



CANYONS & CAVES

A Newsletter from the Resources Stewardship & Science Division

Issue No. 28

Spring 2003



Springtime means flowers. These natives are bearded or shaggy stenandrium, *Stenandrium barbatum*. (NPS Photo by Tom Bemis)

Edited by Dale L. Pate
 Proofreading: Paula Bauer

RESOURCE NEWS

BIOLOGIST COMINGS AND GOINGS – After three years as our wildlife biologist, **Myra Barnes** has accepted a promotion to Team Leader for the Ecological Monitoring Program at Organ Pipe Cactus National Monument (Arizona). She EODs April 6. She will be sorely missed! **Anita Swanson** has joined us for the summer as a biotech to monitor bird nesting at Rattlesnake Springs. **Donna Laing** will also be here soon as a seasonal biotech to help us with all our summer work. Anita most recently worked at Guadalupe Mountains NP (and lives there with hubby Dan of the fire crew). Donna is from Arizona and worked last summer in the Tonto National Forest in wildlife monitoring, especially Mexican spotted owls and goshawks.

THANKS AND ADIOS to Shane Fryer. Shane volunteered in the Cave Resources Office for a couple of months and helped accomplish a number of tasks.

CONDOLENCES – Our condolences to the family of **Noble Stidham, Jr.** who passed away on March 1. Noble was a member of the Lubbock Area Grotto and volunteered many hours during the 1980's and 90's documenting and restoring park caves.

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Look for Issues of *Canyons & Caves* at the following websites:
<http://www.nps.gov/cave/pub-pdf.htm> Thanks to Kelly Thomas and Bridget Eisefeldt all issues can be downloaded as a PDF file from the park website.
<http://www.caver.net/> Once there, go to the Canyons & Caves icon. Bill Bentley has placed all issues on his personal website and can also be downloaded as PDF files.

Park Address: 3225 National Parks Highway, Carlsbad, New Mexico 88220

NEW CAVES – Three new small caves have been surveyed in the backcountry bringing the total number of documented caves in the park to 105.

NEW RAILINGS IN LEFT-HAND TUNNEL – Thanks goes to **Donn Allen**, park carpenter, for recently installing some additional handrails on wooden structures in Left-Hand Tunnel, Carlsbad Cavern. These railings were of non-treated wood and are temporary fixes for some safety issues. Long-term goals are to replace all the structures in Left-Hand Tunnel with materials that will not corrode or, in some cases, remove the structure entirely.



New railings have recently been installed on existing wooden structures in Left-Hand Tunnel. (NPS Photo by Tom Bemis)

CARLSBAD CAVERNS NATIONAL PARK A WORLD HERITAGE SITE

by Dale L. Pate

What do the Tower of London in England, the Archeological Site of Troy in Turkey, Mount Kenya National Park in Kenya, the Acropolis of Athens in Greece, and the Great Barrier Reef in Australia have in common with Carlsbad Caverns National Park? All have been awarded the designation as World Heritage Sites. Similar to winning a Nobel Prize or an Oscar, World Heritage Sites are recognized as extraordinary places that are important in a world context. At the present time, there are 730 sites worldwide that have received this special recognition. This special recognition has been extended to 20 sites within the United States. This list includes a number of National Park sites such as the Statue of Liberty, Yellowstone, Mesa Verde, Grand Canyon, Yosemite, Hawaii Volcanoes and a number of others including Carlsbad Caverns.

In a move to help protect cultural and natural treasures worldwide, the United States, during the Nixon administration (1972), introduced the concept of the World Heritage Convention. Placed under the United Nations Educational, Scientific and Cultural Organization (UNESCO), this Convention has become “the most widely accepted international conservation treaty in human history.” The United States was the first country to ratify this treaty and by 1997, nearly 150 nations had joined in this worldwide

conservation effort. Nations voluntarily nominate sites within their own nation to the World Heritage Convention to become a World Heritage Site. A committee composed of 21 nations that have ratified the Convention reviews these nominations and designates sites. A nation whose site receives this special designation does not give up sovereignty or control over that site.



Found on the Visitor Center near the main doors, the plaque heralding Carlsbad Caverns National Park as a World Heritage Site. (NPS Photo by Tom Bemis)

There are two types of properties, cultural and natural, that can be nominated for designation as World Heritage Sites and there are established criteria that these properties must meet in order to define their “outstanding universal value.”

