



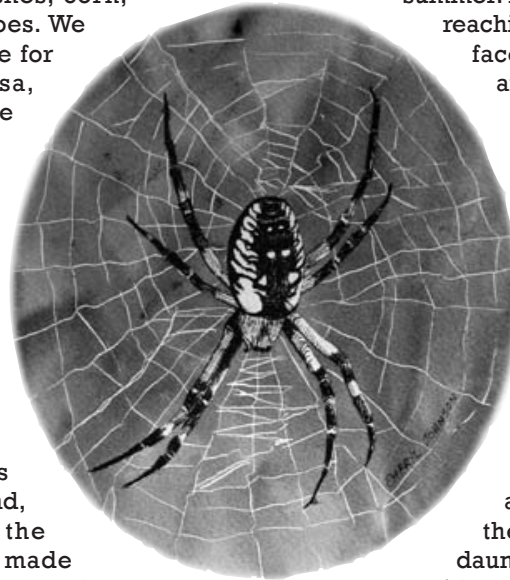
THE WRITING SPIDER

By Margaret Gillespie, Illustration by Cheryl Johnson

On the hilltop behind our 1810 Canterbury farmhouse sits a huge market garden. In the past when both my parents were involved in the garden, it flowed down the hill with row upon row of lettuce, carrots, beets, radishes, corn, squash, potatoes, and tomatoes. We always had two lines set aside for our elderly neighbor, Louisa, who would drive through the field on her lawnmower and delight in harvesting fresh produce. For my “flower-loving dad” we planted zinnias and sunflowers. Little did we know, at least in the spring, we were also growing spiders!

Favorite haunts of the Black and Yellow Garden Spider, *Argiope aurantia*, include old fields, sunny spaces among shrubs, tall flowers, and, of course, gardens. Over the winter, spherical egg sacs, made of spider silk and attached to weeds, protect broods of spiders. One sac, an inch in diameter, may start in the fall with 300 to over 1,000 eggs; but as the tiny spiders hatch and grow within, the weaker ones are eaten. Early in the spring, spiderlings emerge from egg sacs and soon can travel far away by a process called ballooning. They spin silk strands which are picked up by breezes, carrying the little spiders along. Once dispersed

to a good site, these miniature versions of adult spiders build tiny webs that expand in size as they themselves do. These are orb spiders with circular webs that may reach two feet in diameter by late summer. Imagine parting corn stalks and reaching for a zinnia to cut and coming face to face with a 1.5-inch black and yellow spider! Some may be delighted; some may need more data ... quickly.



Garden Spider

Is it a venomous spider? Yes, of course—that is how they subdue their prey. Are they dangerous to humans? In the unlikely occurrence that a person is bitten, the usual result would be mild redness and itching at the site, annoying but temporary. If we get too close, garden spiders may drop to the ground and run for cover. Perhaps it is the size of these spiders that is daunting. The large black and yellow spiders you see in your garden are the females! In contrast, the males are about 0.75 inches, colored an inconspicuous brown and usually overlooked. Search for the male in a small web within or near a female’s web, available to mate when the right time comes. After the female mates in late summer, she spins her egg sac and lays eggs. She dies shortly afterwards as the weather cools, bringing the one-year life cycle to an end.

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FORGING TRAILS

ANOTHER NEW SEASON

Spring is an exciting time at the Science Center. We emerge from our winter cocoons and new energy and excitement abounds. As I write this (in late April), we are anticipating opening day of trail season, even though the last mounds of snow have not quite melted outside the Gordon Children’s Center. Our two bears are awake—if still a little drowsy after their long winter nap—and we have a new bobcat and skunk that are currently in quarantine but will join the exhibits in May.

Dynamic new projects are underway. Our *Sea to Lake, Summit to Sky* project launched this spring with our wonderful partners Seacoast Science Center, Mount Washington Observatory, and the McAuliffe-Shepard Discovery Center. Middle schools are signing up for this grant-funded program this spring and fall. Thanks to the Jane’s Trust for its support.

The Blue Heron School is thriving. It was a lovely addition to the long winter to hear the sounds of laughing, playing children every morning and see them bundled up in their snowsuits as they headed

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FORGING TRAILS continued from page 1

off to explore. What an amazing nature education experience they are immersed in each day – the embodiment of our mission.

Our new Osprey Project is underway. By the time you read this, we hope to have satellite transmitters on the two breeding males at our target nests. New web pages will allow you to follow the bird's movements this summer and their migrations to South America this fall. We will deploy three more satellite backpacks on chicks in our two nests, so that by August we will be tracking five Ospreys. Over the next two years—if funding allows—we plan to tag ten more Ospreys. We are grateful to our project partner, Public Service of New Hampshire, for not only providing financial support but logistical support, too. Additional support is from the Jane B. Cook 1983 Charitable Trust. Look for much more detail on this project soon.

Another exciting Osprey development happened on April 21. As some of you may remember, back in January 2008, we installed an artificial Osprey nesting platform on a large pole in the hope of attracting a pair to nest here. After three seasons of no interest, I decided to up the stakes a little bit and try a new tactic. With help from Facilities staff Tim Curry and Dean Smith, we installed a loudspeaker rigged to an MP3 player near the nest. It broadcasted Osprey calls 24/7 beginning April 1 (when Ospreys arrive back from South America). My hope was that a passing male Osprey—maybe fishing on the lake—would hear the sounds of an “active nest” and be attracted to check it out. Well . . . it worked. On the morning of April 21, I noticed an Osprey flying over the parking lot heading toward our nest. By the time I was a short way up the trail he was doing his full noisy display flight over the Webster Building (with fish in talons) and dropped down into the nest. Now that a male has found the nest, we'll have to see if he is successful at attracting a mate and settling in. What a lovely new “exhibit” that would be!

