

ATBI QUARTERLY

Great Smoky Mountains National Park, Great Smoky Mountains Association, Friends of the Smokies, and Discover Life in America

Happy as a Clam, Sluggishness, and other Molluscan Metaphors

G. Thomas Watters

The Great Smoky Mountains are recognized as having among the highest diversity of mollusks in North America, particularly for land snails and slugs. Many of these occur nowhere else in the world. Nearly 130 species have been recorded from the Park and the list grows longer each year. Beginning in 2000, malacologists (mollusk folk) from the Ohio State University Museum of Biological Diversity (OSUM) have participated in the Great Smokies ATBI.

Whereas some Smokies snails and slugs are large and conspicuous, the great majority are minute and secretive. Many snails are less than 5 mm in length as adults and some are less than 2 mm. These lilliputians live in leaf litter, under logs, or attached to grass stems. Finding them requires considerable time and effort. Snails just don't respond to black light traps, mist nets, electroshocking, or any of the other "easy" capture methods used by other biologists. Typically, to sample mollusks, gallon-size ziplock bags are filled with leaf litter, taken back to the lab, air-dried, and laboriously sorted under a stereo microscope for snails. Slugs must be identified in the field—preserved specimens are very difficult to identify.

Many mollusks are rather habitat specific. In the Smokies, many species occur at particular elevations; for instance, one large species is very common at the lower elevations, but is replaced by a similar species on Clingmans Dome. Other species only occur in open fields, or along creeks, or even in trees.

Mollusks build their shells from calcium, which is at a premium in the Park, particularly at the higher elevations. In fact, some high elevation species have very thin, calcium-poor shells and others have forgone shells altogether – slugs. Not surprisingly, the Smokies is also home to an endemic semi-slug, a snail with a shell that is too small to accommodate it. This

appears to be evolution in action, as this snail gradually loses its shell over time. Thus the Smokies support a great diversity of snails because of the great diversity of habitats. From mountain tops to river valleys, from fields to virgin timber, there are native mollusks in abundance. Conversely, very few exotic or introduced species have been found, testimony to the relatively undisturbed nature of the Smokies. In most of "suburbanized" America, introduced species may constitute 75% or more of the molluscan fauna.

In the Smokies, aquatic habitats are not as hospitable as the land environment for mollusks. Most streams are cold and flashy; few support any mollusks. Once these streams leave the mountains for the flatter surrounding areas, some freshwater snails and mussels may become abundant. In fact, there appears to be an undescribed mussel in the Little River but its range within the Park has not been established.

While finding mollusks in the Smokies may be relatively easy, identifying them can be a challenge. Most of the relevant guides are out of print and may be very expensive. To this end, OSUM received a grant from Discover Life in America to help develop an online, interactive key to the mollusks of the Park. The key was written using Lucid, a powerful program that enabled us not only to create a user-friendly key, but also to attach text, images, and maps to the species and characteristics. Users download a free Lucid Player that enables them to access the online key. This key is perhaps the first of its kind for identifying such a large group of mollusks. The key and player may be downloaded from the museum website at: <http://www.biosci.ohio-state.edu/~molluscs/OSUM2>.

G. Thomas Watters, Curator of Molluscs
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Mesodon chilhoweensis. Endemic to the Smokies, it is the largest land snail (26-42mm) found east of the Rockies.



Mesodon perigraptus, a common snail in the lowlands, often found climbing trees.



The carnivorous snail *Haplotrema concavum* devouring another snail, *Mesodon clarki*.



Collectors Trisha Menker and the author.
All photos by the author.



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A Note from a New DLIA Board Member

Steve Bohleber

As an attorney and political activist I have had the opportunity to serve my hometown of Evansville, Indiana on many not-for-profit and government boards during my life and have always viewed civic involvement as a privilege of citizenship. From the moment I first became involved with the ATBI, as a volunteer photographer, I knew it was something unique and I felt proud to be a small part of the important scientific work that was being done. To be actively involved as a board member has profound personal meaning to me since my original career choice was to be a research biologist. Although my professional life took me in other directions I have always devoted my leisure time to learning about the natural world around me, photographing its beauty and sharing those experiences with anyone who will listen.