In 1994, the Department of the Interior for the United States nominated Carlsbad Caverns National Park to become a World Heritage Site. From the nineteenth session of the World Heritage Committee held in Berlin, Germany in December 1995, the report stated:

The Committee inscribed the nominated property (Carlsbad Caverns National Park) on the basis of criteria (i) and (iii), considering that the site is of outstanding universal value with exceptional geological features, unique reef and rock formations, and containing major cave formations, gypsum chandelier speleothems, aragonite ‘christmas trees’ and hydromagnesite balloons. The committee also wished to encourage the authorities in their efforts to establish a cave protection zone to the north of the park.

Criteria (i) states: *Sites nominated should be outstanding examples representing major stages of earth’s history, including the record of life, significant on-going geological processes in the development of land forms, or significant geomorphic or physiographic features.*

Criteria (iii) states: *Sites nominated should contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.*



Superlative natural phenomena - gypsum chandeliers in Lechuguilla Cave. (NPS Photo by Dave Bunnell)

Events leading up to the nomination of Carlsbad Caverns National Park as a World Heritage Site included oil and gas leasing and drilling on the northern boundary of the park that could threaten Lechuguilla Cave and even Carlsbad Cavern. By the time the World Heritage Committee inscribed the park as a site in December 1995, the Lechuguilla Cave Protection Act of 1993 had been signed into law by President Clinton. In general, this act established a Cave Protection Zone north of the park and allowed existing producing wells to continue, but did not allow any new wells to be drilled.

What does the inscription of Carlsbad Caverns National Park as a World Heritage Site do for the park and the community? It recognizes that the resources of the park are of outstanding world value. This is a recognition to be proud of and one that will bring more visitors from all over the world; thus, adding to the economic base of the community. There are no hidden agendas in this designation, only the international recognition that Eddy County, New Mexico contains one the great natural wonders of the world.

CARLSBAD CAVERNS NATIONAL PARK A HOTSPOT FOR DRAGONFLY ENTHUSIASTS?

by Paula Bauer

Petaltails, Darners, Clubtails, Spiketails, Cruisers, Emeralds and Skimmers. Quite an exotic-sounding list, but did you recognize them as dragonfly names, particularly as the Family names? Would you know a *cruiser* from a *skimmer*? Would you be surprised to find that the visitors scouting the plants with binoculars were looking for dragonflies, not birds?



A Filigree Skimmer (*Pseudoleon superbus*). Used with permission. © Dustin Huntington www.imunu.com

Most people pay little attention to these common creatures. Perhaps we recognize their general dragonfly shape – in fact dragonflies are very popular these days as a decorative motif. People seem to slide them into the same slot as butterflies – they're harmless and pretty. They don't sting and have an insignificant bite. Possibly we know that they are usually found near water. Perhaps we puzzle over the presence of a water-loving insect located in a desert. Still, we often dismiss them as just one more flying insect buzzing by. I admit that that is what I did, until I found myself on the edge of *swarm* of dragonflies.

Last fall I was working near the natural entrance of Carlsbad Cavern when I noticed hundreds, possibly thousands, of dragonflies whizzing, darting and diving about. I had never seen such a concentration of them. What was going on? They took no interest in me but seemed focused on the desert willow nearby. Were they attracted to the flowers? The next day they were gone. What happened? I wondered. In my search for answers, I began a voyage of discovery into the world of these intriguing insectivores.

Odonata, Odonatists, Odonates

One of my unexpected discoveries was the passion and dedication that a segment of the worldwide population feels about the Order Odonata—dragonflies and damselflies. Just as birders have their societies, websites, frequent bird counts and

fanatically kept “life lists,” odonatists have dragonfly organizations, websites, recurring population counts, and zealously tracked numbers of species they find.



An Eastern Ringtail Dragonfly (*Erpetogomphus designatus*). Used with permission © Dustin Huntington www.imunu.com

As stated earlier, most people could easily recognize a dragonfly or damselfly by its long, slender abdomen, tiny antennae, three pairs of legs and two pairs of drawn out, clear, many-veined wings. For identification, enthusiasts and researchers note numerous qualities including the insect’s flight pattern, time of activity, choice of perch, perch posture and position, habitat and if they are lucky enough to observe it closely at rest, its body shape, color pattern, eye spacing and wing pattern. David McShaffrey from Marietta College in Ohio states that in some cases the only way to positively identify the species is by thorough examination of the insect under a microscope. Perhaps some of the attraction odonatists feel is the adventure of the hunt and the thrill of successfully identifying and recording an illusive species.