Speaking of exhibits, the New Hampshire Geology Exhibit is completed and open this spring. As usual, our Education and Facilities staff did an outstanding job with the interpretation. You will enjoy the fruits of their creativity through several outstanding interactive components.

In June, look for an exciting new traveling exhibition of climate change. “Seasons of Change” focuses on the effects of climate change on iconic aspects of New England life such as maple sugaring, lobster fishing, and forestry. Installation is in early June; it will be open from mid-June through mid-September.

So . . . there are many new things to see and experience at your Science Center. I know I speak for all the staff when I say that we look forward to seeing you this season!

Forging Trails is written by Executive Director Iain MacLeod.

You may contact Iain at 603-968-7194 x 23 or iain.macleod@nhnature.org.

NEWSBRIEFS

◆ In March, we welcomed Amanda Gillen to fill a new position called Marketing and Visitor Services Manager. Previously Amanda was Online Marketing Manager for groSolar, a solar energy installer and distributor based in Vermont. She began her career in marketing for new home construction and worked on the program staff for NH 4-H Camps. Amanda grew up in southern New



Hampshire. She holds a B.A. in Studio Art with a minor in Sociology from the University of New Hampshire. At Plymouth State University, Amanda earned a Strategic Marketing Management Certificate and an M.B.A. in General Management. Amanda lives in Orford with her husband, Elie Roy, Penny the Wonder Dog, and a flock of various fowl. Amanda's interests include yoga, hiking, and solar energy.

◆ March brought staff changes. Marketing Manager Christine Cherry

SQUAM LAKES NATURAL SCIENCE CENTER

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Squam Lakes Natural Science Center is a non-profit educational institution incorporated in 1966 as a charitable organization under statutes of the State of New Hampshire with its principal place of business in Holderness. Our mission is to advance understanding of ecology by exploring New Hampshire's natural world.

Tracks & Trails is a regular publication of Squam Lakes Natural Science Center distributed to all members. Comments are welcomed by newsletter editor Janet Robertson at 603-968-7194 x 12 or janet.robertson@nhnature.org.

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TRUSTEE PROFILE

ALEXANDRA T. BREED



My mother was the original conservationist. Born from good Scots lineage, she was morally compelled to waste nothing and save and recycle everything. My sense of the importance of the preservation of natural resources stems from this early imprint. This formative family experience was enhanced by three summers at a Quaker wilderness camp in Vermont, where I learned to pitch poncho shelters, dig trenches, paddle a canoe solo, and respect the Earth.

I attended law school in Boston in the 1970s, just as the nation was embracing a vast array of new environmental clean up laws. In swift order Congress passed the Clean Air, Clean Water, Rivers and Harbors, and National Environmental Protection Acts. We all became aware of the dangers of not protecting our wild places and the natural resources when we saw midwestern urban rivers catch fire. I truly believe in Thoreau's statement that "In wildness is the preservation of the world." The education of children in the values of revering, conserving, and protecting the natural environment is the solution, and it became my adult passion.

When I joined the Science Center Board in 1986, the central issue being debated was whether to tear down the Holderness Inn. We are still struggling with this issue 25 years later! Some things don't change. But many things have changed for the better: New exhibits and programs, new staff and Board members, but the Science Center remains the premier New Hampshire institution of learning about and experiencing

directly the natural world that sustains us. I have served under the leadership of Bill Webb, Nancy Beck, Will Abbott, Dave Chase, and now Iain MacLeod. All have brought their separate gifts and interests and applied their energies to moving the Center forward. The fact that Dave and Brenda Erler continue to bring their unique talents to hundreds of children each year speaks volumes about the stability of the center!

I have had the pleasure of serving on many non-profit boards over the years, most focused on the environment and natural resources, beginning with the Environmental Law Council and Conservation Law Foundation, then The Nature Conservancy NH and Appalachian Mountain Club, and now the Mount Washington Observatory. All these organizations, along with the Science Center, concentrate on the preservation and conservation of natural resources and education of children and adults to the value of preserving and protecting natural systems for the spiritual and physical health of society.

Serving on the Science Center board has been a privilege and a pleasure. I have been continuously impressed by the experience and commitment of the board and staff and feel that the Center has been very well managed. We have come a long way since 1986, both in the physical plant (many new trails and exhibits and the excellent new entrance building) and in our programs (including a nature preschool). The Board has grappled with the issue of how to use the resources of the center more effectively, especially during the winter months. I applaud our efforts to date and look forward to many more years of strategic growth to provide robust and innovative environmental education to our children and grandchildren.

Alexandra T. Breed has been a trustee since 1986 and will retire in August 2011. She served as Board Chair from 1992-1995. An attorney at McLane, Graf, Raulerson & Middleton, P.A. in Concord, Alexandra counsels individuals and families regarding estate planning, conservation easements, and charitable giving. Alexandra and her husband Douglas P. Hill have two adult children, J. Porter Hill and Ramsay T. Hill and reside in Gilford.

NEWSBRIEFS continued from page 2

resigned after a productive two-year stint. Christine's achievements were many, including refining tracking metrics to assess the value of our advertising, building community engagement through social media, new school marketing initiatives, and representing the Science Center on the Squam Chamber of Commerce board. Also resigning in March was Animal Care Curator Katie Moksosian. Katie's expertise in animal training took our animal enrichment efforts to a new high, notably with the Mountain Lions. She also led the recent effort to apply for reaccreditation from the Association of Zoos and Aquariums.