I look forward to my service on the Board and hope that my life experiences, photography and love for the natural world will honorably serve the ATBI and DLIA.

Steve Bohleber, Attorney at Law
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Summer "Bio-Quests" Draw Scientists, Educators, and Volunteers

As we go to press, the second "Beetle Blitz" is taking place in Great Smoky Mountains National Park. This year's intensive collecting, identifying, and databasing effort has been organized by Victoria Bayless of the Louisiana State Arthropod Museum, Chris Carlton of Louisiana State University and leader of the Coleoptera "TWIG" (Taxonomic Working Group), and Jeanie Hilten of Discover Life in America. There are 18 scientists and about two dozen volunteers participating, searching the Park for beetles and hoping to raise the count of species into the several thousands. Education is a strong component of this quest and researchers are taking the time to present programs for students, teachers, and the public. Stay tuned for a report on the event in the fall edition of the *ATBI Quarterly*.

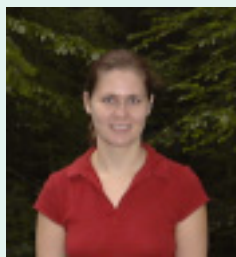
The "High Country Quest" will take a somewhat different approach. Multiple taxa are the quarry and specialists in a variety of areas will be in the Park to head up the searches:

- Myxomycetes (slime molds),
Steve Stephenson
- Mollusks (mostly land snails),
Dan Dourson, Tom Watters
- Ferns, Patricia Cox
- Collembola (springtails) and other soil organisms, Ernest Bernard
- Drosophila (fruit flies), Bill Etges
- Biting flies, Will Reeves
- Aquatic Insects, Chuck Parker and
Becky Nichols
- Hemlock associated insects,
Paris Lambdin and Lee Grant
- Moths, Michael Pogue
- Mecoptera (scorpionflies), Wes Bicha

Volunteers will fan out into the backcountry to set up light traps and do other kinds of collecting at upper elevation areas. The regions of concern are unique ecosystems such as grassy and heath balds, beech gaps, spruce-fir forests, and wetlands. Some of these areas receive high amounts of ozone and acid deposition, and are suffering from onslaughts of exotic insects and diseases.

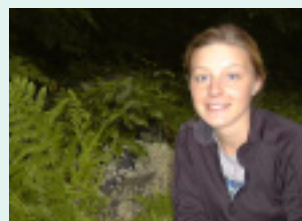
For details about the events, contact Jeanie Hilten, jeanie@dlia.org

Discover Life in America's Summer Interns



Donnelle Robinson

Two interns are helping DLIA with a variety of projects this summer. Donelle Robinson and Christine Scheele have jumped into our whirlpool of activities with enthusiasm. Donelle is a graduate of the University of Richmond in Virginia. She is assisting Amber Pitt, a student of Dr. Max Nickerson, with a larval hellbender project, as well as taking photographs through the microscope, scanning with the high resolution scanner, and participating in the Fern Forays.



Christine Scheele

Christine is a graduate of Skidmore College in New York, with a degree in Biology. Christine is sponsored by the Joint Institute for Energy and the Environment (JIEE). She is working in several areas related to ATBI database needs and is participating in the Fern Forays and giving field and data-related help to DLIA scientists. Both interns will be involved with the Beetle Blitz and the High Country Quest.

Thank you, Donelle and Christine!

Searching for and Discovering Life in Tomales Bay, California

Staff at Point Reyes National Seashore

Point Reyes National Seashore, Gulf of the Farallones National Marine Sanctuary, several universities, and community groups have launched an ambitious effort over the next five years to discover and inventory the organisms occurring in Tomales Bay, which is adjacent to Point Reyes National Seashore. The project, known as the Tomales Bay ATBI, is the only one of its kind on the West Coast. The goal is to inventory, identify, and describe the thousands of species found within bay waters and along the shoreline. Currently, scientists estimate the bay may contain 10,000 species with less than 2,000 recorded. An overall vision is to develop one of the most complete and thorough marine biodiversity databases ever created. This will serve to provide the basic information needed to make sound, science-based management decisions for preserving the incredible biodiversity of this important coastal estuary.

