THE CONDUIT

Building understanding of karst through interdisciplinary action
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Welcome to The Conduit

This e-newsletter is distributed twice a year to over 700 karst enthusiasts globally. This double-issue combines all of 2014 activities, and upcoming events for 2015 and 2016. The 2015 Karst Award recipient is Dr. David Culver, and the 2015 Wilson Scholarship recipient will be announced March 14, 2015. Watch the KWI website and Facebook page for the announcement. The past conferences, meetings, and field trip reports span a range of topics and locations, which should excite everyone to participate in the upcoming KWI 2016 conference to be held in Puerto Rico. Finally, several summaries for research projects being conducted by Board members are highlighted. I hope you enjoy the stories for the past year, and find the research useful and interesting. As always, thank you for your continued support of KWI.

-- Annette Summers Engel

President’s Corner

January 6, 2015

The mission of KWI – KWI seeks to advance scientific knowledge of and increase awareness and appreciation for karst water systems for the scientific and general audience – continues to engage our volunteer past and present Board members and officers and associates. The activities of these individuals range from evaluating the impact of construction of a new Metro line in suburban Washington DC on cave life to studying the consequences for human health of contaminant chemicals in the limestone aquifers of Puerto Rico to presenting research on karst hydrology in numerous karst sessions at the Annual Meeting of the Geological Society of America held in October 2014 in Vancouver, British Columbia. We are an active community of scholars influencing the science and its practical applications.

And, we continue to grow! On behalf of KWI, I welcome two new Associates, Ingrid Padilla and Ellen Herman, to our karst community.

This year, I am on leave from my home institution of the University of Virginia while I serve as Program Director for Hydrologic Sciences at the National Science Foundation. I arrange for the evaluation of all research proposals submitted to the Hydrologic Sciences program and make the final decisions regarding which proposals to fund. The program receives about 200 proposals each year, and I have the opportunity to read the newest ideas in hydrology and contact a huge number of members of the scientific and engineering communities as I seek peer reviewers and panelists. We are currently able to fund about 10% of the proposals, so I say “No” a lot more often than I say “Yes” to hopeful investigators. The opportunity to help young investigators develop good strategies for writing successful proposals is my priority during my year of service at NSF. Of course, I would like to see more karst hydrology proposals submitted and funded, so please contact me while I am still here (through August 2015):

I am proud to serve as President of an organization that advances the knowledge of and communication about karst systems to peer scientists and to the general public. I look forward to 2015 and wish you all the best in the new year.

Janet S Herman

www.karstwaters.org
**KWI Happenings**

**Board Members meet in Houston, Texas**

The Spring Board meeting was held March 1, 2014, at the South County Community Center near The Woodlands, Texas, prior to the annual Awards banquet. Attendees were treated to local Texas BBQ at the home of Board member PJ Moore the evening before the meeting. The meeting started with welcoming everyone. After reviewing the agenda, issues discussed included Institute awards and organizational structure, reviewing the past conference in The Bahamas, discussing a ‘culture and karst’ conference being planned by Board members Dorothy Vesper and Bill Jones, and other potential conference and workshop topics. Reports and updates were given for the Wilson Scholarship fund, the Institute budget, the Awards banquet, and from the Communications department regarding the website and publications. Planning for the 25th anniversary in 2016 is underway.

The meeting finished in the early afternoon, before the Awards banquet started at Americas restaurant in The Woodlands. A group of about 20 enjoyed a fantastic spread of hors d’oeuvres, sides, and main dishes before the presentation given by Karst Award honoree, Dr. Bob Loucks. He spoke on the topic of “How Modern Karst Studies Lead to Understanding the Development and Burial Evolution of Paleokarst Reservoirs.” Also announced was the student recipient of the 2014 William L. Wilson Memorial Scholarship, Michael Markowski, from Texas State University.

The next Board meeting will be in the Washington D.C., area on March 14, 2015. The meeting will be followed by the Awards banquet honoring Dr. David Culver.

