and the William L. Wilson Scholarship. **For more information, go to: <http://karstwaters.org/scholarship/>**

Upcoming 2014 Conference – Hypogene Cave Morphologies

The *Hypogene Cave Morphologies* conference will be held at the Gerace Research Centre (GRC) on San Salvador Island, The Bahamas, the first week of **February, 2014**. Exact dates are still to be determined. The main theme of the conference will be to examine and discuss the unique cave morphologies and speleogens associated with hypogene caves, from the scale of 100 km+ cave maps down to the centimeter wall-rock shapes and forms. Hypogene caves can be argued to represent a laminar flow regime that is quite different from the turbulent flow found in epigenic stream caves coupled to surface hydrology. Can these morphologies be uniquely characterized to identify hypogene caves? What effect do these laminar flow regimes have on geochemical dissolution models in hypogene settings? Do flank margin caves fall in a hypogene flow environment?

Initial plans call for an opening day, optional field trip to see two very large but easily accessible flank margin caves on Eleuthera Island that have a large suite of morphologies commonly associated with hypogene caves. The rest of the conference will be held on San Salvador Island, with morning talk sessions, evening poster sessions, and afternoon field trips to see caves and karst. The geologic setting of time and space constraints will help illuminate possible mechanisms of cave formation.

The GRC is a field station (see www.geraceresearchcentre.com for more information about the field station; note the British spelling of “centre” in the URL). Registration will open in 2013. The registration fee, when established, will cover all meals and lodging at the GRC, as well as all San Salvador field trip expenses, field guide, etc. Participants will arrive by commercial air to San Salvador. The Eleuthera pre-conference field trip will fly Nassau to Eleuthera and then on to San Salvador for the start of the conference. Time will be made available to enjoy the sights and culture of San Salvador, including swimming and snorkeling on beautiful tropical beaches.

Space will be limited for this conference, and participation will initially be by invitation, opening to volunteered abstracts as lodging space allows (~50 people in two-to-a-room accommodation). Contact John Mylroie at: mylroie@geosci.msstate.edu for more information.



Where are they now? Wilson Scholarship Research



Research completed by the 2009 winner of the William L. Wilson Scholarship, **Cassie J. Gray** (Louisiana State University) was recently published in *The ISME Journal* (advance online publication, doi:10.1038/ismej.2012.105), “Microbial diversity and impact on carbonate geochemistry across a changing geochemical gradient in a karst aquifer.” Cassie is currently employed with CH2M Hill in Houston, Texas.

Amanda Laskoskie, winner of the 2012 Wilson Scholarship, M.S. student at West Virginia University, provided details about what she has been working on since receiving the scholarship.



-- Submitted by Amanda Laskoskie, West Virginia University

In the past year, I have focused on the development and methods for using hydrogel tracer beads (HTBs) in the field to mimic nonaqueous liquid (NAPL) fate and transport. HTBs are made from alginate, derived from marine algae. 3M® Glass Bubbles and Risk Reactor® ultraviolet pigment is added to make an innocuous, highly visible floating bead.

Initial work focused on HTB optimization. Various drop height and alginate percents were tested to determine which combination resulted in a most spherical bead. The 3% beads at 30 cm drop heights were most spherical, while higher drop heights resulted in a more oblong bead and lower alginate percents resulting in bead malformations (Figure 1). Field testing of the HTBs was completed throughout the summer and fall of 2012. Research was put on hold during a visit to Buckeye Creek Cave, which found the cave stream stagnant as a result of the drought conditions experienced throughout most of the United States this past summer. A backup surface stream, Rhine Creek, was found in Terra Alta, WV. Comparative tracer tests of fluorescein and the buoyant HTBs demonstrated the beads travel preferentially in quicker flow paths than the fluorescein, arriving two minutes before fluorescein was detected.

The test section at Rhine Creek was 64 meters long and the discharge was 85 L/s. Recovery rates of the dye were 86 and 78% and the HTBs was 52 and 47% (Figure 2). The low recovery is due to trapping mechanisms in the stream such as vegetation and exposed bed as well as not catching all beads that made it to the collection point. The beads travel faster than the dye because they are buoyant and float in the center of the stream at the surface which is the fastest flowing part of the stream. Conversely, the dye disperses laterally and horizontally throughout the water column and therefore experiences a slower travel time. The transport of the HTBs is what is expected with NAPL contaminants and are therefore a suitable proxy for NAPL fate and transport in karst systems.