Tomales Bay is one of the most ecologically significant estuarine areas in the state of California. It is twelve miles long and was formed by movement along the San Andreas Fault and covers approximately 9,200 acres. The Bay provides critical habitat for numerous threatened and endangered species, invertebrates, fishes, amphibians, flora, avifauna, and marine mammals. The Bay supports nearly 40,000 shorebirds and water birds that winter along the coast between the San Francisco Bay and Bodega Bay. Although threatened by pollution, sedimentation, and invasive species, Tomales Bay still remains one of the most treasured natural and recreational amenities on the west coast of North America.

This past spring, the first in a series of “bio-quests” was conducted on Tomales Bay. Students and faculty from Sonoma State University and University of California-Berkeley traveled to rocky sites around the Bay to capture a “snapshot” of the biodiversity, including invasive and rare species. The information generated from this inventory will provide support for management and conservation decisions by the Tomales Bay Watershed Council, the National Park Service, the National Marine Sanctuary Program, and other local stakeholders. This knowledge may also have significant economic, scientific, and cultural consequences.

Also, a Tunicate (“sea squirts”) bio-quest was conducted in May 2003 by world tunicate experts Gretchen and Charles Lambert along with scientists and students from Bodega Marine Lab. They located an exotic, invasive tunicate species (*Didemnum* spp.) in Tomales Bay. The organism can be detrimental to oyster populations. Such ATBI findings have given an early warning signal that this species may be a problem in the future. Management implications are not known at this time, but in some areas the tunicate populations remain at low densities for several years before becoming a problem.

One way we are increasing the effectiveness of the ATBI of Tomales Bay efforts is to train new naturalists and scientists as taxonomists. Through the Pacific Coast Science and Learning Center at Point Reyes National Seashore, dozens of high school students hired as biological science technicians assist NPS and ATBI researchers in their inventory and monitoring efforts. School-based education efforts include Tomales Bay High School,



Invasive *Didemnum* spp. (a clonal sea squirt) found on the recent Tunicate bio-quest in Tomales Bay. The tunicate may foul oyster racks, threatening the mariculture industry in Tomales Bay. Photo by G. Lambert.

which was awarded a grant by the State of California to charter a “School within a School” that is specifically focused on Marine Biology and the ATBI.

This is a collaborative project already involving 32 scientists, educators, and community leaders from more than 25 different institutions. Point Reyes National Seashore Association and the Pacific Coast Science and Learning Center at Point Reyes National Seashore are acting as leads for this cooperative initiative. The Learning Center was funded by the Natural Resource Challenge, a five-year national initiative to provide funds for the preservation and protection of park natural resources. For more information, please visit our expanded website at www.nps.gov/pore/science.htm or contact ben_becker@nps.gov.

Ben Becker, Director and Marine Ecologist
Pacific Coast Science and Learning Center
Point Reyes National Seashore



Students and faculty from Sonoma State University collect and identify algae specimens during an Algae bio-quest. Photo by Gary Knoblock.

Note: The ATBI Quarterly will occasionally print articles about biodiversity inventories from other national parks and preserves.

Volunteers Come Out in Force to Help with Fern Forays

Pat Cox



Pat Cox

Volunteers worked in the Deep Creek area.



Jeanie Hillen

"Fern frondlers" in the Greenbrier area.



Paul Super

Twenty-four volunteers at Purchase Knob.

This is the third summer that volunteers have helped to do trail surveys in the Park for ferns. We had a record number of twenty-five volunteers on 31 May 2003, and nineteen volunteers mapped ferns on 12 June 2003. Without volunteer help, this project would not be as successful as it is. As of the last foray, we have mapped portions of 31 trails (approximately 100 miles) in all areas of the Park. In addition to the work accomplished during the fern forays, several school and intern groups have also been involved with this project by mapping additional trails.