**Fall Institute meeting held in Vancouver, British Columbia, Canada**

The Fall Institute meeting was held October 19, 2014, beginning at the Vancouver Convention Center and then moving to a nearby bar (thank you for buying, Dorothy Vesper), then settling in at Forage, an absolutely outstanding restaurant devoted to sustainable dining (http://www.foragevancouver.com/) that Ira Sasowsky identified for the group. Although the gathering was smaller than in most years due to the location, the energy level was high.

As usual, the fall meeting is a brainstorming and planning meeting, and the excellent food, drink, and company fueled our discussions. Much of the discussion centered on ideas for upcoming meetings. The next meeting is in the works for January 2016 in Puerto Rico on “contaminants and karst” (see full article in this issue of The Conduit). Future topics under discussion include for meeting or workshops “culture and karst” and “ice and karst.” For any meeting to take shape, volunteer has to step forward and lead the effort.

Something for all of us to be considering is how to best commemorate the 25th Anniversary of KWI in the year 2016.
Karst Award Announcement for 2015, Dr. David Culver

The 2015 Karst Award honoree is Dr. David C. Culver. The banquet will be held March 14, 2015, at 6 p.m. at Dos Tequilas Grill, 525 East Market Street, Leesburg, VA. Dr. Culver will speak at the annual banquet. His presentation will be on the topic of “Why Study Cave Life?” The cost of dinner will be $60 per person. Reserve your seat(s) by March 6 by EITHER 1) Sending a check for $60 per person to Karst Waters Institute, PO Box 4142, Leesburg, VA 20177, OR 2) Entering reservations via Paypal (total cost $62.10 per person) at the www.karstwaters.org website.

Dr. Culver received his B.A. in Biology from Grinnell College (1966) and Ph.D. in Biology from Yale University (1970) with the dissertation titled Analysis of Simple Cave Communities. He began his academic career with an appointment as Assistant Professor of Biological Sciences at Northwestern University in 1971. His career advanced to the level of Full Professor of Ecology and Evolutionary Biology during his tenure at Northwestern that came to an end in 1987. Moving to American University in Washington, DC, in 1987, Culver joined the faculty of the Department of Biology and later led the formation of the Department of Environmental Science in 2008 where he now holds his faculty appointment. Culver has acted as Department Chair in Ecology and Evolutionary Biology at Northwestern and in Biology at American University, and he has been Associate Dean for Academic Affairs and Associate Dean for Science, both at American.

David Culver has conducted cutting-edge research on cave life and published “the” book on that topic: Cave Life (1982, Harvard Univ. Press). His work on biological diversity in cave communities resulted in new concepts of the biogeography of subterranean life. Culver advanced theories about species evolution subsequent to organism isolation in caves that revolutionized our understanding of biogeography. Detailed studies of predation and competition, feeding behaviors, and morphological changes in cave organisms all connected to his insights into evolutionary theory. Sustained efforts to identify and fully describe new species in locations around the world added to his comprehensive study of cave life. Connectivity to the surface environment or among caves added to the complexity of his maturing understanding of cave life and its various adaptations. Culver developed tools to access sampling gaps and quantify species richness that added rigor to studies of cave life. His work on biodiversity and available habitat speaks to issues in species conservation and cave protection.


Culver is a leader in the karst community. He led the creation of the Karst Waters Institute in 1991. Culver has served KWI as a member of the Board of Directors, Executive Vice-President, and President of KWI. He is currently the KWI Comptroller. Culver is a National Speleological Society Honorary Life Member and Fellow. He has served on the Board of Directors for the Cave Conservancy Foundation and is a member of the Virginia Cave Board.

The science of cave and karst studies would not be where it is today without Culver’s many contributions. Our understanding of cave life derives directly from his life’s work.

