CENTER LINE

A Publication of Waukesha County's Retzer Nature Center

Summer 2011

In this issue...

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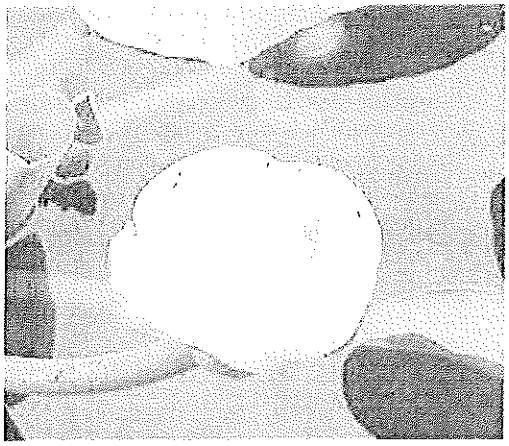
STRETCHING A WATERCOLORED CANVAS

The Wisconsin Glacier started 70,000 years ago-give or take a few leap years, when it forced its ice-aging ways into our state. The state of Wisconsin was transformed in those early ages by four major lobes of this glacier: Lake Michigan, Green Bay, Chippewa River, and Lake Superior. One minor lobe, the Wisconsin River Valley, was also involved with related advancing wrecking crews. My favorite locale, now called the Kettle Moraine, was formed between the Lake Michigan and Green Bay lobes of the Wisconsin Glacier. To make a lengthy article shorter, 10,000 years ago, when all the pushing, shoving and shifting culminated with a complete melt-down, Wisconsin's topography became a work of art to get acquainted with. With the leaping of transitional years, Wisconsin would inherit a treasure trove of landscapes, some branded in collected watercolors. A collection called Wetlands.

Wetlands are considered lands or areas containing much moisture. In Wisconsin's treasure trove there are four main watercolored types—Marsh, Swamp, Bog, and Fen. Our heritage left from an iceage. How exciting is that. Find a fast trail to a Wisconsin wetland. Let's start with a Marsh.

Marshes are treeless wetlands, a transition stage between water and dry land. Freshwater marshes develop in lake shallows or ponds, places where the water current is slow or nonexistent; cattails, sedges, and water grasses root out from the shore. On deep water slides, waterlilies and aquatic plants float on the surface. One might spot the Yellow Pond Lily with its cup-shaped flowers and heart shaped leaves floating on the water. One may also find a few Buckbean plants. This plant has white, starlike flowers, clustered atop leafless stalks. Surrounding leaflets in threes are oblong and leathery. Sometimes this plant is called Marsh Clover. Another marsh bloomer is Allegheny Monkey Flower. The plant is 1-4' tall with a 1/2-3/4" wide flower. Flowers are blue to lavender and have puffy lower lips. Leaves grow in pairs, are lance shaped; the stems are square. It's been reported that if you squeeze the Monkey Flower both of you will smile. Could be! Marshes are a haven for bird populations. From the small Marsh Wren to the Great Blue Heron, the American Bitterns to the Sandhill Cranes, Ducks and Geese and Grebes too, are just a few species of birds that congregate at the marsh. As wings flap and glide, search for mammals that frequent the area. Muskrats, Mink or an occasional Beaver could be hanging out with the White-tailed Deer. Among the reeds in shallower water, you may hear Spring Peepers or bellowing Bullfrogs. A marsh landscape is a colorful blend of flora and fauna. A canvas to study and jot notes, while the Dragonflies dance with the Viceroys.



(Watercolor... continued)