What do we do on these forays? First, the volunteers are divided into groups of 5-7 and each person is given a "duty." Next, the group is given a trail to map and at the start of the trailhead (plot 1) they measure off a 15 meter circular plot, take a GPS reading and begin recording information at this site. The information recorded includes what fern species are present, numbers of each species, and what tree species are in the canopy. After the initial data are recorded, the trail is then used as a transect and volunteers measure off 200 meters, set up the next 15 meter circular plot, and begin recording data. Information concerning the ferns between the plots is also recorded on the data sheets. This continues until either the whole trail is mapped, or a time limit is reached.

We have determined that Christmas fern (*Polystichum acrosticoides*) is probably the most abundant fern found in the Park, followed closely by New York fern (*Thelypteris novaboracensis*). A few of the less common ferns that we have encountered are interrupted fern (*Osmunda claytonii*), filmy fern, (*Trichomanes petersii*), and maidenhair spleenwort, (*Asplenium trichomanes*).

This summer we are fortunate to have three interns, Christine Scheele, Donelle Robinson and Stephanie Osborn, helping to get all the data from the fern forays organized with the goal of producing fern species web pages on the DLIA website. I would also like to recognize my graduate student volunteers who help with identification and leadership. These are Dr. Edgar Lickey, Keith Bowman, Joey Shaw, Kunsiri Chaw Siripun (Pum), John Beck, and Chris Fleming from The University of Tennessee, and Dr. Kerry Heafner, Mike Barker and Jessica Budke from Miami University of Ohio. All of the volunteers make my work so much easier. Thank you all. A Fall Fern Foray is planned for September 13th at Abrams Creek Campground.

Patricia B. Cox
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The areas and trails that have been mapped are as follows:

1. Metcalf Bottoms-Townsend "Y"
Curry Mountain Trail
Metcalf Bottom Trail
Meigs Creek Trail
Schoolhouse Gap Trail
Turkey-Pen Ridge Trail
West Prong Trail (St. Mary's School)
Finly Cane Trail (St. Mary's School)
2. Elkmont
Jakes Creek Trail
Cucumber Gap Trail
Little River Trail above Elkmont
Huskey Gap Trail
3. Newfound Gap
Sweat Heifer Creek Trail
Kephart Prong Trail
Road Prong Trail
Thomas Divide to Kanati Fork Trail
4. Clingmans Dome (Upward Bound Students)
Sugarland Mt. Trail from Fork Ridge Trail
Forney Ridge trail to Andrews Bald
Fork Ridge Trail
Noland Divide Trail from Clingmans Dome Rd.
5. Big Creek
Big Creek Trail to Walnut Bottoms
Chestnut Branch Trail
Baxter Creek Trail
6. Twin Creeks
Rainbow Falls Trail
Baskins Creek Trail
Grassy Branch Trail to the Two-mile Trail
7. Smokemont
Smokemont Loop Trail
8. Greenbrier
Grapeyard Ridge Trail
Ramsay Cascades Trail
Porters Creek Trail
Rhododendron Creek Manway
9. Deep Creek
Deep Creek Trail
Indian Creek Trail
Loop Trail
10. Purchase Knob
Cataloochee Divide
McKee Branch

Hunting for Hellbenders

Amber Pitt

Cryptobranchus alleghaniensis alleghaniensis, commonly known as the hellbender, is a giant salamander native to the eastern United States. The species occupies a range from southwestern New York to Louisiana and as far west as Missouri. It is a permanently aquatic amphibian that can grow to 2 1/2 feet in length and has a lifespan of about 30 years in the wild and 55 years in captivity.