KWI sponsor for GSA conference sessions in 2014

Karst science was reported at the Annual Meeting of the Geological Society of America, October 19-22, 2014, in Vancouver, British Columbia. There were several theme sessions, some of which were co-sponsored by KWI. These theme sessions did not relate to caves and karst and karst waters, however, but instead focused on hydrogeology, geomorphology, engineering geology, geochemistry, and environmental geology. One session, “Enhancing the Toolkit for Karst Investigations,” was convened by Douglas Gouzie, Matthew D. Covington (KWI Board member), Joseph Myre, and was co-sponsored by KWI, GSA Hydrogeology Division, GSA Geophysics Division, and the National Cave and Karst Research Institute. Other sessions included, “Karst Systems and Processes in Mountainous and Alpine Terrain,” “Speleothem Records of Climate Change in North America, and “Carbonate Reservoirs—Characterization, Geochemical Modeling, and Case Studies.” Details can be found at the GSA website for past conferences, http://www.geosociety.org.
2014 William L. Wilson Scholarship Recipient

Michael Markowski is working on his M.S. in Aquatic Resources at Texas State University in San Marcos, Texas. He received his B.S. from The University of Texas in Austin were he got his formal start in hydrogeology studying groundwater-surface water interactions in alluvial systems. Now at Texas State he is working in a karst system located at the southern extent of the Trinity Aquifer called Cave Without A Name. Here he is trying to gain a better understanding of infiltration and recharge processes controlling movement of rapidly recharged water and sediment and nutrient load through the larger Trinity Aquifer system. Furthermore he hopes research will be useful in guiding a sound ecological and hydrological management of the Trinity Aquifer and similar systems.

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. To stimulate the development of new, energetic, motivated, and creative karst scientists, and to remember Bill Wilson and his dedication to karst science, the scholarship has been established in his memory. The scholarship is a one-time award is $1,000.

Final Report – “Hypogene Cave Morphologies” Conference

This conference was held on the island of San Salvador, Bahamas, from February 2 to 7, 2014. KWI was the primary sponsor, and the International Speleological Union, Commission on Karst Hydrogeology and Speleogenesis was a secondary sponsor. John Mylroie, Alexander Klimchouk, and Ira Sasowsky were the conveners. Unfortunately, Dr. Klimchouk was unable to be present at the meeting due to administrative issues. In keeping with the tradition of prior KWI meetings, the goal was creative interactions between engaged researchers. The main thematic activities were to examine and discuss the unique cave morphologies and speleogens associated with hypogene caves, from the scale of 100 km+ cave maps down to centimeter size 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 models of dissolution drive in hypogene settings? Do flank margin caves fall in the hypogene flow environment?

Thirty-one participants from 13 countries contributed, and there were 31 presentations. Participants stayed with room and board at the Gerace Field Station. Many participants took part in an optional pre-conference trip to Eleuthera, which visited 2 exceptional sites: Ten Bay Cave and Hatchet Bay Cave. The formal meeting began Sunday evening with keynote addresses by Art Palmer and John Mylroie. Monday was an all day geology field trip led by John & Joan Mylroie. In the evening, two lectures and the posters were presented with a social hour. On Tuesday, a full day karst trip of the island was followed by 3 talks and social hour. Wednesday had a morning trip to Lighthouse Cave, with the afternoon and evening given to lectures.

The meeting concluded that evening with a rum-punch social, and a wonderful talk about fossil assemblages in blue holes by Nancy Albury.

Published proceedings (SP 18) are available on the KWI website.
New KWI Associates

---Submitted by Janet Herman (University of Virginia, National Science Foundation)

There are many ways to participate in KWI to advance its mission. Regardless of the role a participant in KWI plays, there is one certain fact – all effort is made by a volunteer. Some volunteers are serving critical functions in KWI activities yet do no hold titles as Board members or Officers. In recognition of particularly important or timely contributions, the President of KWI can make short-term appointments of Associates. Our two new Associates as of January 1, 2015, have been appointed for three-year terms. In both cases, these karst scientists have been active in developing the plan for an upcoming KWI Conference to be focused on the intersection of karst hydrology, groundwater contamination, and human health.