Watercolored masterworks can be found with a visit to the wetland called a Swamp. What identifies this wetland as a swamp, rather than a marsh, is the presence of trees and shrubs. Freshwater swamps, with their companions of the marsh, carry the cleanup of our environment on their shoulders. They are the artisans of our landscape, and although they forego all fees, their work spaces are now protected. Lands drained from slow-moving waters resemble sponges, and have the capacity for absorbing huge quantities of liquid. Multiple rains or melting snows, and the rivers and lakes will overflow, inundating forest areas. The region is turned into a vast swamp. The resulting wetland can absorb and retain millions of gallons of water and aid in flood management. Swamp wetlands also act as natural filters using plants and microbes that have adapted within this working system. The collectors trap sediment; and remove nitrogen and phosphorus. The green teams can break down animal wastes and toxic substances. Needless to say, the swamp abounds with rich plant life; and displays an opulence of bird species, including Belted Kingfishers, American Woodcocks, Common Yellowthroats, and Great Blue Herons. Northern Orioles and Prothonotary Warblers are found in Wisconsin's southern swamps. The Black Duck is a member of Wisconsin's northern auxiliaries. A preference of climate can be noticed in northern versus southern tree species too. Red and Silver Maples are found, also with Black Ash, in the southern swamp areas, while Hemlock and White Cedar prefer northern sections. Skunk Cabbages and Marsh Marigolds are early bloomers in the wetlands. Visitors to Wisconsin's wetlands should card a good field guide. There are numerous plants and animals to discover, observe and identify. Remember to slip a small camera in your pocket. Mammals are on the loose in the swamps! Moles, Minks, or Muskrats in the southern portions; Black Bears, Snowshoe Hares, even a Bobcat may be wandering around the northern areas. A Northern Water Snake could be skimming on a southern watercolor. A Wood Turtle may be sleeping on an old northern watered log. Something fishy can always be found in Wisconsin waters!

Third on the list of Wisconsin's wetlands is the Bog. Bogs are natural phenomena. The bog occupies a glacial depression; it conserves the cold of winter, and acts as an insulated microclimate. Bogs display the gradual evolution of their areas from open water to forested land. In the beginning a floating fringe of mosses and sedges encircles the pool of water. This is followed by shrubby growth and supported by floating vegetation, which eventually will penetrate toward the center. With passing of time, the bog undergoes all these changes, and will finally dry out. The mosses turn into peat, and the Spruces and Larches will surround and invade the areas. Peaty wetlands have no significant water movement in or out. The American Indians called the peat wetlands "muskegs"; this name is of Algonquian origin. To the Ojibwa the meaning was grassy bog. The sphagnum bog is named for its characteristic mosses. Because of the acid water and lack of oxygen, many aquatic life forms are absent from the bog. This absence is also true when it comes to fish species. They are not to be found in the bog. Birds and animals that are sighted are transients from surrounding forests. The shy Southern Bog Lemming likes to make an occasional appearance. Overhead, among the many birds frequenting the bogs, are Cedar Waxwings, Golden-crowned Kinglets, Yellow-bellied Flycatchers, and Palm Warblers, to name a few. What makes the bog inviting for investigation, however, is the amazing growth of carnivorous plant species that decorate the bouncy mat of sphagnum moss. The sphagnum bogs are acidic, anaerobic and cold. Plants and animals that die in a bog remain in the bog. Their nutrients do not break down. Carnivorous plants thrive in a habitat of acidic, nutrient-poor, freshwater wetland. Their essential nutrient, mainly nitrogen, which is needed for them to exist, is not to be found in their drinking water. Carnivorous plants have made adaptations in their watercolored world, to achieve this existence. How is this possible? They serve meat on the menu. Butterwort, a thriving plant of the bog, traps small insects in its leaves. Leaves are greenish-yellow and have a greasy sticky feel about them. They are clustered at the base of the plant stalks. Small insects crawl into the leaves and are trapped. With time the leaf edges curl over. The plant then secretes enzymes that extract nitrogen and vital elements from the victims. After this adaptation, the leaves will reopen for business. The Butterwort grows 2-6" tall and has tiny violet flowers. Each small flower has a spur, but all the action takes place within its buttery leaves. Another inventive plant of the bog is called the Northern Pitcher Plant. Here again, the plant has adapted a special connivance. The deed is done, again in the leaves clustered at the base. The shape of the leaf is what gives the plant its name. Leaves are shaped like colorful pitchers, which hold mostly rainwater. The hood, the leaf above the trap; uses a bright color and sweet nectar to entice. The plan works every time. The inside wall of the hood is covered with hairs, stiff hairs that point downwards. Isn't this a clever method to obtain a meaty entrée? The insect lands and hikes down right into the trap. Can't walk up because of the stiff entry hairs. A one-way street. The inner wall of the trap is as slippery as black ice. The victim walks in, slips down and can't return. Enzyme-producing glands found on the inner surfaces of the pitcher digest the meaty repast. The pitcher plant Sarracenia purpurea (the species found in Wisconsin) depends on commensal organisms to break down its prey. As luck will have it, indigestible parts such as wings and exoskeletons drop to the bottom of the pitcher and remain there through