Hailed by some as one of the most unattractive creature that exists, the hellbender has a dorsoventrally flattened head and body, and a laterally flattened, rudder-like tail. This body shape enables it to be very hydrodynamic with the ability to sit motionless at the stream bottom or maneuver through the water easily. As larvae, hellbenders have four pairs of external gills that disappear as they mature, leaving only one pair of gill slits on the adult form. Instead of relying on gills, respiration is almost entirely through the skin and is facilitated by a series of fleshy folds along the animal's lateral lines. The hellbender boasts small eyes, short, thick legs and five toes per foot. It is generally extremely slimy, a defense mechanism, that can make it difficult to handle and unsavory to predators. These physical characteristics have led some people to believe that hellbenders are dangerous or venomous, though they are neither. Many senseless hellbender deaths have occurred as a result of this assumption. Hellbenders are often caught by anglers using live bait since the adult hellbender's diet consists mainly of crayfish, but can include small fish, snails, and worms.

Hellbenders require rivers and streams with clean, cool, highly oxygenated water and large rocks and riffles. Their populations are highly affected by declines in water quality, and thus they are an excellent indicator species of stream health.

Population censuses from the past two years have shown that a low population of hellbenders exists in the Little River. This population, however, is very unique in that a high ratio of larvae to adults was found, indicating that it is a healthy breeding population and stable within the constraints of the habitat. This aspect of the population is extremely important since very little is known about the life history of the larval hellbender and very few larvae have been found outside of Great Smoky Mountains National Park. As the hellbender is a species of special concern and is threatened or endangered throughout some parts of its range, it is very important to know all that we can about this species. That is why this summer, as a student of Dr. Max Nickerson of the University of Florida and with the help of DLIA volunteer Donnelle Robinson, I am spending my time searching for larval hellbenders.

Upon capture, I measure, weigh, and mark them by giving them a non-toxic tattoo with acrylic paint. I record data on the habitat in which they are found, and I also non-lethally examine their stomach contents. This information will be used to determine the specific living requirements of the larval hellbenders in order to see how they differ from the adults. This more complete hellbender natural history will make it possible to better protect this species of special concern.



Hellbender photo courtesy of Jeff Humphries <www.hellbenders.sandwalddesigns.com>. Copyrighted photo by John White.

For more information, or if you are interested in volunteering in the month of July, please feel free to contact me. No specific gear is required other than swim wear, although a mask and snorkel are helpful.

Amber Pitt
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New Science Center Update Keith Langdon

We are holding our breath as the advertisement cut-off date for the construction contract for the science center at Twin Creeks approaches. The final planning and design progress is on track, and assuming no snags, the construction contract should be awarded in late September. While some site preparation may be accomplished in the fall, most actual building construction will take place in spring, 2004.

Some features of the 15,000 square foot building include a new curation room for the natural history specimens, and offices for the Park's Inventory and Monitoring staff, some of the Resource Education folks, Jeanie Hilten and DLIA volunteers. There is a large work area for DLIA scientists including ample computer and phone hook ups, a wet lab, a rearing room for invertebrates, and a GIS/data room. There will be a built-in 1,000 sq. ft. education room to be used for the Parks-as-Classrooms program, and other educational groups.

The main room will be mostly illuminated by natural light, supplemented with fluorescent light automatically, as needed. There will be 40 geothermal wells that will circulate a water solution (in a closed system) to reduce heating and cooling costs. Run-off from the roof and other impervious surfaces will be collected on-site in percolating "pond-ettes", which will be planted with grasses, sedges, wildflowers and shrubs of native genotypes to the Park. There will be no lawn.

Keep your fingers crossed that the planners in our regional office and the contract architects can meet the time line!

Keith Langdon, Inventory and Monitoring Branch Chief
Great Smoky Mountains National Park
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ATBI Trail Distribution Surveys for Selected Species: An Introduction to ATBI Methods for DLIA Volunteers

Keith Langdon

One of the reasons scientists become scientists is that they love discovering new things that no one has ever known before...pushing the boundaries of science. If you are interested in hiking, discovering new things, and sharing that experience with others - read on and become a DLIA volunteer!