Dr. Ingrid Y. Padilla is a full professor in Environmental and Water Resources Engineering in the Department of Civil Engineering and Surveying and the Director of the Environmental Engineering Laboratory (EEL) at the University of Puerto Rico, Mayagüez. Before this, she led the groundwater office at Greg Morris and Associates (1999-2001) and directed several hydrologic investigations while working with the U.S. Geological Survey (1988-1992). Dr. Padilla’s expertise is in contaminant and subsurface hydrology. She directed laboratory, field-scale, and modeling investigations of karst systems in the academic, government, and private sectors. Her work in karst groundwater systems includes flow modeling of the karst system of northern Puerto Rico, aquifer testing, hydraulic characterization, water quality sampling, and monitoring, spatio-temporal assessment and potential exposure of legacy and emerging contaminants, and characterization and quantification of fate and transport processes. Her current work integrates multidisciplinary efforts to assess contaminant exposure and public health impacts in karst regions. Dr. Padilla has served on several review panels for the National Science Foundation and the National Research Council. She received numerous awards, including: Distinguished Professor in Civil Engineering; Innovative Woman in Engineering Education; and Ford Foundation Fellowship. She presented her work in many local, regional, and national conferences and has published in distinguished journals and proceedings.

Dr. Ellen K. Herman is an Associate Professor in the Department of Geology at Bucknell University in Lewisburg, PA. Ellen joined the faculty of Bucknell in 2006 after graduate work in karst hydrology with Dr. William B. White at Penn State University. Her work focuses on karst spring and cave systems in the Appalachians with particular emphasis on sediment transport and storm flow behavior. She works with a variety of professional collaborators as well as undergraduate students to consider theoretical and applied problems in karst hydrology. In addition to other on-going projects, she and her students will be working over the next 3 years with Dr. Laura Toran of Temple University and her graduate students on an NSF-funded study to re-visit the 1971 “Shuster and White “classic springs using continuous logging and finely spaced storm sampling to develop a robust classification system.

Retirement News – Dr. John Mylroie

---Submitted by Annette S. Engel (University of Tennessee)

In December, 2014, former KWI board member, Institute officer, and conference organizer, Dr. Mylroie sent me greetings from Cayman Brac, where he and his wife Joan were doing field work. John shared two news-worthy items with me. We all wish him a happy and long retirement! 1) He officially retired from Mississippi State University, as of Dec 31, 2014. His last official act was to hood his final PhD student (Athena Owen Nagel) at graduation. 2) Springer Verlag is producing a karst book series. He will be writing a book on glaciated karst in the NE USA with his former MSc student Max Cooper (now a PhD student with Matt Covington at the University of Arkansas). Others are writing books for the series, so we should all be aware of the upcoming books.
“Karst, Groundwater Contamination & Public Health: Moving Beyond Case Studies”

This KWl conference will bring together karst and public health scientists, regulators, and community groups to consider overlapping topics of concern. Public health concerns for karst systems stem from the ease of introducing contaminants, the ubiquity of karst terrains worldwide, and pervasive use of karst water as a drinking water source. The primary objective of the conference is to develop a systematic framework for the study of problems connecting public health to contaminant transport in karst groundwater with the following specific aims: (1) bring together experts from both fields for cross-fertilization; (2) develop a conceptual framework for how contaminants are transported in karst; (3) identify particular adverse public health outcomes and prevention strategies resulting from rapid and long-term exposure relating to karst; and (4) communicate the meeting outcomes to the scientific community and general public.

The conference will take place in January 2016 in San Juan, Puerto Rico. Invited speakers will include specialists in the karst geology of Puerto Rico, current water-related public health issues in Puerto Rico, tools for investigating contaminant transport, and human health risks in karst terrains. There will be a mid-meeting field trip to see the San Juan Estuary Program and a longer post-meeting trip to the karst of Puerto Rico.

The conference will be co-sponsored by the Puerto Rico Test Site for Exploring Contamination Threats (PROTECT) project of the Superfund Research Program (SRP) of the National Institute of Environmental Health Sciences (NIEHS). The planning committee includes KWl officers, directors and associates plus public health specialists from the University of Michigan and United States Environmental Protection Agency.