- ◆ There are three Education Program Interns this summer. Danielle Diermeier is from Wisconsin where she is a senior at the University of

Wisconsin, Stevens Point, majoring in Wildlife Ecology: Information and Education with a minor in Captive Wildlife Management. Last summer she completed an internship at the In-Sync Exotics Wildlife Rescue and Education Center in Wylie, Texas, working with large and small exotic cats. Brittany Mielcarek is a senior at the University of Tampa working towards a B.S. in Biology where she has also been a Genetics Lab Assistant. She volunteers as a veterinary technician with the Hyde Park Veterinary Clinic, at the YMCA Camp Campbell Outdoor Science School, and with Marion Therapeutic Riding assisting physically, mentally, and emotionally disabled individuals through horseback riding. Alyssa Piper is a junior at Worcester Polytechnic Institute, working on a B.S. in Biology

and Biotechnology. Alyssa has been an animal care specialist, professional pet sitter, WPI Community Advisor, and Landmark Education Self Expression and Leadership coach. Other interests include music, photography, drawing, and carpentry.

- ◆ Communications Intern Mike Jenkins is from West Lebanon and is a senior at St. Lawrence University in Canton, New York. He is pursuing a degree in economics and psychology, with a minor in statistics. Mike is interested in marketing and hopes to gain experience in basic market research and advertising. Other interests include Nordic skiing and cross country running, along with taking flight lessons.

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GARDENER'S CORNER



ROCK GARDENS AND THE FELLS

By Janet Robertson

When I was a young child, I wondered why my aunt wanted to add a rock garden to the yard of the old Pennsylvania farmhouse she and my uncle were renovating. Didn't most people want to remove rocks from gardens? She eventually created a small lovely rock garden that was her pride and joy.

Now, living in the "Granite State," I have seen many rock gardens, and one of the best around is at The Fells Historic Estate and Gardens in Newbury, New Hampshire. This July, the Science Center is pleased to offer our members a free visit to The Fells through a reciprocal member exchange. In July, Science Center members may visit The Fells once at no charge, and The Fells members may enjoy a free visit here. Be sure to take your membership card with you before you go to The Fells. Consult their website (www.thefells.org) for information about hours and directions.

The Fells, named after the Scottish word for rocky upland pastures, is on a hillside overlooking Lake Sunapee. It is the former summer home of American writer and diplomat John Milton Hay (1838–1905). Hay's son, Clarence, inherited the property, and with his wife Alice Appleton Hay transformed the rock pasture into extensive gardens, turning it into one of New England's finest examples of an early 20th-century summer estate. There are guided tours of the Colonial Revival home, woodland walking trails, and renowned gardens. The gardens include a perennial border, a rock garden, rose terrace, old garden, pebble court, and heather bed.

So please enjoy this benefit of your membership in July and perhaps be inspired to create your own rock garden.

Gardener's Notebook and Kirkwood Gardens are sponsored by the Belknap Landscape Company, Inc. www.belknaplandscape.com

Renew your membership online at www.nhnature.org

Kirkwood Café

Snacks • Sandwiches • Beverages • Ice Cream

Enjoy your lunch or snack on our patio or porch overlooking the gardens

Open Daily • 10:00 a.m.–3:00 p.m. • June 25–September 5

FROM THE HERON'S NEST

By Laura Mammarelli



April was a good month for discovering mud. We walked down to the stream one morning after a light snow and observed several different animal tracks: skunk, raccoon, squirrel, fox, and birds. Naturalist Margaret Gillespie showed us wooden animal track tools, and we made animal tracks in the mud by the stream. We bushwhacked through the brush to get to the stream bank. Afterwards, classroom activities matching animals and their tracks allowed the children to practice identifying the animal tracks.

Blue Heron School, a nature-based Montessori school for children ages three to six, operates from Monday through Friday, 8:30 a.m. to 1:00 p.m., September to June. Blue Heron School starts its second year in September and is now accepting applications for enrollment. For an application or more information, contact Laura Mammarelli at 603-968-7194 x 40 or blueheron@nhnature.org.

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NATURALIST'S CORNER

WHAT CAN NATURE TEACH YOU?

By Eric D'Aleo

Here's an unusual question to consider: What do a kingfisher, a termite mound, a whale flipper, and the leaf of a lotus have in common? Seems like it's a stretch to find a common thread here, doesn't it? However, all four are examples of something called biomimicry, the process of learning an idea from an organism (nature) and then applying it to human problems.

Although I've been aware of biomimicry for a few years, I never had many solid examples that I could draw upon for inspiration. It wasn't until I attended a workshop session for educators at the Building Energy Conference in Boston this March that I realized how exciting the concept is. As Kevin Stack from the Biomimicry Institute went through multiple examples, I found that I was leaning forward eagerly anticipating explanations of how nature fits form to function, providing the inspiration for solutions to human problems.

The first example is the Shinkansen Bullet Train, the fastest train in the world, which travels at 200 miles per hour. The problem was noise caused by changes in air pressure. When the train emerged from a tunnel, it produced sounds like large thunder claps (think sonic booms), which caused nearby residents to complain. The solution came when the train's chief engineer, an avid bird watcher, asked the question, "Is there something in nature that travels quickly and smoothly between two different mediums?" He discovered the answer by observing the beak of a kingfisher. This bird dives headfirst into water with little disturbance of the water's surface when it fishes. After modeling the front end of the train on the beak of a kingfisher, the train not only became quieter, it also used 15% less energy while becoming 10% faster.

My interest was piqued, and I listened more closely to the next example: How termites provided not just inspiration but a solution to cooling an office complex in Harare, Zimbabwe, based on the self-cooling of their mounds. The termite species *Macrotermes michaelseni* is able to maintain the temperature in their nests to within one degree while the outside temperature may vacillate from 42°C/107°F to 3°C/37°F. By studying how termites cool their nests, architect Mick Pearce designed an office complex to be more sustainable, so that it uses 90% less energy than a conventional building of the same size. In nine months of operation, \$3.5 million dollars in air conditioning costs were saved. My mind started mulling over this information since I was researching information for an article on cooling a home without air conditioning.