the life of the leaf. Larvae of flies and mosquitoes, and some moth caterpillars, dine on the inside of the pitcher. They help in cleaning up the remains. When the adult moths emerge, they help by pollinating the flowers. In this partnership, the tiny critters benefit, the pitcher plant benefits, and all is well in the wetlands. Another plant to be found in the bog is Labrador Tea (Ledum groenlandicum). It has 5-petaled white flowers and narrow evergreen leaves. Leaf edges are rolled under, and leaf color is white or rusty on the undersides. It is a member of an acid tolerant family. Its root system buffers acidic waters. Another flower to draw attention in the bog is the Yellow Lady's Slipper. Flowers have beautiful slipper-like lips and brown to greenish spiral side petals. The flower is 4-24" tall and dances in the wetland picture April through August. This wetland is an exciting place to get bogged down and dirty!

After cleaning up the boots and getting a bit of rest, one is ready to take in the excitement of another Wisconsin watercolor landscape. Last, but not least, on the list, is that rare marsh-type wetland called a Fen. The water source of a fen comes in part from mineral rich groundwater. Concentrated calcium and magnesium bi-carbonates cause high "pH" readings in this wetland water. When mineral-rich groundwater bubbles up from below, saturating the fen, one of the plants that is most pleased, and will thrive in this environment is Watercress. Watercress can grow to be 10' long, with stems matted in the water and creeping up on the bank. Flowers are white, in clusters, and leaves are shiny and divided into many leaflets. Tiny snails and water bugs will be hanging-out with the watercress plants. It's their favorite salad bar. A pretty piece of flora in these wetlands is the Marsh Cinquefoil. Cinquefoil means "five-leaf". The cinquefoil has small flowers which are star-shaped and scattered on slender stems. Leaflets in groups of five are toothed. Many of the cinquefoils can bear flowers that can produce viable seeds with or without fertilization. Handy equipment to have in the fen. Other plant life found in the fen includes the White Lady's Slipper, the Swamp Thistle, and the Bladderwort, to name a few. Bird watching can be suitable entertainment while following a trail in the fen. Be on the lookout for the Swamp Sparrow, Yellow Warbler, or Common Yellowthroat. The Common Snipe also is a fascinating bird of the wetlands. He has a long, slender bill. Head, neck, and back are streaked in shades of brown, and he has a reputation for his unusual courtship performances at dusk. In spring, from high above, and probably out of sight, his humming, winnowing sound filters down to earth to attract a mate. This eerie sound, however, is not vocal, but is produced as air is forced through the bird's fanned-out tail feathers, as he makes his swoops and dives. Hopefully, a Common Snipe lady is in – waiting! This wetland is home to frogs and reptiles. Blanding's Turtles, Butler's Garter Snakes and Pickerel Frogs – all make their homes in this watercolored landscape called the Fen.

The bad news; Today only half of Wisconsin's original wetlands remain. The good news: fragments of wetland watercolors can be found at Retzer Nature Center, even the rare find of a Fen.

See you on the trail,

Shirley Blanchard

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HEARTWOOD

Awe-Inspiring Adaptations!

In April of 2005, our friends at the Mitchell Park Domes gave us about 2 dozen **walkingstick** insects for display in our animal exhibit. These new residents instantly became a big hit with school groups, families, and the general public. Now a walkingstick does not appear to do much—basically, they crawl slowly and deliberately, hang from assorted pieces of wood (or the cage screening), eat romaine lettuce, drink water, and grow slowly and steadily. Taken out of the cage and placed on someone's sleeve, a walkingstick does even less—it takes a few steps, finds a comfortable position, and then simply STOPS, freezes completely motionless, with one or more of its legs held utterly still in mid-air (it especially does this if the sleeve is earth-tone in color!).