Background

The Smokies are an “ark” for a tremendous number of species, Sadly, although legally protected, there are many threats to their existence in this refuge. Discovering more about the number and identity of the species is a very high priority of the Park. Thus the inception of the ATBI, where we are interested not only in discovering what species are in the Park, but also their distribution, relative abundance, and some insight into their ecological role. A few species’ distributions can be mapped using remote sensing data from aircraft or other means, but discovering something about the distributions of most species will involve some field work. Distributions of plants, lichens, snails, fish, butterflies and other organisms can be inferred from surveys that associate known points where species occur with standard habitats that are now mapped over the entire Park.

The New Vegetation Map

The Park has recently received a new detailed map that classifies approximately 80 different habitats, based mostly on vegetation. It covers all 810 square miles of the Park and maps different habitats as small as about 0.5 hectare, or about 1 acre. These data are digitized on a computer mapping program, so individual habitat types (or points from the field that we add) can be manipulated at will.

By conducting searches over large areas of the Park, much of it along trails, we can track where we find and, just as importantly, where we *do not find* selected species. A predictive model is then made for the probability of encountering the species in each of the habitats in the Park, and an initial map is produced electronically. That map is then “ground truthed”, or tested, by going to places where that species is predicted to be, or present or absent. By recording the results of the ground truthing of the first iteration of the map, a second and more accurate distribution map can be produced for that species—the first *ever* for that species here.

Field Mapping

Obviously, the initial field mapping is critical to the whole project. Some species are easily identified when encountered by using simple guides and field identification manuals. Other species groups must be collected and returned to the lab for eventual identification. We usually use timed searches (e.g., search for 5 minutes) and/or plot constrained searches (e.g., search within 7 meters for 2 minutes) for groups that are not easily detected along trails. This allows us to assume equal

sampling at all points along trails, an important assumption when producing maps.

We encourage ATBI volunteers to map easily identified species, at least at first. Later, more challenging but interesting species groups can be done and even several species groups can be done at once! All points have Global Positioning System (GPS) coordinates recorded or a point on a map labeled with the plot number. The number of individuals seen, site conditions, or other data may also be necessary, depending on the species/group. Simple field sheets help us remember the data we need to record when we are at each point on a trail.

How we Use Maps

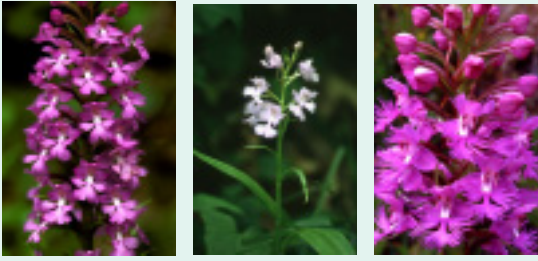
Once the map is produced and tested we will want to post it on the corresponding species page of the DLIA website. In this way, Park managers, researchers and the public will have access to the information. Unfortunately, if it is a species which the Park believes could be illegally collected (poached), the map will only be shared with those who need to see it for conservation and research purposes. We will learn new things about species as we overlay the new maps (electronically) with other important Park maps, such as: topography, geochemistry, soils, other species occurrences, deposition of air pollutants, and invasive non-native species. Mapping is a very powerful tool by which the Park can assess how to target its limited resources to protect its rarest species, and most critical natural processes.

Getting it Organized

Volunteers who have completed an orientation about these types of activities through DLIA’s training days may want to “adopt” a species and do trail surveys for it in areas of the Park where it is thought to be. We always suggest, however, that there be at least two people per team for efficiency and general safety—besides it is more fun to share the experience of discovery! Teams of volunteers may want to divide trails that need to be covered in order to complete it faster, or even do more than one species at a time. As they gain expertise in this process, they can train others.

Credit for who was involved with what aspect of the distribution map will be posted on each species page, upon completion. We also want to post a photo of the folks involved!