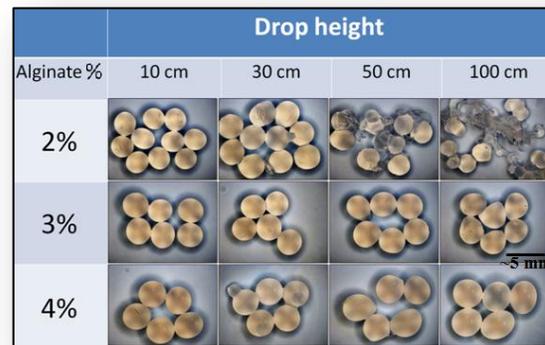
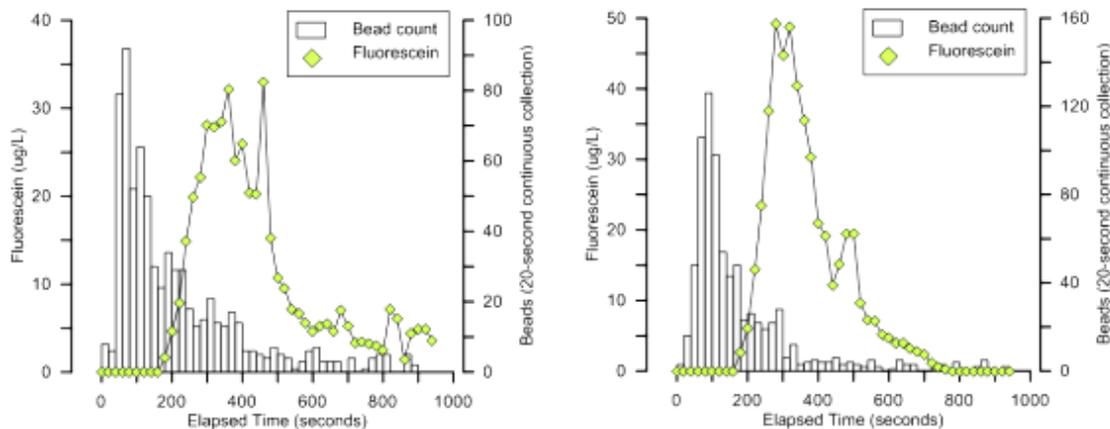


Figure 1: Beads formed with various drop heights and alginate percents. The short and long axes were measured to determine bead sphericity.

Figure 2: Breakthrough curves of HTBs and fluorescein for consecutive tracer tests at Rhine Creek.



How the Karst Waters Institute Became Established

Reprinted from *The Conduit* (Volume 1, Issue 1)

In November of 1988, Dr. David C. Culver, Chairman of the Department of Biology at American University, convened a conference near Charles Town, West Virginia to examine the nature of karst research in the United States. The meeting was oriented towards biospeleology, but the disciplines of geochemistry, hydrology and geology were also represented. What was then known as the Spring and Ground Water Resources Institute (now the Freshwater Institute) sponsored the meeting, and provided funds to bring together the assembled scientists, including three from Europe. They looked at karst research in the United States, and compared the American situation to other countries which had karst research institutes. Some simple truths evolved from the meeting: 1. Karst research was under-funded in the U.S. 2. Karst research in the U.S. did not receive a lot of respect from mainstream science. 3. Lack of young karst scientists. 4. Various problems of reality and perception regarding karst science could be remedied by establishing a karst research laboratory in the U.S. 5. Foreign karst laboratories thrived best not in remote field locations where the karst was, but in areas where routine interaction with mainstream scientists was possible, and where logistical support was good. The meeting adjourned without any real plan to continue.

Over the following months, Dave Culver worked with John Mylroie and Bill Jones, two participants of the November 1988 meeting, to examine how establishment of a U.S. karst laboratory could proceed. With help from Dr. Robert Putz of the Spring and Ground Water Resources Institute, a second conference was planned for March 1990 to focus on the issue of a U.S. karst laboratory. A select group of senior karst scientists from across the country met in West Virginia to develop the laboratory concept. The meeting was extremely successful, and resulted in laying out the fundamental issues of the mission, goals and objectives for what was beginning to be called the "Karst Waters Institute" or "KWI". As the framework of an institute took form, discussions ranged on how to actually execute the formation of the KWI. It was clear that the ideal goal would be a totally independent, endowed institution. In reality, it was realized that association with one or more universities or government agencies might be the only practical way to obtain the funding necessary to pull together scientists, technicians, graduate students, and visiting scholars. An intermediate goal still seemed possible, in which the basic operations of the KWI were to be funded from gifts and endowment, but the actual research was funded by grants and contracts.