The next example: The water repellent leaves of the Lotus plant *Nelumbo nucifera* inspired a new generation of paint, glass, and fabric finishes. Because of the large number of tiny crevices on its microscopically rough leaf surface; water droplets bead on its surface until a light breeze or tilt in the plant leaf causes the droplet to roll off. As the water rolls off it picks up dust and dirt particles, effectively cleaning the leaf. By mimicking the hydrophobic surface of the Lotus leaf, a fabric finish known as GreenShield (manufactured by G3i) repels stains and water as

well as conventional fabric finishes do while using eight times fewer harmful fluorinated chemicals.

The examples seemed to come forth at a faster pace as I listened and tried to process the information. Wind turbine blades modeled after a humpback whale's flippers have increased efficiency and may improve safety and performance of airplanes and fans. Blue mussels that use a natural adhesive to remain anchored to rocks in the pounding surf of the ocean inspired a formaldehyde-free wood glue used in hardwood plywood and particle board. Shark skin has been studied to improve how objects and humans move through water more efficiently. The iridescent colors of some butterfly wings have inspired the creation of color without using harmful chemicals or dyes. The process of how natural ecosystems improve water and soil resources while still producing food has helped to alter how we look at modern agriculture. The list just kept growing. By the time I left the room 90 minutes later, I was inspired by the possibilities yet also humbled by what I learned.

Since then, I've continued learning more about biomimicry through articles, videos, and books and think that Janine Benyus, founder of the Biomimicry Institute, eloquently sums up the challenge and excitement in this new field of study.

"In modern times we've forgotten something that we used to know ... that we live in a competent universe. We are part of a brilliant planet and are surrounded by genius. Life over 3.8 billion years has made a lush livable place for us and we are in a long line of organisms that have come to this planet and ask ourselves, how do we come to this planet and live gracefully over the long haul? How can we do what life has learned to do, which is to create conditions conducive to life? We need a chance to remind ourselves of those geniuses and somehow meet them again..."

So, what can nature teach you?

SPIDER QUIZ

1. A spider is an eight-legged insect. True or False?
2. The spider body part to which the legs attach is called the _____.
3. What is the main purpose of "ballooning" for spiderlings?
 - A. Escape predators
 - B. Disperse to new areas
 - C. Cross bodies of water
4. In an orb spider's web, which strands are sticky?
 - A. Spiral
 - B. Radial
 - C. Both spiral and radial
5. The male and female Garden Spiders are very different in size. Which is much larger?

1. False. Spiders are not insects. All insects have six legs!
2. Cephalothorax 3. B 4. A 5. Female



SPECIAL EVENTS

Kirkwood Gardens Day

Saturday • June 11

9:00 a.m. to 1:00 p.m.



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HOLDERNESS 250TH ACTIVITY

SONGS AND TALES OF THE EARTH

Friday • August 5 • 1:00–2:00 p.m.

Families



We are pleased to present award-winning musician, author, and storyteller Steve Schuch (www.NightHeron.com) as part of Holderness's 250th anniversary activities. Children from the Science Center's 'Earth Songs' summer Guided Discoveries program will be featured. Weaving together performance, history, and science, this program encourages wonder and respect for the natural world. Join us on the lawn at Kirkwood Gardens; bring a lawn chair or blanket to sit on the grass. Rain or shine (in the Red Barn in case of rain).

No charge to attend, but reservations are required.



SQUAM LAKES
 NATURAL SCIENCE CENTER

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StoryWalk™

Sponsored by Meredith Village Savings Bank and Innisfree Bookshops

July 1–August 7

A new StoryWalk™ returns with *Blueberries for Sal* by Robert McCloskey in collaboration with the Holderness Library and Holderness Recreation Department. StoryWalk™ opens July 1 at 10:00 a.m. with activities for the whole family until noon and is located in the field behind the New Hampshire Fish & Game parking lot (please park in town or at the Science Center as this lot is reserved for boat trailers).

No charge and no reservations are required.

Come Play the WILD Animal Way! Animal Enrichment Day

Sponsored by Northway Bank

Wednesday • July 13 • Trails open at 9:30 a.m.

This fun-filled day focuses on educating the public about animal 'enrichment'—providing stimulating activities for captive wildlife to keep them engaged in their surroundings and allow them to lead the best possible lives in captivity. Live animal presentations, crafts, and demonstrations throughout the day. Thanks to Tootsie Roll Industries for supporting this event.

Cost: \$15/adults, \$12/seniors, \$10/youth

No charge for members or children 2 and under

Annual Meeting and Summer Gala

Saturday • August 13

The evening begins with our Annual Meeting to elect Officers and Trustees, vote on updates to the By-Laws, honor retiring board members, and recognize employee service. The Summer Gala will highlight *Sea to Lake, Summit to Sky*, a science education collaborative of the Science Center and our partners—Seacoast Science Center, Mount Washington Observatory, and the McAuliffe-Shepard Discovery Center. This innovative distance learning curriculum was observed by New Hampshire middle school students this spring.

For details, election slate, and suggested By-Law updates visit www.nhnature.org/2011annualmtg.html • Look for invitations in July.

Proceeds support the Science Center's education programs.

Autumn Festival

Sponsored by Community Guaranty Saving Bank of Plymouth
 Saturday • September 24 • 9:30–4:30 (last admission at 3:30 p.m.)

Meet best-selling author Michael Tougias and hear tales of misadventure at his remote Vermont cabin as chronicled in his book *There's A Porcupine In My Outhouse: Misadventures of a Mountain Man Wanna-be*. This book won the Independent Publishers Association Award for "Best Nature Book of the Year." Tougias' other books include *Overboard: A True Bluewater Odyssey of Disaster and Survival* and *Ten Hours Until Dawn*. He will sell and sign his books following the program. Enjoy live animal presentations and crafts for children at this day-long family festival. Lunch will be available for purchase from Longhaul Farm.