I have never seen people get so excited about something so low-key. But I think the reason for this excitement is that we are intrinsically fascinated by **adaptation.**

An **adaptation**, in plain language, is anything that a plant or animal has—a structure, an ability, a behavior—that helps it to survive successfully in its habitat. All plants and animals have such adaptations—and the proof that the adaptations work is that the plant or animal is, in fact, alive. It survives, thanks to its adaptations. There's more than one way to skin a cat, and there's more than one way to successfully survive in your habitat—and witness the **variety of kinds** of plants and animals (**biodiversity**), the variety of ways that they are constructed, the variety of abilities and behavior they have, the variety of ways they manage to survive!

I like going to the zoo, and one reason to go to the zoo is to see the adaptations of animals—the giraffe's long neck, the zebra's stripes, the leopard's spots, the elephant's trunk. The zoo is great fun, but we needn't go there to see adaptations; the slightest characteristic of the humblest animal in our backyard turns out to be an adaptation of the greatest importance to survival. The butterfly's rolled proboscis, unrolling to drink nectar from flowers (even as the butterfly is dusted with the pollen it will carry, flower to flower); the squirrel's ever-growing front teeth, kept short and sharp by constant chewing on whatever's handy (for example, my wife's new birdfeeder), allowing them to make short work of acorns and hickory nuts; the sharp talons and hooked beak of the Cooper's Hawk (that sails into my yard), allowing it to pick-off a Mourning Dove, dispatch it, and take it home to the kids in the nest—all these are adaptations of the first order, on which survival literally depends.

An easily-understood adaptation is that of **camouflage**—an animal that blends in with its habitat is hard to see, thereby enabling it to escape detection by a predator (or enabling it to sneak up on its prey!). This gets interesting when you consider that camouflage is habitat-specific: an owl with tree-bark camo is starkly obvious on an open snowy hillside; the earth-brown mottling of a toad stands out against a green lawn; a vireo's tree-top green would be clearly visible against an understory tree-trunk. We're left with the conclusion that camouflage only works when the animal is 'home', in its particular habitat—and that the only way to protect an animal species from extinction is to protect the habitat where its adaptations work, to help it survive.

But back to the walkingstick, who takes camouflage to a whole new level!

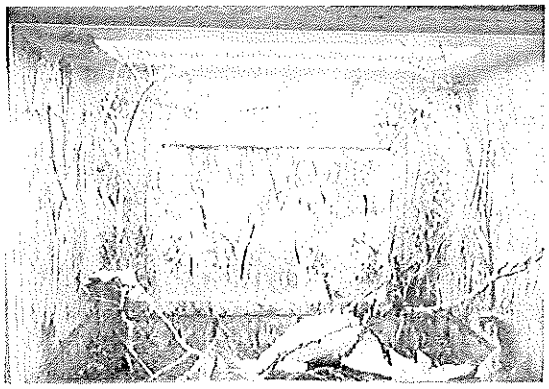
The walkingstick doesn't just blend into its tree-top habitat; it actually **looks like it.**
It **mimics**...in this case, a tree twig—complete with branch segments and angles, bark lenticels, and a suggestion of buds. This **mimicry** stands out as a special adaptation indeed, and the walkingstick's behavior cooperates—because holding still, frozen in place, is precisely what a twig would normally do (except for a certain amount of swaying in the wind), in order to look un-appealing as a food item for a passing bird (and if the walkingstick should chance to move while the bird is near, the bird's response would certainly be "wait a minute...", followed by lunch).

Each of the 2 dozen walkingsticks in our animal exhibit grew slowly but steadily in size, eventually reaching a body length exceeding 4 inches. At this size, one's attitude toward an animal seems to change—it outgrows the casual attitude most

of us have toward an individual insect, and becomes more like the curious regard one has toward, say, a toad or lizard. This comes to border on affection—and just about the time the individual walkingsticks were being given names, they came suddenly to the end of their short individual lifespan (being insects), and we would find them in the morning, one by one, motionless and dead on the mulch. By August 2005, all our original walkingsticks had passed on, and we sadly concluded that they were a fascinating but unfortunately transient highlight to our animal display. We were just about to clean-out the cage, when we chanced to notice tiny little pale green somethings moving around inside; examination with a hand lens revealed them to be 'walkingsticklets', baby walkingsticks, the progeny of our walkingsticks—newly-hatched from tiny eggs laid in the mulch!