Following are some species which are of interest to Park managers and/or researchers. Most are rare, easy to identify, and/or of limited distribution (we think!) in the Park. We are also interested in what pollinates these plants. Please contact Jeanie Hilten for detailed information, questions, and to “register” your interest and intent. By coordinating the interest of volunteers, staff, researchers, and other resources we will be much more efficient at solving these distributional mysteries! Push the boundaries of science. Join with DLIA and the National Park Service to be a Citizen Scientist!



*Plantanthera
psycodes*

Plantanthera grandiflora

Purple-fringed Orchids

These are beautiful, uncommon mid to high elevation species. They bloom with many flowers on a 1 to 2 foot tall spike from about mid-June to late July. They are usually spotted in sun-dappled damp areas and seeps. There is another species: the small purple-fringed orchid (*Plantanthera psycodes*), which is just as tall, but the “throat” of its nectar tube is hourglass or dumb-bell shaped. While we think it is scattered across the mid to high elevations in the eastern two-thirds of the Park, the large purple fringed orchid (*P. grandiflora*) is currently known only from a single small colony at high elevations. It is easily differentiated by its round or oval opening to the nectary. Surveys for these orchids will require relatively quick coverage during or immediately after the blooming season. Each plant blooms for at least a couple weeks, and plants at each patch are usually not always in sync, making our identification “window” longer. Photographers: Alan Heilman, Dennis Horm, and Edgar Lickey.

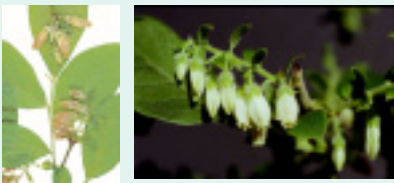


Hydrangea radiata

White-leaf Hydrangea

We may have three species of these large shrubs in the Park. The white-leaf (*Hydrangea radiata*) is only known from the dry forests west of Cades Cove on the TN side, and the far west end of the NC side – we don’t know its exact range. It is easily recognized by the bright white underside of the leaves, and larger individual flowers

on the stalk. The more common species (*H. arborescens*), is green underneath the leaves and is common in low to mid elevation moist forests, BUT we think it may get replaced by the white-leaf as you go west. There is another species with leaves that are gray underneath, but it has not been seen in recent decades... is it still in the Park? Can it be re-discovered? Summer to early fall is the best time to survey for these species. Photographers: Wofford and Chester.



Vaccinium hirsutum

Hairy Blueberry

There are only three species of low growing blueberries in the Park. All three stay are less than half a meter tall, have green twigs, and frequently

occur in dry forest types. The hairy blueberry (*Vaccinium hirsutum*) is believed to be only in the west end of the Park, though it may occur up to 5,000 ft. elevation. Its entire world range is western

NC, southeastern TN and extreme northeastern GA. We need a more accurate idea of where this species is in the Park. The berries, flowers, and twigs are all hairy. It is easily identified in any season. Another of the low-growing blueberries is only known from steep rocky cliffs on Mt. LeConte, and the third is thought to be common throughout. Photographers: Wofford and Chester.



Arundinaria gigantea

Dwarf or Mountain Cane

This is a type of native cane (bamboo) that has been found in the Southern Appalachians. It grows up to 1 meter tall in extensive and sometimes dense stands and is deciduous. Often it grows extensively right up the mountain slopes. The other cane, often called giant or river cane (*Arundinaria gigantea*) grows to 4 meters tall (16 ft.), always along alluvial areas and is evergreen in winter. So far we have only found the mountain cane on the

North Carolina side of the Park from Oconoluftee, west. It is being genetically tested to determine if it is an undescribed species. Any season is good for surveys. Photographers: Wofford and Chester.



Rhododendron minus

Carolina Rhododendron

This is a high elevation rhododendron (*Rhododendron carolinianum*) recently segregated from a similar species which occurs at low elevations (*R. minus*). The entire world range of the Carolina rhododendron is: southwestern NC, southeastern TN, northeastern GA and northwestern SC. In the Park we know it from the Mt. LeConte area, and central high elevations. It blooms in June with distinctive small lavender flowers, and grows on the most acid rock formations in the Park. It is also

easily recognized in the dormant season as it is evergreen and has small, rough leaves. Photographers: Wofford and Chester.