A Blue Dasher (*Pachydiplax longipennis*). Used with permission. © Dustin Huntington www.imunu.com

Across North America, there are more than 300 species of odonates, another term for the insects themselves. New

Mexico is home to 138 species of dragonflies and damselflies, with Carlsbad Caverns National Park protecting 63 known species. Many of these statistics were provided by Robert Larsen, who is working with Dr. John Abbot of the University of Texas on the distribution of odonates in New Mexico and is in his sixth year of a voluntary Odonata Survey of Bitter Lake National Wildlife Refuge near Roswell. Through his network of dragonfly enthusiasts and surveyors, he provided an interesting comparison. The total number of dragonfly and damselfly species found so far in Everglades National Park is 59. Larsen states, “One would not expect CCNP with its few, isolated springs and dry, intermittent streams to show greater diversity with its 63 species than the Florida Everglades; all very amazing.”

In the Life of a Dragonfly

While this surprising variety caught my attention, it was the dragonfly’s unusual life cycle and behavior that most intrigued me. I thought I knew the life process from my understanding of basic invertebrate biology—egg, larvae, and winged adult. However, each stage of development has its own remarkable details.



A Checkered Setwing (*Dythemis fugax*). Used with permission. © Dustin Huntington www.imunu.com

Certainly the process begins with eggs laid in or near water. Most hatch in about 10 days, although those in temporary pools may hatch in 5 days and those species that must survive a cold or dry season may hatch after several months. Upon hatching, they begin their lives as voracious predators, as larvae often called nymphs. Sidney Dunkle’s book, *Dragonflies through Binoculars A Field Guide to Dragonflies of North America*, contains a concise and compelling natural history, a lengthy list of species accounts, and beautiful color photographs. Dunkle notes that they “are usually the top carnivores in freshwater habitats without fish.” One decidedly odd trait about nymphs is that their gills are located inside of their rectal chamber, so they breathe through their anus. This air exchange also provides a means of mobility. This larval stage may last about one month or up to eight years. Following numerous molts, the nymph reaches a point when it will transform into an adult and will not eat for a few days before the transformation. When the moment of emergence is

near, the nymph climbs out of the water and securely fastens itself to a support. It then draws in air, which splits the larval skin, slowly rising out of its shell. Its legs harden then the wings inflate. It rests until dawn as a soft, pale and vulnerable ghost of its future self. Throughout the emergence process the insect could easily die if knocked from its perch, even by a gust of wind or a wake from a boat. With the sun, it is usually strong enough to rise for its first flight. Dunkle asserts, "The dragonfly is now fully grown. Little winged dragonflies do not grow into big winged dragonflies."

The adult-sized dragonfly may not yet be fully sexually mature. Full maturity may take a week to a month and is dependent on species, temperature, and food supply. Adult dragonfly life consists of preying on insects, finding a mate and reproducing, perhaps defending a territory and avoiding getting eaten by its many predators, such as frogs, flycatchers, spiders, falcons and even other dragonflies. Dragonflies also have to deal with pesky parasites, like certain mites and biting gnats. Where the feeding is good, dragonflies may swarm, which is probably the behavior I observed at the cave's entrance. A few species are also known to swarm for migration although little is understood about this activity and is being actively studied in many places in the United States.

Dragonflies in Danger

There are many more fascinating details that I could share about the dragonfly lifecycle and behavior, but this is not the forum. Besides as soon as this is on paper, devoted odonatists will have gained new pieces of information. As with much of our natural world, people understand so little about dragonflies, often stumble on challenges and worry about what will be lost before we can discover or know more. For example, it is difficult to chart the range of dragonfly species as they are subject to an ever-changing landscape—new ponds, lost wetlands, climatic changes. Sidney Dunkle warns, "About 15% of North American dragonfly species are at risk of extinction in the foreseeable future, at least outside of reserves." They are susceptible to the same hazards as many other forms of wildlife, habitat loss or change, pesticides, water containing sewage, industrial waste or excessive fertilizer or silt. Robert Larsen points out that many of North America's rarest species are found in the park. He goes on to state "50% of the species known for the park (Carlsbad Cavern NP) are species shared with the Neo-Tropical Region of Central and South America." Thus, the migrating birds and bats share the park with another wide-ranging animal.

Dragonfly Hot Spot

Can you tell the difference at a glance whether a bird is sparrow, a dove, or a hawk? Most people can because we see birds flitting around us daily and learn to recognize them in childhood. In many cases birds are part of our culture, symbolism or language. Yet, what I discovered through my research into Odonata is that dragonflies too deserve some attention. Perhaps they lack a bird's lilting song, but they still have a variety of habits, colors, and mysteries worth watching and investigating. Scientists can occasionally read the health of a wetland by the diversity and abundance of dragonfly

species. With Carlsbad Caverns NP, particularly Rattlesnake Springs, being an example of healthy riparian dragonfly habitat, perhaps I should not be surprised that it is "a hot spot for dragonfly enthusiasts." One thing I'm reminded of frequently while working here is that this National Park is full of wonderful surprises.