Cost: \$15/adults, \$12/seniors, \$10/youth

No charge for members or children 2 and under



NATURAL ADVENTURES



COLOR CODED MESSAGES

First Wednesday of the Month

June 1 • July 6 • August 3 • September 7
9:30–10:30 a.m.

Ages 3 and younger

Nature talks with color—some colors help to hide, some to say danger, and still others mean welcome. Explore the natural world of color with your child. Adult must accompany children at no charge.

Cost: \$5/member; \$7/non-member

New! LEARN TO IDENTIFY BIRDS

June 3 and 24 • 7:00–11:00 a.m.

Age 14+

Join Executive Director Iain MacLeod for one or both of these beginning birding programs to learn to identify the huge variety of birds that fill our woods, meadows, and wetlands each spring. Explore a different habitat in the Lakes Region each trip. Learn identification by sight and sound.

Cost:

\$12/member; \$15/non-member per date

STOKES FIELD GUIDE TO THE BIRDS OF NORTH AMERICA: YOU, BIRDING AND NEW HAMPSHIRE BIRDS

Tuesday • June 7 • 7:00 p.m.

New Hampshire residents and nationally acclaimed bird authors, Don and Lillian Stokes, will present their newest work, *The Stokes Field Guide to the Birds of North America* and tell how they designed it for you, the birdwatcher of today. Six years in the making, with over 3,400 color photos, this is the most comprehensive national photographic field guide ever published. The Stokes will give you a behind the scenes look at what's involved in producing a work of this magnitude and teach you how to fast-forward your bird identification skills. They will also show photos from the book of New Hampshire birds, including birds of the Lakes Region.

No charge but reservations are required.

HOORAY FOR TREES

Sunday • June 12 • 1:00–2:30 p.m.

Families

From the small dwarf willows to the mighty redwoods, trees are fascinating plants! Celebrate trees by learning how trees are different from other plants, how trees grow, and why they are important to humans and other animals.

Cost: \$7/member; \$9/non-member

INSECT INVESTIGATIONS

Thursday • June 23 • 9:30–11:30 a.m.
Families

There are more insects than people on this planet! Come take a closer look at these intriguing creatures that live nearly everywhere. We will venture to both terrestrial and aquatic communities to observe the many shapes, colors, and sizes of insects. We'll visit with some insect eaters too!

Cost: \$8/member; \$10/non-member

EARLY MORNING BIRDING CRUISE

Thursday • July 7 • 5:00–8:00 a.m.
Age 8+

Join Senior Naturalist Dave Erler to experience Squam Lake as the sun rises and bird activity is at its peak. We will cruise Squam in search of water birds, including Common Loons, Great Blue Herons, and Bald Eagles. At the southeastern end of the lake, we will take a short land excursion to see and hear bird species found in the forest and swamp of the Chamberlin-Reynolds Memorial Forest.

Cost: \$18/member; \$20/non-member

HOP, WIGGLE, AND FLY

Tuesday • July 12 • 1:00–3:00 p.m.
Thursday • August 11 • 1:00–3:00 p.m.
Families

From hopping frogs to flying birds, animals move in many different ways. We will explore different natural communities in search of wildlife and see the unique ways animals move. Let's get moving by wriggling, crawling, and hopping like the animals we observe.

Cost: \$8/member; \$10/non-member

TALES OF TAILS

Friday • July 15 • 10:00–11:30 a.m.
Friday • August 12 • 10:00–11:30 a.m.
Families

Animal tails take many shapes and sizes. Come and learn the amazing ways some New Hampshire animals use their tails. The whole family will love this engaging, thought-provoking live animal program.

Cost: \$7/member; \$9/non-member

WATER DRAGONS

Tuesday • July 19 • 9:30–11:00 a.m.
Age 7+

Dragonflies and damselflies are some of the most noticeable insects we see during the summer. Discover the lives of these tiny predators above and below the water's surface as we explore their life cycle and the adaptations these insects have for survival in their wet world.

Cost: \$7/member; \$9/non-member

DISCOVER THE NIGHT

Tuesday • July 26 • 7:30–9:00 p.m.
Tuesday • August 9 • 7:30–9:00 p.m.
Age 6+

What is night like for owls, bats, and beavers? We will meet two of the Science Center's live nocturnal animals and then go outside to explore their world. Discover the night through games, activities, owl calls, and a walk along a little-used Science Center trail.

Cost: \$7/member; \$9/non-member

ICE AND STONE — THE SHAPING OF SQUAM

Thursday • July 28 • 9:30–11:30 a.m.
Age 12+

The Lakes Region has undergone dramatic changes in its geologic history, most recently 20,000 years ago, when the last continental glacier flowed through the area. These changes were recorded in the stone surfaces and rock features left behind. Spend the morning locating traces and signs of this massive ice sheet on the rock outcrops and shoreline around Squam. Find out how those forces are still at work altering the land today.

Cost: \$8/member; \$10/non-member

THE ART OF OBSERVING: DRAWING FROM ASPECTS OF NATURE

Saturday • July 30 • 9:30–12:30
Adults

Explore nature's beauty and sharpen your awareness of the natural world through this class for artists of all skill levels. With beautiful Kirkwood Gardens and the Science Center's trails and exhibits as inspiration, you will create a finished drawing along with a series of sketches. Learn about artistic representation and nature study methods. Bring an open mind and be prepared for a wonderful day engaged in a morning of art making and discovery.

Cost: \$45/member; \$50/non-member

NEWT ADVENTURE

Thursday • August 4 • 10:00–Noon
Age 3+

Come learn about New Hampshire's state amphibian, the Red-spotted Newt. Find out why this species is unique among the state's 12 salamander species. We will start inside with a brief look at their life cycle and see photographs of their life stages. Then we will go outdoors in search of these amazing amphibians.