Since then, our colony of walkingsticks has continued to be self-sustaining (for nearly six years now!), with each successive generation of adults replaced (after a few weeks) by tiny youngsters that grow slowly but steadily. They continue to be a big hit with successive years of school groups, families, and the general public, and they continue to impress us all with their low-key antics, and with their **awe-inspiring adaptations**!

Walkingsticks are members of the Phylum of Arthropods, Class of Insects, Order of Phasmatodea, Family of Heteronemiidae. Over 2000 individual species are found world-wide, mostly in the tropics, with about 30 species native to North America. They are considered to be close relatives of grasshoppers and praying mantises (and, like them, the young look like exact miniature copies of the adults—an example of 'incomplete metamorphosis'). Being insects, walkingsticks have a protective exoskeleton (but no internal skeleton), a segmented body, 3 body parts (head, thorax, and abdomen), and 6 legs. In addition to the obvious mimicry of stems and twigs, various species of walkingsticks have incredible built-in adaptations—including the ability to grow back lost legs, and the ability of females to reproduce young without mating (a fact which may explain the successful reproduction of the walkingsticks in our exhibit!).



Look closely - the walking sticks are there!

Although the walkingsticks in our exhibit are not the ones native to Wisconsin, you can indeed find native wallkingsticks in our forests and woodlands here at Retzer Nature Center!

Larry

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--Personal experience of the author, and the Naturalists at Retzer Nature Center.

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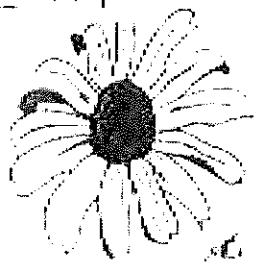
C4



That letter-number combination always seems to pique someone's interest. Some people think of a very stable, transportable, high-energy plastic explosive. Actually, most people probably make this connection thanks to action movies. If you are in the field or hobby of natural resources, you likely think of summertime; because that is when this method of carbon fixation really shines.

Yes, C4 refers to a way to convert carbon dioxide into solid compounds, thereby 'fixing' the 'C' part of CO2 for warm-season plants to utilize. How do they utilize it? Plants, like all life we know of, are carbon-based and use carbon as building blocks for most everything. More to the point, the 'solid compounds' are sugars, which make up the majority of the diet for any self-respecting photosynthesizer.

What are the advantages to the C4 pathway and why does it work best in the summer? This is a good question, and it implies there are other ways to fix carbon. C3 is another common method in plants, which converts CO2 (plus additional compounds—but that is another dissertation) initially into 3-carbon molecules, and eventually glucose. It usually has the advantage in early-succession situations and lower temperatures (Ellery et. al. 1992). The third and final means for plants to metabolize CO2 is called CAM (Crassulacean Acid Metabolism). There are few plants in Wisconsin that use this process, which is best suited for hot, arid conditions. CAM plants mostly only open their stomata (openings in the leaf surface for gas exchange) at night. This is great for conserving water, but poor for efficiency. They must store the gas until day, since photosynthesis requires sunlight as a matter of course. For a quick recapitulation, we know CAM plants are best in the desert, C3 plants grow well in the cool season, which brings us to C4 plants. They excel in warm temperatures, but need more water than CAM species to reach their peak. It now seems like each system has it's niche, but that still does not answer the above question.

The advantage of C4 metabolism is simply that it is hands down, bar-none, dog-gone, cat's meow, the most efficient way for flora to fix carbon; period (McKown and Dengler 2010) (Kubien and Sage 2003). It produces the initial 4-carbon molecule; the basis for it's name. This molecule was discovered in 1966 by Slack and Hatch as they compared tropical grasses to some well-known agricultural plants. The grasses seemed to grow at very high rates. They found the tropical plants assimilated more CO2, and produced more food as a result. They also found that it took about one third more energy (in the form of ATP—Adenosine Triphosphate) to produce each sugar molecule. Even though it requires more energy, C4 plants are more efficient in warmer conditions, producing more energy in the form of glucose than it takes to fix the carbon in the first place. This only makes sense, since any form of life would die if it were otherwise. With the hot, blazing sun providing the necessary, extra energy, these plants can produce some serious biomass.