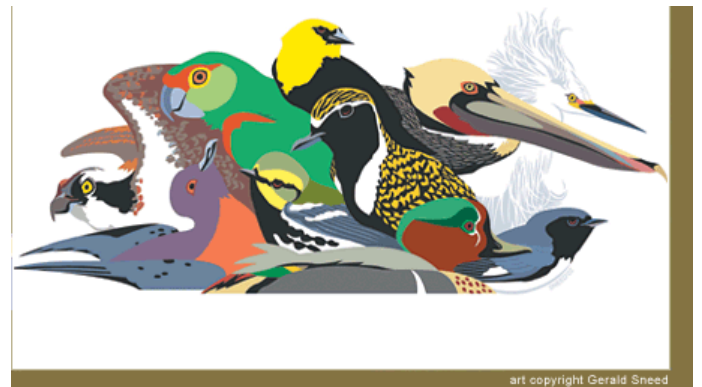
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INTERNATIONAL MIGRATORY BIRD DAY HONORS BIRDS AS 'CATALYSTS FOR CONSERVATION'

by Renée West

Soon it'll be time again to celebrate the spring return of neotropical migratory birds. International Migratory Bird Day (IMBD) this year is Saturday, May 10. The Spring Bird Count is one of the activities open to any willing participants -- you don't have to be an expert. If you're interesting in finding out about the Eddy County count, contact count compiler, Bob Nieman, in Carlsbad at 505/628-3977. It can be lots of fun! (Stay tuned for announcements for other possible events in CCNP.)



Borrowed Artwork © Gerald Sneed.

IMBD began in 1993 to honor the enormous distances that many birds cover during their twice-a-year migrations—tens of thousands of miles for many species. The theme of this year's IMBD is "Birds—Catalysts for Conservation." It celebrates the fact that birds "have long inspired important conservation actions around the world. Many of these measures are far-reaching laws enacted by federal governments. Others are individual or group efforts that have

resulted in important changes in human attitudes and the management of wildlife and the environment.”¹

One significant conservation event being celebrated this year is the centennial of Theodore Roosevelt’s creation of the National Wildlife Refuge System. From one small refuge in 1903, the refuge system has grown to nearly 94 million acres.

The National Park Service is one of many co-sponsors of this year’s International Migratory Bird Day.

¹Website: www.BirdDay.org

A WEEK OF SEARCH AND RESCUE FEBRUARY 2003 *by Tom Bemis*

During the week of February 3, Carlsbad Caverns hosted thirteen students and instructors from Guadalupe Mountains National Park and Lincoln National Forest Guadalupe Ranger District, as well as from the Cavern for five days of high-angle rescue training. Instructors included personnel from the Cave Resources Offices at Carlsbad Caverns and Sequoia Kings Canyon National Park.

The weather held well for the first three days of classroom study, but then turned foul with cold winds for the day of cliff practice and winds and snow for the day of cave rescue practicals, giving students a taste of real-life rescue scenarios.



Students load Austen Carpenter into the litter. (NPS photo by Paul Burger)

During the course of training, students learned basic safety practices, communications, patient packaging and transport, as well as anchor selection, haul and lower system rigging, and resource impact mitigation. One full day was spent on personal rope skills and one-on-one rescues.

The excellent turnout from the forest service will greatly improve the multi-agency response capability for incidents within the Guadalupe Mountains.



Stan Allison rides an empty litter over the lip. (NPS photo by Paul Burger)



Inside Chimney Cave, anchors are prepared to direct the equipment away from delicate areas. (NPS photo by Tom Bemis)

LECHUGUILLA CAVE UPDATE *by Stan Allison*

The first trip into Lechuguilla Cave for 2003 was a survey, exploration, and inventory expedition to the Far East section. Peter Jones and Dan Legnini were the leaders of this January 11-17 expedition. Trip participants were: Dave Jones, Rich Sundquist, Kent Taylor and Charley Savvas. Most of their time was spent in fixing bad survey loop closures. A few climbs were done that led to small sections of passage. A return was made to the optimistically named “Other Side” passage discovered in October 2002. Unfortunately it proved not to be the other side and led to only a couple hundred feet of unexplored cave.