Cost: \$8/member; \$10/non-member

Limited space available; reservations and advance payment required unless otherwise noted. Programs are subject to cancellation if minimum enrollment is not met.

GARDEN THURSDAYS

THE YIN AND YANG OF PLANT CONSERVATION: NEW HAMPSHIRE'S RARE PLANTS AND THE INVASIVE SPECIES THREAT

Thursday • June 30 • 6:30–7:30 p.m.
Adults

Bill Brumback, Conservation Director of the New England Wild Flower Society will speak about conserving the rare plants of New Hampshire and fighting the invasive species threatening the biodiversity of the state. Learn about the fascinating lives of some the state's rarest plants, as well as how to recognize and control some of its worst invaders. Discuss the native and invasive plants often used in gardens.

*No charge to attend, but reservations are required.
Donations appreciated.*

EDIBLE LANDSCAPING: BEAUTIFUL TO BEHOLD AND BROWSE

Thursday • July 14 • 11:00 a.m. – 12:00 p.m.
Adults

Susan MacLeod will discuss edible and medicinal uses of flowers, herbs, and weeds. Learn how to integrate vegetables, berries, and fruits into your existing flower gardens.

No charge to attend, but reservations are required.

RETHINKING YOUR CUTTING GARDEN

Thursday • July 28 • 11:00 a.m.–12:00 p.m.
Adults

Karen Porrizzo owns Stone Gardens Fitness Studio in New Hampton where she combines her passion for gardening with her love of creating a comfortable environment for all types of wellness classes. Karen will explore new options for cutting gardens and flower arrangements. She will include the use of shrubs, perennials, annuals, and house plants.

No charge to attend, but reservations are required.

*All programs are at Kirkwood Gardens
(or in the Red Barn in case of rain).*

OUR DYNAMIC EARTH

ADULT LECTURE SERIES

The world around us is constantly changing, sometimes in slow and barely noticeable ways and at other times abruptly. Discuss local, regional, and global changes to Our Dynamic Earth.

No charge to attend, but reservations are required.

Climate Change and the White Mountains

Monday • July 11 • 7:00 p.m.

Steven Hamburg, Chief Scientist of the Environmental Defense Fund and Vice Chair of the Hubbard Brook Research Foundation, will discuss and show data highlighting the profound changes to the ecology of our forests and lakes due to climate change.

History and Ecology of the North American Beaver

Monday, July 18 • 7:00 p.m.

Learn why beavers make dams and what areas best suit them, as well as how to improve habitat for beavers and other wildlife. Matt Tarr, of the University of New Hampshire Cooperative Extension, assists New Hampshire Fish and Game Department to manage wildlife habitat for landowners, communities, and natural resource professionals.

A Brief History of Earth and its Life

Monday • July 25 • 7:00 p.m.

Trustee John Gephart has worked for over 20 years as a research scientist at Cornell University. He will review the dynamic nature of our planet through time and the Earth's present condition and changes occurring even now.

Invasive Plants in New Hampshire

Monday • August 1 • 7:00 p.m.

Chris Matrick is Botany and Non-native Invasive Species Program Manager for the White Mountain National Forest. Find out about one of the greatest threats to native flora of New England: invasive exotic species. Learn what you can do and what others are doing to combat them.

Changing Visibility in the White Mountains:

How Much is a Clear View Worth?

Monday • August 8 • 7:00 p.m.

Visibility in the northeastern wilderness has declined substantially since the 1970s. John Halstead, professor and chair of the Department of Resource Economics at the University of New Hampshire, will examine these changes and share how hikers and the general public value visibility.

The Gulf Oil Spill

Monday • August 15 • 7:00 p.m.

The April 2010 explosion and sinking of the Deepwater Horizon oil platform in the Gulf of Mexico and subsequent discharge of crude oil and gas may be the largest environmental catastrophe in U.S. history. Judith E. McDowell, Woods Hole Oceanographic Institute Senior Scientist, will share their findings about the oil spill, efforts to contain it, and plans for future studies.

This series compliments the "Seasons of Change" exhibit, which shows the effects of climate change on iconic aspects of New England life. Admission to "Seasons of Change" is included in trail admission. Look for the exhibit in the Mead Discovery Center at the Trailhead Gallery from mid-June through mid-September.

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by Ernest Thompson

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SCIENCE CENTER LAKE CRUISES

EXPLORE SQUAM

Through June 30 • Daily at 1:00 p.m.
July 1–October 16
Daily at 11:00 a.m. • 1:00 p.m. • 3:00 p.m.

EAGLE CRUISE

Through June 28 • Tuesdays at 3:00 p.m.

LOON CRUISE

June 17–August 19 • Fridays at 3:00 p.m.

NATURE OF THE LAKES

July 5–August 31
Tuesdays, Wednesdays, and Thursdays at 4:00 p.m.
September 1–October 13
Tuesdays, Wednesdays, and Thursdays at 3:00 p.m.

Reserve our canopied pontoon boats for your Church Island wedding, or charter a private cruise.

Contact Operations Manager
Tom Klein at 603-968-7194 x 10 or
tom.klein@nhnature.org for reservations.

NATURE TOURS

LAST CHANCE: Wildlife of Scotland Hebrides and Highlands

June 7–20, 2012



By special request, Executive Director Iain MacLeod is offering his Hebrides and Highlands tour once more. Join Iain for a two-week tour of his homeland in search of birds, beasts, history, and culture. This very personal tour of Iain's favorite Scottish haunts will give one and all a flavor of Caledonian heritage and natural history. Iain has chosen hotels with exceptional Highland hospitality, charm and comfort, outstanding cuisine, and spectacular settings.

Hebridean natural history highlights will include birds, seals, otters, and wildflowers on the rich "Machair" farmland and kelp-filled sea lochs of North Uist, Benbecula, and Skye. Along the way, we will visit ancient stone circles and spectacular white sand beaches.