In the months following the March 1990 meeting, a number of approaches were followed with some vigor, but with little success. In hindsight, it seems clear that we had gotten ahead of ourselves, trying to sell an institute that didn't really exist. In January of 1991, at Dave Culver's invitation, John Mylroie took a leave of absence from Mississippi State University and spent the spring semester in Washington, D.C. at American University, where he worked with Dave Culver to develop the institute. A series of projects were proposed, including a demonstration project to develop the Karst Hydrology Atlas of West Virginia under the direction of Bill Jones. Dave Culver and Bill Jones developed the papers for incorporation of the KWI, which were signed in September of 1991, and an inaugural meeting of the KWI Board of Directors was set for early November 1991.

On November 9, 1991 the Karst Waters Institute officially came into being, with successful adoption of the incorporation papers and Bylaws by the Board of Directors. Further activity was done on the paperwork of organization, and plans were developed to find sources of funds to allow the KWI to move from a paper organization into a physical entity. The KWI now has offices courtesy of Environmental Data in Charles Town, WV. After the meeting was over, a press release was developed and distributed. The press release generated a lot of interesting responses, and more are still coming in.

The Bylaws of the KWI call for an annual meeting each March. The first annual meeting was held March 21 through 22 in Charles Town, WV, and the results of that meeting are presented in a detailed article in this initial issue of the Karst Waters Institute Newsletter. Because there have been so many inquiries about the Karst Waters Institute, this brief history was presented to bring everyone up to date and give a common ground to all those interested in the KWI. Included immediately following this article are the Mission Statement, Goals and Objectives of the KWI.

KWI Happenings

Institute and Board Members meet in Charlotte, North Carolina

The Fall meeting was held November 3, 2012, at the Weston in Charlotte, prior to the annual Geological Society of America meeting. In attendance were Board members, Institute officers, Associates, and guests. Some Board members were included by conference call or Skype. **The next Institute and Board meeting will be in Boulder, Colorado, on March 3, 2013.**



Upcoming Conferences and Courses

Karst sessions at the 2013 NGWA Summit - The National and International Conference on Groundwater

April 28 – May 2, 2013, San Antonio, TX, USA

The abstract submission deadline has passed, but registration is still open. Meeting information can be found at <http://groundwatersummit.org/>. The following list summarizes some of the karst sessions:

- Innovative Approaches for Investigating and Managing Karst Groundwater Resources
- Challenges in Characterizing and Modeling Karst Aquifer Systems
- Characterizing Biology with Water Quality in Karst: What Can It Tell Us About Aquifer Health

National Cave and Karst Management Symposium

The 20th National Cave and Karst Management Symposium (NCKMS) is now accepting abstracts for its next meeting, which will be held **November 4-8, 2013** at the National Cave and Karst Research Institute (NCKRI) in Carlsbad, New Mexico. For details about the conference, abstract submissions (due March 15, 2013), manuscript submission deadlines (June 1, 2013), and registration, go to <https://sites.google.com/site/nckms2013/home>.

Anyone needing financial assistance to attend NCKMS, especially students, are encouraged to apply for a George N. Huppert Scholarship. For information about the scholarship and how to apply, visit:

<http://nckms.org/scholar.shtml>

Summer 2013 Karst Field Studies Program

The **Hoffman Environmental Research Institute**, through its Center for Cave and Karst Studies and in cooperation with the Mammoth Cave International Center for Science and Learning and Western Kentucky University, announce the Summer 2013 Karst Field Studies Program. Courses this summer will include:

- Karst Geology, June 2-8, Dr. Art Palmer
- Karst Geophysics, June 9-15, Dr. Lewis Land
- Cave Photography, June 10-14, Dr. Dave Bunnell
- Karst Hydrology June 17-21, Drs. William White and Nicholas Crawford
- Cave Biology and Ecosystems, June 17-21, Dr. Dave Ashley

Courses may be taken for graduate, undergraduate, or continuing education credit. Courses may also be taken as non-credit workshops. For more information about the program, courses, how to register, and instructors, visit karstfieldstudies.com. While visiting the website be sure to also check out the 'Scholarships' tab for information about the Nick Crawford Karst Education Scholarship, a competitive award designed to offer financial assistance for attending a course. Questions should be directed to the Karst Field Studies Director, Dr. Leslie North, at leslie.north@wku.edu.

16th International Congress of Speleology

July 21 - 28, 2013, Brno, Czech Republic

Registration is still open. Early registration ends Jan. 31, 2013. Visit <http://www.speleo2013.com> for more details.