Paul Burger runs tests for coliform bacteria at Deep Secrets. (NPS Photo by Stan Allison)

A management trip was taken into the Western Borehole on January 22-24. Trip participants were Stan Allison (cave technician), Paul Burger (Park Hydrologist), Mike Wiles and Rene Ohms. Mike is the cave specialist and Rene is the assistant cave specialist at Jewel Cave National Monument. This trip provided a good opportunity for them to take a look at some of the cave management issues at Carlsbad Caverns National Park. The main purpose of this trip was to perform total coliform and fecal coliform tests of three pools that have been used for drinking water supplies in the Western Borehole. As the tests had to incubate in place for 48 hours we planned several rigging tasks as well as fixing some bad survey loops. Using an excellent quadrangle map produced by Hazel Barton we made our way through the Chandelier Graveyard to the King Solomon's Mine area where we resurveyed and fixed two bad survey loops. After finishing this task we explored and surveyed a lead Hazel had mentioned and found that it continued with airflow on the edge of known cave! Starting our survey at EQA7 we continued the survey to EQA43 where the airflow we were following slipped into a passage too small for humans. The first part of this survey was named "Dodge" in reference to Hazel's comment that the lead was supposed to be "dodgley, just perfect for Paul and I". The latter parts of the survey were in a gritty, vertical, body-tight passage that we named "The Hell out of Dodge". Several breezy leads remain in the King Solomon's Mine area and the area deserves more work in the future. Fortunately, all of the total and fecal coliform tests were negative.

March 7th was Shane Fryer's last day of volunteering for the Cave Resource Office (Thanks for all of the great work Shane!). Shane and Stan went into Lechuguilla with packs stuffed with 450 feet of new rope and bolting equipment. The purpose of this trip was to re-rig the top drop in Apricot Pit and replace ropes down to the traverse line more than half way down Apricot Pit. The top drop in Apricot Pit has been a chronic problem for cavers due to two very difficult lips that aggressively wore away at the ropes. In fact on this trip when we pulled the rope up we were surprised to see that the sheath of the kernmantel rope was cut, exposing the core of the rope! We placed a new rope on the drop and placed one expansion bolt for a deviation to bypass the first lip and then placed two expansion bolts for a rebelay to bypass the second lip. This change in rigging should serve to reduce the risks taken in negotiating Apricot Pit by 1) reducing the damage done to ropes by abrasion on the lips and 2) making it easier for cavers to negotiate the pit. As always, the expansion bolts, hangers, and maillons used were made of stainless steel to prevent the corrosion and subsequent loss of strength that occurs with aluminum and steel. We then replaced ropes down across the traverse line. Coming back out of the cave we realized that 450 feet of dirty, wet ropes are much heavier than 450 feet of clean, dry new ropes.

Survey, exploration, and inventory expeditions for Lechuguilla Cave in 2003 have been selected. The following expeditions have been approved:

Joe Sumner: 4-person trip to do quad map work in Underground Atlanta.

Hazel Barton: 9-person trip to do work on Chandelier Graveyard quad.

Art Fortini: 4-person trip (original discovery team) to survey and explore the Nativity Chamber and perhaps beyond.

John Lyles/Ray Keeler: 12-person trip to do quad work in Far West.

Steve Reames/Bruce Albright: 3 day-trips to perform quad map work in the North Rift.

Garry Petrie: 6-person trip to perform quad map work in the Voids area.

LEARN: two 12-person trips focusing on the Far East and the Southwest.

Proposals were judged based on the following criteria:

- Quality in achieving the goals of producing quad maps of Lechuguilla Cave.
- Amount of proposal detail including personnel and task lists.
- Past success in Lechuguilla Cave.
- Willingness to protect Lechuguilla Cave by following the Lechuguilla Guidelines and practicing minimum impact caving techniques

Applications for Survey, Exploration and Inventory expeditions in Lechuguilla Cave in 2004 will be due December 31st, 2003. Proposals will be selected in January 2004 and recommended to the Superintendent by the end of January, then announced by early February 2004.

NETLEAF HACKBERRY: A STUDY IN BIOLOGICAL COMPLEXITY

by Renée West

Our native netleaf hackberry, *Celtis reticulata*, is a magnificent tree that provides shade and beauty, fruits for wildlife, and thick leaf cover for nesting. Young hackberry leaves are browsed by mammals. One significant feature of the hackberry's role in the ecosystem is easily overlooked: the tremendous amount and variety of insects that rely on the tree, or rely on the insects that rely on the tree. Those strange bumps on so many hackberry leaves are sure signs of insects using, but not killing, the trees. Various caterpillars grow up feeding on hackberry leaves without harming the trees.