While these Carbon-4 powerhouses make up only about 4% of the world's plant species, some estimate they contribute 18-21% of the world's floral productivity (Ghannoum et. al. 2000). This is due to the tropics, but more due to the world's grasslands, where the graminoids (grasses, sedges, and rushes) receive the full benefit of the Sun. This speaks to the importance of grasslands; specifically native grasslands. The prairie is where to find these plants in our area. Look for the Big Bluestem, Little Bluestem, Prairie Dropseed, Indian Grass, Prairie Cordgrass and Switchgrass stems this summer. These are what we call 'warm-season' grasses (as compared to 'cool-season' grasses like those in your lawn, which grow with gusto in the spring and fall). If you noticed (and even if you did not), there are no forbs (broad-leaf plants) in that list. There are no C4 forbs in the Mid-west; the ones that survive the heat and drought of the summer, do so with very deep and large roots.

Finally, each species has only one method 'on board' to fix carbon. It would be an incredible advantage if a given plant possessed multiple techniques, selected by environmental conditions, but this is simply not the case. Different plants fill different voids in natural communities, and different methods of photosynthesis help us to understand the 'why' and 'how' of it all. Have a great summer.

Mike

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The Last Prairie...References Continued

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EDUCATION CORNER

TAKE A HIKE

Where, when, how and why would someone want to do such a thing. What is hiking, or for that matter, going on a hike?

By definition, this can cause confusion for some. Do you mean—to walk, stroll, increase an amount, or to get lost? Whatever the final meaning comes to be, they all seem to lean towards moving in some manner. Therefore, now that we have movement, we need to find our direction. As one begins on the journey ahead, will this over shadow the destination you reach at the end. Which is more the experience in taking a hike—the journey or the destination?

Let's start with the journey. You might need to have an idea of the final destination, if you require transportation or lodging on the other end, but for the better part of the experience this fact can quickly disappear from thought. Which direction to go? Pick one. Type of terrain, depends on how hard you want to work or sweat. Okay, off you step and what is the first notion that you are taking a hike? Notice the quiet, surrounding you- No phone ringing, computerized game blaring, dog barking, or kids bickering. Just the sound of nature speaking to you, then all you can do is oblige its request for a deep breath and calm.

Next few steps bring even deeper calm and relaxation to your being, so time is of no concern and you keep moving forward not wanting to look back. Ahead lies an unknown adventure waiting to draw you closer into simple ideas and tasks. Whether it is to stop and listen to the sounds from a nearby tree or the calm babble of the stream as it runs along it banks, the journey is only just beginning. Further, away from our busy lives, we stroll along the path and just past the next rock, tree or bench, you find another pausing moment to soak in what nature is offering up. What makes us long for this slower pace that we are so willing to step into, without the slightest glimpse at time? So your journey takes you along a path, trail or even the edge of a road, you will continue to make a forward progression and take in the sights, sounds and wonders offered just for you. At some point, reality knocks, bringing you back to the time you have left in taking a hike. Do you speed up your pace to reach the end of the journey or do you turn around and go back to finish at the start. Choices that must be made can lead you into the new or head back through the old, with hopes of finding new along the way. One direction or another, you will end up at your destination, through a journey that has given you time to slow down and discover why taking a hike is an important activity everyone should make time for.

I guess the journey is more important than the destination, as long as the journey continues to provide new discoveries and adventures for us all.

Lets all go take a hike!

Amy Zentner
Naturalist

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RETZER NATURE CENTER

WAUKESHA COUNTY PARKS & LAND USE
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The Friends of Retzer Nature Center is a registered, 501 (c)3, organization dedicated to encouraging, perpetuating, and promoting the work of conservation and natural resource education.

The organization seeks the involvement of the community in the form of financial and volunteer support to work toward the continued growth and improvement of Retzer Nature Center. If you would like to become a member or view some of our projects and activities, please visit our web site at http://FriendsOfRetzer.org.