In the Highlands we'll explore the ancient pine forests known as the Great Wood of Caledon and the lochs and marshes of the river Spey. Visits to castles, ruins, and other cultural antiquities are scattered throughout the trip. Iain might arrange a special dusk viewing of badgers (of *Wind in the Willows* fame).

Another highlight is the sight, sound, and smell of tens of thousands of breeding seabirds — including puffins — on the huge sea cliffs of the Aberdeenshire coast. The trip will wrap-up in historic Edinburgh with its famous castle, royal mile, and beautiful gardens.

This will be a trip to remember!

Group size limited to nine.

Cost: \$5,500 per person.

All-inclusive cost includes hotel accommodations and all meals, round-trip airfare from Boston to Glasgow, van transportation in Scotland, and admission fees to nature reserves and most other destinations listed on the itinerary. View a comprehensive illustrated trip itinerary at www.nhnature.org/nature_tours.html. Contact Iain at iain.macleod@nhnature.org to reserve your place or for more information.

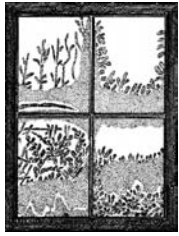
GREEN FACT

Here is one small thing that will make a big difference!

You can feel good about making a difference the next time you recycle your aluminum cans!

- Aluminum is nearly 100% recyclable.
- It is very durable and can be reused over and over.
- A used aluminum can is recycled and back on the grocery shelf in about 60 days.
- It takes 95% less energy to make aluminum from recycled aluminum than from ore. Recycling one aluminum can saves enough energy to run a television for three hours.
- Americans recycle more than half of the aluminum used in their homes. Most is from cans. However, thousands of tons of aluminum foil go into landfills every year—enough to create an entire fleet of airplanes.
- Aluminum in landfills takes about 400 years to break down naturally. If it is incinerated, it releases toxic metals and gas into the air.

earth911.com/recycling • www.ehow.com • www.epa.gov/osw/conserv



OPENING A WINDOW TO THE NATURAL WORLD

JOSIAH H.V. FISHER



Honorary Trustee Josiah H.V. Fisher, 89, passed away on July 29, 2010. Joe was a Trustee from 1974 to 1980 when he became an Honorary Trustee. He served as Board President in 1976–77. He was a New Hampshire native and served as an artillery officer in World War II and the Korean War. Later he spent 20 years in the CIA as an operations officer. He also served on the board of the Audubon Society

of New Hampshire, was active in conservation causes in New Hampshire, and was an avid birder. Joe and his late wife of 58 years, Charlotte W. Parker (“Parkie”), resided in Campton and wintered in North Carolina.

Throughout his tenure on the board, Joe was a strong advocate for estate planning to benefit the Science Center. It was through his leadership, along with that of Honorary Trustee Bertha Fauver, that a pooled income fund was created in 2005. Until his death last year, Joe received quarterly income disbursements from the fund. Thanks to Joe’s forethought and generosity, the Science Center received a gift of more than \$15,000 in December 2010.

Joe’s gift was added to the Board Designated Reserve Fund, an invested fund that earns income. Operational surpluses also go into the Board Designated Reserve Fund. The Board authorizes special expenditures at its discretion. This flexibility is an important resource for the Science Center’s ongoing financial stability and management.

You may contact Janet Robertson, Development and Communications Director at 603-968-7194 x 12 or janet.robertson@nhnature.org.

We are grateful for these memorial gifts received from January 1 through March 31, 2011

In memory of Jeff Mason
Lucy and Robert Talbot

In memory Paul Mayerson
Dorothy Chekas
Judy and Charles Sniffen

WRITING SPIDER continued from page 1

Looking closely at the female spider, you will see right away that it has eight jointed legs and two main body parts—the light-colored fuzzy cephalothorax (head and thorax fused) and the brightly colored abdomen. Note that the legs attach to the cephalothorax. If a leg is lost, spiders can grow a new but somewhat smaller leg the next time they molt. Although spiders and insects are both in the Order Arthropoda, checking numbers of body parts and legs tell you right away that spiders are not insects. Insects, in contrast, have six legs and three body parts (head, thorax and abdomen).

Let yourself be intrigued by the circular web. Dew often highlights these orb webs suspended delicately between plants. Silk for the webs comes from spinnerets on the abdominal section of the spider. It extrudes as a liquid but immediately solidifies into silk. On the web, you will notice a frame attaching to surrounding plants. From the center of the web, radii attach to the frame and lines form a spiral in the main section of the web. So, how does the spider move freely while not getting trapped in its own web? The frame and radii are spun first. Then, in creating the spirals, the spider makes a temporary swirl starting from the center, proceeding to the edge. These are not sticky. On reversing and making a spiral back to the center, the spider eats the protein-rich temporary spiral as it spins the final one with sticky silk. Then she moves on the radii but not the spiral!

Black and Yellow Garden Spiders are usually found waiting, head down on the central stabilimentum—that zigzag pattern of thick silk that sometimes looks like a series of “Ws.” This pattern has not reached the penmanship of *Charlotte’s Web* but this is a “writing spider” that lives near you! The significance of the stabilimentum remains mysterious. Found only in day-hunting spiders, the pattern seems to alert birds to the web so they do not fly into it. Intriguingly the silk in the pattern reflects ultraviolet light while the rest of the web does not, making an arrangement somewhat like a flower attracting insects. However, research shows that garden spider webs with zigzags catch fewer insects than those without!

When an insect inadvertently flies into the web, the spider feels the vibrations with its legs. One would think that with eight eyes, garden spiders would depend upon their vision, but they actually see rather poorly. With small prey, these spiders bite first, injecting killing venom, and then wrap with silk. For larger prey like grasshoppers, they might do the silk wrap first to get control of the situation. Since spiders have no chewing mouthparts, they simultaneously inject both poison and digestive juices into their prey. When the time comes to dine, they can merely suck up the contents.