The organizing committee members are:
Dorothy Vesper, West Virginia University
Ellen Herman, Bucknell University
Will White, Pennsylvania State University
Bill Jones, Karst Waters Institute
Janet Herman, University of Virginia
Ingrid Padilla, University of Puerto Rico-Mayaguez
John Meeker, University of Michigan
Marian Rutigliano, U.S. Environmental Protection Agency

For more information contact Dorothy Vesper (Dorothy.Vesper@mail.wvu.edu)

Conference Website
http://karstwaters.org/conferences/KGCPH.htm
Research Focus – Karst Investigations in Illinois

Karst groundwater contaminants in western Illinois. A study of groundwater contaminants in the Salem Plateau karst area of southwestern Illinois was completed in 2014 by researchers at the University of Illinois (Steven J. Taylor, Walton Kelly, Samuel Panno, Robert Weck, Wei Zheng, Ya Zhang, and Wen-Tso Liu). Through a grant from the National Great Rivers Research and Education Center, the team documented pharmaceuticals and personal care product contaminant levels, and determined sources of fecal contamination. The team is expanding studies through 2015, with additional funding through the Prairie Research Institute (University of Illinois) Matching Research Awards Program. A link for the final report is at: https://www.ideals.illinois.edu/handle/2142/50295.


Threats analysis and conservation actions for the Illinois Cave Amphipod. Threats to the Illinois Cave Amphipod (Gammarus acherondytes), restricted to the Salem Plateau karst of SW Illinois and listed as endangered by the US Fish & Wildlife Service, are being studied with funding from the Illinois Department of Natural Resources. The University of Illinois research team (Steven J. Taylor, Matthew L. Niemiller, and Scott D. Cinel) will use an expert opinion survey to conduct a threats analysis to gauge threats through expert elicitation. Guided by the findings of this survey, high priority conservation actions will be developed to help guide management by state and federal agencies.

Research Report – Storm Response Study, West Virginia

Preliminary Report on a Storm Response Study of the Muddy Creek Basin, Greenbrier County, West Virginia

Background
The Cave Conservancy of the Virginias (CCV) has provided grant funding to the Karst Waters Institute for a hydrology study of the Sinking Creek/Muddy Creek drainage basin in Greenbrier County, West Virginia. The goals of this study include:
• Quantifying the flow rates at the resurgences.
• Determining the discharge thresholds for the shifting of flow from Piercys Mill Cave to Piercys Cave.
• Study the filling and emptying of “Interstate Lake” and determine travel times for the system under different flow conditions.

Muddy Creek represents the resurgence of Sinking and Hughart Creeks with a catchment of about 40 square miles in central Greenbrier County. Most (probably all) of the water discharges from Piercys Mill Cave (the head of Muddy Creek) under low-flow conditions. With rising water levels a threshold appears to be reached and the excess water is shunted to Piercys Cave and the flow from Piercys Mill Cave does not exceed maximum value. The combined flow of Sinking and Hughart Creeks appears in a large karst window just south of I-64. This karst window floods, often for a month or more, during high water and is locally known as “Interstate Lake.” The straight-line distance from Sinking Creek to Piercys Mill Cave is about 2.5 miles and a low-flow tracer test reported by Jones (1997) showed a travel time of less than 24 hours.

Figure 1. Hydrograph showing water levels normalized to Interstate Lake.
**Summary of results to date**

Staff gages and water-level loggers were established at five locations in late December 2013, along with a tipping-bucket rain gage at Piercys Mill. These recorded six large storm events to date. Rating curves to convert stage to discharge were prepared for Piercys Mill Cave and Piercys Cave. The stage-discharge relation for the sinking creeks and Interstate Lake were undefined due to back flooding at the gaging points. Water levels and discharge for the five months of record ranged between:

1. Sinking Creek  
   - <0 to 23 feet  
   - Back flooding, no discharge data
2. Hughart Creek  
   - <0 to 20 feet  
   - Back flooding, no discharge data
3. Interstate Lake  
   - <0 to 45 feet  
   - Back flooding, no discharge data
4. Piercys Mill Cave  
   - 0 to 2.5 feet, discharge at 7 to 200 cubic feet per second (cfs)
5. Piercys Cave  
   - 0 to 4.8 feet, discharge at 0.3 to 90 cfs

The reported 0 stages are the result of the data logger being above the low flow water levels at the measuring stations. None of the streams were observed to actually be dry during the study to date. The flow threshold at Piercys Mill Cave to initiate transfer of water to Piercys Cave is about 90 cfs, although there is considerable variance depending on the discharge levels at the start of the storm.