Primary among the small hackberry inhabitants are gall-forming insects. Galls are the bumps that appear on buds, twigs, leaves, stems, roots, etc. Many types of plants co-exist with gall-formers; some plants, including hackberries, have many different types of galls caused by different insects. Gall insects can themselves be food for parasitoids -- insects that lay their eggs on or in host insects. The parasitoids sometimes are used by others called hyperparasitoids, who lay eggs in the parasitoids! And then there are the inquilines, tiny insects that move into a gall and eat excess tissue not used by the gall-former. And the birds eat the caterpillars and other insects.

These kinds of intricate connections feed the principle that "biological diversity increases biological complexity, which increases biological stability (balance)."¹ Hackberries contribute mightily to the stability of our desert system.



Leaf nipple galls on hackberry caused by psyllid insects. Photo from: <http://hflp.sdstate.edu/PestAlert/Pest%20Alert%201007.pdf>

Galls also form on oaks, junipers, raspberry, blackberry, sagebrush, creosotebush, cottonwoods, many species in the sunflower family (composites), willows, etc. Those bumps in the stems of our catclaw acacias are galls. Galls are abnormal growths of plant tissue triggered either by an infection by a microorganism or the feeding and egg-laying activity of certain insects or mites, sometimes caused by chemicals injected by the insects.¹ Insects are thus able to make the plant grow extra tissue and/or to cause individual plant cells to enlarge. As one researcher described it, "Insects have cracked

the chemical code of plants, producing their own chemicals to stimulate grown-to-order structures that both house and feed a larval insect. Since some insect galls on plants appear as irregular, lumpy swellings, there is a tendency to think of galls as plant cancers. If there is an opposite of a cancer, an insect gall is it. A gall is a highly controlled, highly structured plant organ that an insect has designed for itself."²

Normally the insect's larva (or pupa) overwinters in the gall and emerges when the next flush of growth is available in spring. Galls on oaks are generally caused by various species of tiny wasps. Those on hackberries are mostly caused by diminutive insects called psyllids (pronounced "SILL-ids"). There are several kinds of gall-forming psyllids on hackberries, among them hackberry blister gall maker, hackberry bud gall maker, hackberry nipple (leaf) gall maker, and hackberry petiole gall maker. (The petiole is the stalk of the leaf.) Hackberry trees also have a number of gall-forming midge species, such as the thorn gall.^{3,4}

Psyllids are in the order of insects called Hemiptera, in a subgroup with sucking mouthparts adapted for feeding on plant sap.¹ This group includes aphids, whiteflies, scale insects, cicadas, treehoppers, leafhoppers, and planthoppers. Psyllids are like the hoppers in that they are active jumping insects. One of their nicknames is 'jumping plant lice,' although they are not related to lice. Not all psyllids are gall formers, but many on hackberries are. And they are numerous. According to the Texas Cooperative Extension, "Probably no hackberry tree is not infested with one of the gall-forming psyllids."³

The scale insects are strange looking: small and immobile, with the adults having no visible legs or antennae. Like the aphids and psyllids, scale insects feed on plant sap. They have long, threadlike mouthparts six to eight times longer than the insect itself. (A famous scale in the Southwest is the cochineal insect, a cottony scale that occurs on prickly pear cacti and was used by Native Americans to make a crimson dye.) There are hundreds of different kinds of scales, many with picturesque names. Among those that live on hackberries are cottony cushion scale, cottony maple scale, and gloomy scale.

Scales attract their own cadre of insects and other life. When the scales feed they give off heavy concentrations of "honeydew" (just like aphids) that attracts a fungus called sooty mold. There are a number of natural enemies of the cottony maple scale including a number of wasp and fly parasites. Natural predators, such as various species of lady beetles, feed on the immature scales situated on the leaves. Outbreaks generally buildup over a period of years and then disappear due to natural enemies and climatic factors.

Various other insects occur on the different hackberry species around the country. The Virginia Cooperative Extension reports that a moth caterpillar, called the hackberry leaf slug, lives on hackberry trees and feeds on the leaves. Not at all like its namesake, the smooth slimy slug, this caterpillar has tufts of short stinging bristles that are connected to poison glands.⁵

More pleasant relatives of the hackberry leaf slug are the butterflies that use hackberries as larval food. Both the

hackberry butterfly and the tawny emperor breed in Eddy County and probably in our park. The adult males perch in sunny places on high vegetation and watch for females to breed with. Adults lay their eggs on hackberries and the resulting caterpillars feed in groups on the new leaves.⁶ The caterpillars also overwinter in groups, inside dead rolled leaves.⁷