What happens when hay fields are mowed? On our farm, I wondered how the garden spiders would fare. After all, they were my pest control assistants and brightened my days with their splendor. I was delighted to see that they moved to safe places along fence lines and even more chose to be around the garden. Some people may say, “The writing is on the wall.” I say it is in the spider webs and it’s worth reading!

TRAIL'S END

BEFORE WE ASK

One of the things almost all non-profit boards do is ask the community to help support their operations. In most cases, the equation is “dollars in, programs out,” and the business of asking is straightforward.

In the case of the Science Center, there's an extra dimension: this great big throbbing business that generates \$1.3 million or so in annual revenues. Well, it's not Exxon or Google, but it is the biggest full-time employer in Holderness.

So before we ask anyone else for money, we look at ourselves very critically to be sure we're shaking our own trees thoroughly and well.

Here are some of the questions we ask:

- Are we providing customers with “new news” *i.e.* fresh reasons to make repeat visits?
- Are we responding to changes in our capabilities, our business environment, our customer base (think: gas costs for school buses)?
- Are we maximizing the potential of ancillary services like the gift shop, Kirkwood Gardens, and off-site tours?
- Are we taking care of our people with wise and fair personnel policies?
- Are we availing ourselves of funding opportunities from governments and from private foundations?
- Are we getting the message out, to the people most likely to respond, that we're a great place to visit?

- Are we maintaining the physical plant, so it works well and doesn't cost a fortune in later repairs?
- Are we keeping a close eye on costs, particularly big ones like energy?
- Are we investing our endowment and our working capital astutely?
- Are we allocating overheads correctly, so we know which business components are most and least productive?

The next to last thing is to be sure we're asking members, visitors, and schools a fair price for the value we deliver.

Iain and his talented senior staff look at all these things, and more, week in and week out. The Board assists through its committees. That gets us to the last question: is the “Board on board?” *i.e.* are Board members sufficiently satisfied with the answers that we'll make leadership contributions to bridge the gap between operating revenues and total cost—a gap we'd like to keep below 25%.

And then we ask our donors for support ... an “ask” we're pleased to say the community has responded to in good times and in not-so-good. Then we get to say, “thank you” as often and as loudly as possible.

Trail's End is written by Laurie Beeson, Chairman of the SLNSC Board of Trustees. You may contact Laurie at 603-968-2409 or lbeeson@worldpath.net.

NEWSBRIEFS continued from page 5

- ◆ Due to inclement weather forecast for Clean Up Day on April 23, volunteers turned up earlier in the week to help. On Monday and Tuesday, students from Brandeis University's Heller School moved picnic tables, painted a wall, raked, swept, and cleared debris. A group of employees from Stonyfield Yogurt, a couple Plymouth State University students, and several staff members completed the monumental task of raking and clearing debris from the deer pen on Earth Day (April 22). Clean Up Day itself was cold, wet, and snowy, but 64 intrepid volunteers turned up and worked hard. Groups included: Boy Scout Troop #56, Rumney Cub Scouts, Brownie Troop #13139, Plymouth Regional High School Honor Society, Plymouth State University Tau Omega Sorority, Plymouth State University Service Saturday's, Longhaul Farm, and Rockywold-Deephaven Camp. These groups, along with many individuals, families, and 14 staff members polished, scrubbed, vacuumed, cleared debris, moved picnic tables, pruned branches, cleared ice from the otter pool, supplied baked goodies, and much more. Many thanks to everyone! Thank you also to these business for their in-kind donations to provide lunch for the volunteers: Bob's Shurfine Market, Ashland; Cabot Creamery Cooperative, Cabot, Vermont; Dunkin Donuts, Ashland; Golden Pond Country Store, Holderness; Hannaford Supermarkets, Meredith; Hart's Turkey Farm Restaurant, Meredith; Lakes Region Coca-Cola Bottling Company; Shaw's Supermarket, Gilford; Stonyfield Farm Yogurt; and Tootsie Roll.
- ◆ Dead River Company generously sponsored New Hampshire Day on May 1, with additional support from the New Hampshire Electric Co-op Foundation. Representatives from Dead River Company greeted and showed an energy efficiency display. More than 1,300 visitors turned out on a spectacular, sunny day.
- ◆ Daily *Up Close to Animals* presentations resume July 1 and continue through August 31 at the amphitheater. New this year, *Up Close to Animals* continues every Saturday and Sunday at 12:00 p.m. and 2:00 p.m., through October 9 (Columbus Day weekend). *River Otter Enrichment* is every Monday, Wednesday, and Friday at 11:30 a.m. *Turtle Talks* are every Tuesday in July and August at 11:30 a.m. Visit our website, www.nhnature.org for details.
- ◆ Learn about gardening—join a group of hands-on volunteers in Kirkwood Gardens every Thursday morning from 9:00–11:00 a.m. Contact Volunteer Coordinator Carol Raymond at carol.raymond@nhnature.org or 603-968-7194 x 22 to register.
- ◆ In addition to the benefits of national reciprocal admission programs with the Association of Zoos and Aquariums (AZA) and the Association of Nature Center Administrators (ANCA), this year Science Center members will enjoy free admission to The Fells in July and the McAuliffe-Shepard Discovery Center in September. For information about The Fells, see their website at www.thefells.org or call 603-763-4789. To learn more about the Discovery Center, visit www.starhop.com or call 603-271-7827 (not valid for special events or planetarium shows).

Save these Dates!

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SEPTEMBER 10**
HAWK DAY

**SUNDAY
JUNE 19**
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Free admission for
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OCTOBER 9**
**QUILLS,
SHADOWS,
AND LODGES**

**SATURDAY
OCTOBER 22**
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