Two quantitative tracer tests have been conducted as part of this study. The first at medium flow levels yielded travel times from Sinking Creek to Piercys Mill Cave of about 15 hours, and 28 hours to the concentration peak at Piercys Cave. This was the first test to recover dye at Piercys Cave in addition to Piercys Mill Cave. The second test was done at extremely low flow levels and dye was injected in both Sinking and Hughart Creeks. Recovery was only at Piercys Mill with travel times to peak of 85 hours from Sinking Creek and 130 hours from Hughart Creek.

An example of the storm response of the various components of the system is shown from the third storm event (Figure 1). The hydrograph for Interstate Lake is very unusual and illustrates the slow flooding and emptying of this large karst window. The flow at Piercys Mill Cave plateaus early in the event before Sinking Creek reaches a maximum and flows in a restricted range until emptying is well underway at Interstate Lake. The flow at Piercys Cave may be more directly connected to Sinking Creek than to the levels in Interstate Lake. Additional data from this winter should make this clearer.

Air photos were taken during lower flow levels but do show the sinks, springs, and karst window (Figures 2 – 4).
**KWI Members Visit Cuba – Cave Investigations in Cuba**

Submitted by William White (Penn State University)

Something like 60% of Cuba is limestone of various ages from Jurassic to Pleistocene with an equally great diversity of caves and karst. Few American have seen these caves due to the embargo that the US placed on travel to Cuba after the revolution of 1958. There was an aborted expedition by Nittany Grotto in late 1958 where the arriving cavers were ordered out by the collapsing Batista government. There was a successful National Speleological Society (NSS) expedition in 1999 (see NSS News, October 1999, vol. 57, 300-302) when seven cavers were invited to Cuba by the Cuban government. They succeeded in extensive exploration of five caves, mostly in Pinar del Rio Province.

The December 5-16, 2014, excursion, arranged through the Eco Cuba Network, was organized by Dwight and Mary Deal with the cooperation of the Sociedad Espeleológica de Cuba, The Antonio Núñez Jiménez Foundation for Nature and Humanity, the Cuban Institute for Friendship with the People, and the Cuban tourist bureau, AMISTUR. It was the largest American post-revolution caving expedition to Cuba. Twenty six of us, including Bet and I and Harvey and Kathy DuChene, convened in Cancun, Mexico on December 4 and the next day, Cuban visa and a U.S. Treasury Department License in our pockets, we boarded Cuban Airlines and were off to Havana.

The next day, our first stop was the Antonio Núñez Jiménez Foundation for Nature and Humanity (Fig. 1). Núñez founded the Cuban Speleological Society in 1940 when he would have been about 17 years old and remained its guiding light until his death in 1998. Núñez was a geographer and a brilliant scholar who wrote something in excess of 40 books. One of the first was *Geography of Cuba* which said some unkind things about the government, the wealthy landowners, and the treatment of people living in the countryside. For this the government burned his books and tossed Núñez in prison. When he resurfaced, it was as a close advisor to Fidel Castro where his knowledge of the countryside and the caves was invaluable to the success of the revolution. Today, his Foundation is housed in Havana with a museum and an extensive library of books and documents (Fig. 2).

On December 7, our bus rolled westward to Pinar del Rio Province where we set up in La Ermita Hotel directly across the Viñales Valley from the Sierra de los Organos (Fig. 3). The Sierra de los Organos is one of the type localities for cone and tower karst, first investigated by the German karst geomorphologist, Herbert Lehmann in the early 1950s. The limestones have extensive vertical fractures, destabilizing the slopes and resulting in the near-vertical mogotes. Several large streams flowing on the clastics of the valley floor sink at the edge of the mountains and reappear on the western side. The result is a group of large caves, some long enough to make the list of the Long Caves of the World. Below, the 1st column is their place on the World List and the final column is surveyed length in km:

<table>
<thead>
<tr>
<th>World List of Long Caves</th>
<th>Cave</th>
<th>Kilometers Surveyed</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>Gran Caverna de Palmarito</td>
<td>54</td>
</tr>
<tr>
<td>71</td>
<td>Gran Caverna de Santo Tomas</td>
<td>46</td>
</tr>
<tr>
<td>96</td>
<td>Sistema de Pan de Azucar</td>
<td>38</td>
</tr>
<tr>
<td>116</td>
<td>Cueva Majaguas-Cantera</td>
<td>34</td>
</tr>
<tr>
<td>170</td>
<td>Gran Sistema Cavernario Fuentes</td>
<td>26</td>
</tr>
<tr>
<td>171</td>
<td>Sistema Cavernario de los Perdidos</td>
<td>26</td>
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</tbody>
</table>

The National School of Speleology, founded by Antonio Núñez Jiménez, is located at the base of a mogote, just a short walk from several entrances to the Gran Caverna de Santo Tomás (Fig. 4). The school is for training cave guides for the show section of Santo Tomás and also for training cave explorers anywhere in the country. It covers both classroom work in speleology and also practical exploration such as single rope techniques. We visited the school, had lunch there, and visited Caverna de Santo Tomás. Some elected to traverse only a few hundred meters of walking passages. Others plunged much deeper which required wading chest-deep water and coming out of the cave soaked and muddy. Santo Tomás, like most of the other caves in the Sierra de los Organos is a tiered cave with seven levels between the highest and the active stream. No dating appears to have been done, but the cave contains a very long record of the gradual erosion and denudation of the mountains.

Cueva Majaguas-Cantera is considerably west of Viñales and the road showed the effect of Cuba’s crumbling infrastructure. Bridges were rusty, some bridge decks were only a layer of planks, and some were so unsafe that a cutaround was constructed to ford the stream beside the bridge. The entrances to the cave are located at the base of the mountain about a mile from the road. A water entrance (Fig. 5), a large shelter entrance (Fig. 6) and several other entrances are clustered...
Continuation, Cave Investigations in Cuba

Figure 3. View of the Sierra de los Organos. These are heavily folded and faulted Jurassic limestones with intermediate valleys underlain by Jurassic clastics.

Figure 4. One of the many entrances to Gran Caverna de Santo Tomás.

Figure 5. Cueva Majaguas-Contera: The water entrance.

Figure 6. Cueva Majaguas-Contera: The shelter entrance

Figure 7. Cueva Majaguas-Contera: The Cueva Dos Anna’s entrance.

Figure 8. Monument to the Malagon.

together. After lunch in the shelter entrance, we hiked around the corner and scrambled first into a large chamber ending in a collapse, and then around another corner to the La Cueva Dos Anna’s entrance to the system (Fig. 7). As before, some went a few hundred meters while the hard core pressed on. Those who had turned around left the cave and hiked back to the bus and waited. And waited. And waited. Eventually the hard core returned and we reached the hotel about dark.

Wednesday, December 10, began with a visit to the memorial of the Malagon, a troop of guerrilla fighters that scored a decisive victory against the federal forces during the revolution (Fig. 8). Then, it was on to the Speleology School to drop off the hard core for a long trip into Santo Tomás. Most of us rode the bus back to the San Vincenté Valley, a valley enclosed within the mountains except for a narrow gorge at the entrance. Lehmann described the San Vincenté Valley as a polje although it would have to be a breached polje since the valley has an exit. Much of the interior has been made into a park with a museum, a gift shop, a show cave with a boat ride, and a large cave chamber (Cueva de Viñales) refitted as a nightclub. (Fig. 9) Then we waited a while in the city square of Viñales until the hard core returned from Santo Tomas. The final event of the day was a spectacular lunch and tour at an organic farm, the Finca Agricultural Wilfredo, including a demonstration of how tobacco is rolled into Cuban cigars.