Hackberry butterfly, whose larvae feed on hackberry leaves. (NPS Photo)

Luckily, all this feeding by insects seems to do no damage to the hackberry trees, and indeed, the relationships go on year after year. Even in home landscapes, most cooperative extension services say there's no need to try to control the insects. "Although galls are conspicuous and unattractive, they rarely cause serious damage," says one. "Once galls start, formation is largely irreversible. Under most circumstances, control is not recommended."⁸

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¹Grissell, Eric. 2001. *Insects and Gardens, In Pursuit of a Garden Ecology*. Timber Press, Portland, OR.
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⁶Texas Cooperative Extension. Hackberry butterfly. At: insects.tamu.edu/images/insects/fieldguide/cimg284.html
⁷Butterflies of North America, Butterflies of New Mexico. Hackberry emperor. USGS Northern Prairie Wildlife Research Center. At: npwrc.usgs.gov/resource/distr/lepid/bflyusa/NM/36.htm
⁸Cranshaw, W.S., and D. Leatherman. Trees & Shrubs, Insect and Mite Galls. Colorado State University Cooperative Extension Insect Series no. 5.557. At: www.colostate.edu/Depts/CoopExt

2002 SUMMARY OF SCIENCE IN THE CAVES OF CARLSBAD CAVERNS NATIONAL PARK *by Paul Burger*

In 2002, there were 35 research trips into the caves of Carlsbad Caverns National Park, encompassing 9 individual projects. These teams spent from 1 to 5 days underground collecting samples, documenting cave features, and establishing science stations. The projects are summarized below.

The Extinct Bat *Tadarida constantini* from Slaughter Canyon Cave – Gary Morgan

The purpose of this study is to evaluate the taxonomic status of the extinct free-tailed bat *Tadarida constantini* from a fossil guano deposit in Slaughter Canyon Cave. Investigators will also identify other vertebrate fossils found in the guano deposit and will try to establish a date for the deposit.

Pool Fingers and Chenille Spar: Investigation of a possible Biological Origin – Diana Northup, Penny Boston, Michael Queen, Leslie Melim, Mike Spilde

The purpose of this project is to investigate whether microorganisms help form pool fingers and chenille spar that frequently line cave pools.

Late Pleistocene and Holocene Paleoclimatology from Speleothems – Victor Polyak, Yemane Asmerom

The purpose of this study is to reconstruct the climate record for the Holocene and late Pleistocene for the southwestern US.

Late Holocene Climate Changes in the Southwestern United States – Jessica Rasmussen

The purpose of this study is to collect cave drip waters for chemical analysis and monitor drip rates over the course of an El Niño event.

Terrestrial Biomarkers in Caves – Mike Spilde

The purpose of this study is to identify geologic material that may serve as indicators (biomarkers) of microbiological activity that will aid in the search for microbiological life in meteorites and eventual geologic samples from Mars.

Microclimate and mineral geochemistry of Spider Cave – Rick Hazlett, Michael Queen, Garrett Miller, Alexandra Plank

The purpose of this study is to derive a microclimate model of Spider Cave using humidity, CO₂, and radon. The investigators also hope to interpret the speleogenesis of the cave based on mineral chemistry.

Geomicrobiology of Lechuguilla and Spider Cave – Penny Boston, Diana Northup, Mike Spilde

The purpose of this study is to determine the nature of microbiological communities within corrosion residue in Lechuguilla Cave and to discover the interactions between microbial communities and the rocks, minerals, and air of the cave.

Geomicrobial Investigations of a Cave Deep Substrate Environment – Diana Northup, Penny Boston

The purpose of this study is to investigate the possibility that the corrosion residues in Lechuguilla and Spider Caves are produced through the actions of microorganisms.

Geology of Lechuguilla Cave and Related Caves – Arthur and Peggy Palmer

The purpose of this study is to determine the geologic and geochemical controls on the origin and pattern of Lechuguilla Cave and other Guadalupe Caves.

INTERPRETING WOMEN'S HISTORY BEYOND WOMEN'S HISTORY MONTH

by Bob Hoff

For *Women's History Month 2003 (WHM)*, here at Carlsbad Caverns National Park (CAVE), we invited Deborah Blanche to present her living history portrayal of Laura Gilpin, the now famous photographer of the American Southwest and American Indians. Since 1996, Deborah's excellent presentations have included Marion Russell (life on the Santa Fe Trail), Libby Custer, and Erna Ferguson, New Mexico author. As usual, her programs informed and inspired.