Photographs from the University of Tennessee Herbarium. See their website: <http://tenn.bio.utk.edu/vascular/vascular-browse-genus.html>

2003 Calendar of Events

Jeanie Hilten

The 2003 ATBI summer research season is full of interesting new projects, special events, and on-going programs. To participate, contact the persons listed with the activities below. Also note that there are many scientists who have particular requests. For more detailed information about studies underway and about DLIA's volunteer "project teams", contact Jeanie Hilten, 865-430-4752 or Jeanie@dlia.org

Please note there have been some changes since the last calendar.

Thursday, July 17 through Sunday morning July 20: Beetle Blitz. Coleopterists from around the nation will participate, with the help of trained volunteers, teachers, and students (Contact Jeanie). Interested scientists contact Victoria M. Bayless of the Louisiana State Arthropod Museum at 225-578-1838 or vmosele@lsu.edu

Thursday, July 31 through Sunday morning August 3: High Country Quest. We are interested in surveying for a variety of taxa, including slime molds, snails, flies, soil and aquatic insects, and ferns. We will concentrate on upper elevation ecosystems such as beech gaps, balds, and spruce-fir forests. Volunteers, especially those who can hike to the high country and stay overnight, as well as scientists who wish to participate, contact Jeanie.

Sunday, August 3 through Saturday August 30: "Documenting Life" Exhibition. Exhibit of the works of photographers and artists who volunteer for ATBI and DLIA. Macro-photography, scans, drawings, and other images of the beautiful living things

of Great Smoky Mountains National Park will be displayed at the Blount County, Tennessee Public Library in Maryville, TN. A reception and program will be held Thursday, August 21 at 7:00pm. Contact Ruthanne Mitchell, cwmitchell@ntown.com

Saturday, August 2 through Saturday, September 6: "Documenting Life" Exhibition. This exhibit features the work of DLIA's photographers and artists. Macro-photography, scans, drawings, and other images of the beautiful living things of Great Smoky Mountains National Park will be on display at the Tomato Head Restaurant in Knoxville, TN. A reception will be held Saturday, August 23 from 4:00 to 6:00pm. Contact Ruthanne Mitchell, cwmitchell@ntown.com

Friday, September 12 through Sunday, September 14: Citizen Science for Teachers. Great Smoky Mountains Institute at Tremont. Contact Michelle Prysby, michelle@gsmit.org

Saturday, September 13: Fall Fern Foray. Meet at the Abrams Creek Campground at 9:30 am. Contact Pat Cox, pcox@utk.edu

Tuesday, December 2 through Saturday December 6: 7th Annual ATBI Conference and associated meetings. Gatlinburg, TN. Contact Jeanie Hilten to assist with the planning committee. **Special Note:** Tuesday evening, December 2nd and Wednesday morning, December 3, there will be a meeting focusing on the development of new All Taxa Biodiversity Inventories in other National Parks as well as National Forests, Wildlife Refuges, State Parks, etc. Interested managers contact Keith Langdon, Keith_Langdon@nps.gov or 865-436-1705.

Dr. Peter H. Raven, Director of the Missouri Botanical Garden, will be the keynote speaker. To learn more about Dr. Raven, one of the world's leading botanists and conservationists, go the website <www.mbot.org/raven>



Nancy Lowe's illustration of a lace bug (*Acalypta duryi*).

Note to Authors

The deadline for the fall issue is Oct. 6th. Quarterly editors encourage scientists to contribute short news stories (from 200 to 700 words). Please send your documents as either MS Word or Word Perfect files. Photographs or drawings may be sent as .TIFF files (approximately 3 x 5 inches @ 300 dpi) or as high resolution .JPG files attached to your e-mail message. Please supply captions and credits for photos and drawings. Thanks to the ATBI authors featured in this issue.

Ruthanne Mitchell, Newsletter Coordinator
cwmitchell@ntown.com