Thursday, December 11 wedrove to Havana, visited the headquarters of the Havana Speleological Society, and then traveled east to Matanzas Province where we checked in to the Meliá Varadero Hotel. (Fig. 10) Cuba has been rapidly developing its tourist industry as a mean of obtaining foreign capital since the fall of their old patron, the Soviet Union. The tourist industry is doing great with luxury hotels crowded with Canadians, Germans, French, and other Europeans. Just no Americans.

Cueva de Bellamar, the oldest show cave in Cuba, is located on a ridge above Matanzas. The entrance shaft has a very nice building over it so that the tour of the show cave begins with descending about 90 meters on steep slippery steps. We were taken on a loop off the show cave route that involved scrambling over some breakdown. Like most Cuban Caves, Cueva de Bellamar is well decorated, but in addition it contains thick coatings of scalenohedral calcite on many surfaces. Whether the crystal coatings are the result of formation below a high water level or whether they imply a hydrothermal component to the cave development is unknown. Much of the ridge top overlying Cueva de Bellamar is an ecological preserve. We had lunch at Jardines de Bellamar, a permaculture farm that is part of the preserve.
Continuation, Cave Investigations in Cuba

Saturday, December 13, was the last day of caving. Cueva Santa Catalina is under a low ridge about a mile south of the coast road. A hike along a trail through the brush across the coastal plain brings one to a low escarpment, quite possible an old sea cliff. A few hundred meters on a rugged trail over highly karsted limestone leads to a collapse entrance to the cave. Santa Catalina has all of the characteristics of an old flank margin cave – many irregular interconnected chambers that add up to some thousands of meters of passage. The cave is highly decorated with unusual “mushroom” stalagmites that indicate old water levels, certainly one of the more spectacular of the Cuban caves (Fig. 11).

Cueva Ambrosio is a small flank margin cave in a Pleistocene dune ridge on the Valadero Peninsula. It has a typical flank margin pattern of interconnected chamber and is almost completely devoid of speleothems. There are many circular skylights in the ceiling indicating that the rock over the cave is only a few feet thick. It purports to be a show cave, meaning that visitors can go in and wander around at their leisure.

Sunday, December 14, we packed up and returned to Havana. The next day we visited the old Hotel Nacional, were treated to a roaring ride around town in the old classic cars so famous in Cuba, had lunch at the studio of artist José Fuster (whose ceramic art rather boggles the mind) (Fig. 12), and had an extensive session with ICAP, the Cuban Institute for Friendship with the People. At the latter we, were treated to a long harangue on the necessity for freeing the Cuban Five and easing up restrictions imposed by the United States. The next day we flew back to Cancun and on December 17, while sitting at breakfast in our hotel, the TV flashed on the news of the President’s announcement of new relations with Cuba. I bet ICAP never expected such rapid results. Dwight and Mary Deal’s trip to Cuba was the largest and the only one in recent years. It is unlikely to be the last.

Update – new Karst Division, Geological Society of America

On Wednesday, October 22, 2014, the GSA Council approved an application for a Karst Division. Some of the rationale to support a new division for karst studies is well known to all of us. Karst terrain underlies ~25% of the global land surface, and an estimated 25% of people worldwide obtain water from karst. But, many people did not realize that karst research also spans a wide range of topics, including nearly all of the division subjects that GSA had previously recognized. KWI was involved with some of the early planning and getting petition signatures to obtain the recognition. Good job to all of those who stewarded the application through the system, and congratulations to all of us! It is nice to have our research area recognized by others. The upcoming 2015 meeting will undoubtedly include many sessions co-sponsored by the Karst Division.

Officers are as follows; contact them if you have any questions:

- Chair and JTPC representative: Cory BlackEagle, Earth and Environmental Science, University of Kentucky
- 1st Vice Chair: Bonnie Blackwell, Chemistry Department, Williams College
- 2nd Vice Chair: Jason Polk, Hoffman Environmental Research Institute, Western Kentucky University
- Secretary: Penny Boston, Earth and Environmental Science, New Mexico Tech
- Treasurer: Ben Tobin, National Park Service
- Webmaster: Pat Kambesis, Hoffman Environmental Research Institute, Western Kentucky University