Another WHM project involved updating the Power Point presentation entitled *Women of the Underground*, a program prepared by ex-CAVE interpreter Kale Bowling-Schaff (now at Redwoods National and State Parks). To do this, I included more women from our recent history, including women working here currently.

As I viewed the one-of-a-kind special program by Deborah Blanche twice and worked on and presented the *Women of the Underground* program several times, I realized that, *Women's History Month* notwithstanding, women's history in our park's interpretive programs should be included all year round, especially with student groups. The "tangible" stories of women at CAVE suggest parallels with women's history in the National Park Service at large and in United States general history. Many historians would agree that only in recent years have women not been formally or informally blocked from applying and occupying positions of greater responsibility and authority in many organizations, agencies, and companies throughout the U.S.

As women have entered and performed in such positions of greater responsibility and authority at CAVE, their resulting contributions made us more professional, creative, and productive. In short, their contributions have enriched CAVE. And given the opportunity, women in the past and present at CAVE have added and are adding to the accomplishment of the National Park Service mission at CAVE.



Women rangers with Colonel Boles on May 7, 1932. (NPS Photo)

The program *Women of the Underground* also notes the contributions of women outside the NPS—from caving organizations, universities, and private life—in the exploration, scientific understanding, and cave conservation and restoration of many of our park's caves, especially Lechuguilla Cave. For example, Gosia Allison, wife of Stan Allison of our Cave Resources Office, has been in Lechuguilla 15 times, mostly assisting in park management projects. Working closely with the Cave Resources Office, she has participated in trips to 35 of our 105 known caves helping to discover and survey eight of them.

I have given *Women of the Underground* program to several student groups recently. I think that the program is particularly good for students. Why? I personally believe that girls and boys "need" to see and recognize positive female role models. The students may also "benefit" by seeing an overview of the challenges accepted and contributions accomplished by women at CAVE, then and now.

At the start of some of my "shadow" program talks, it is obvious that many of these eight graders don't have much interest in history or even a working concept of it. I point out to them that history traces change over time and "why" and "how" those changes took place. I also want students to know that all of us interpret history based on our background, experience, education, and the research we do and the books and articles we read. For an historian to have a "historical interpretation" accepted, she or he must convince others of the validity of the historical sources used and the logic of the conclusions drawn from them.

I also ask the students if they know their family history. "Do you know about the history of your parents, your grandparents, your relatives?" Some facial expressions indicate to me that those students might only think that history is to be found in books and at school, but they don't realize that they have a family history. Every topic has a history. One girl in the 8th grade raised her hand and told me that her main interest was "make-up." I asked her if she knew when the use of "lipstick" started and why (does anyone know when lipstick first came in and why?). I know that at CAVE there has been a history of some of us telling our bat flight audiences that one of the ingredients of lipstick is bat guano (I don't buy either

that theory or lipstick!) (Ed. Note - see *Canyons & Caves* No. 26, page 3.)

In the 8th grade, sports ruled my world, not history and not any other academic subject. In the 9th grade a teacher challenged me to study for a particular test. I did and I made a grade of 100. Before that, I didn't realize that anything outside of sports could make you proud. I also discovered that my Dad liked history and we discussed it many times after that. Prior to that, I didn't know that he had taught international affairs in the Air Force for three or four years.

When I told one group that New Mexico became a state in 1912, one girl made a personal connection. She said, "That is the year the Titanic sunk." Two facts not related as far as I know, but an example of a young mind trying to piece things together.

History becomes more interesting when we "see" the details of "how" and "why," surrounding historical people and events. For some people, it becomes more interesting when they realize the diverse interpretations about many historical topics. For others, history becomes more interesting when certain stories help us to broaden our worlds and to better understand ourselves.



Women staff members in 2000. (NPS Photo)

If we don't include women's stories, contributions, and importance to the Carlsbad Caverns National Park story frequently and in detail, we are interpreting, in many cases, only one-half the story. Adults may be surprised to hear about women who have been left out of this and other history or had their role "marginalized" for so long. Students may be surprised and inspired by these women's stories. Interpreting women's history beyond *Women's History Month* will help set stories closer to reality and will include the diversity of perspective from both women and men. In the process, we better serve all visitors, and better educate ourselves about the past.

For more information go to the online NPS booklet: *EXPLORING A COMMON PAST—Interpreting Women's History in the National Park Service*, 1996.
<http://www.cr.nps.gov/history/hisnps/NPSHistory/womenshistory.htm>

(Eds. Note - Also see *The Women of Carlsbad Cavers: 1920-1940* by Rebecca Lee in *Canyons & Caves* No. 7, page 3.)