NATURALIST NOTES

MAY 2024

NPAT Receives Prairie Education Grant

The $15,000 grant will provide prairie education to underserved youth in the Greater Houston area. Congrats, Della !

New Tiger Beetle Species Discovered in Houston Area

Researchers discovered a new species of tiger beetle, *Eunota houstoniana*. It is found east of the Colorado River in partially open salt pans surrounded by grasses and other vegetation. The populations are vulnerable due to habitat loss.

https://doi.org/10.1038/s41598-024-56875-9

Goats Return To HANC

Goats will be helping remove invasive species and increase biodiversity from May 20th – 26th. They will be in a 3 acre area along the Outer Loop between the South Meadow and Muscadine Grape trails. Visit them from 7 am to dusk any day.

Check out our website

https://txmn.org/gulfcoast

The Gulf Coast Chapter was founded in 1999. According to the 2023 Annual Report, our chapter has contributed 223,677 volunteer hours.

Patterns in Nature – Spirals

From ferns to galaxies, spirals are found at many scales. Many mollusks grow spiral shells, the rest of this article will focus on these.

Surprisingly few rules are required to produce various spirals. A Scottish scientist working during the first World War, Sir D'Arcy Wentworth Thompon, listed four rules. He thought of spiral shells as two-dimensional objects spinning around an axis in three-dimensional space. Imagine putting a long, thin needle through the center of

the *Hainesia crocea* on the left and allow it to rotate like a spinning top around this axis. The shell has grown downward from the tip. The first rule is that the cross-section of each coil remains the same, in this case approximating a circle. Second, the shell's curvature expands from the center at a fixed rate. The whorl's overlap remains the same, and last, the angle between the whorls and the center is constant.

To further explore possible shapes, David Raup looked at how quickly a shell flares, how fast it gets taller, and the distance from the whorls to the central axis. *Hainesia crocea* flares relatively slowly, gets moderately taller, and has a short distance between the whorls and central axis. In contrast, the moon snail or shark's eye flares more quickly, but gets taller more slowly and has a slightly larger distance between whorls and the central axis.

Not all possible shell shapes existed or currently exist in nature. Some may be too heavy, too fragile, or offer too little protection against predators. Another possibility is that the mutation(s) producing a particular shell shape have not occurred, therefore evolution could not create that shape. Next up, waves.

Credits: Pictures from Wikimedia.org. Resource: Scales, Helen (2015) Spirals in Time: The Secret Life and Curious Afterlife of Seashells.

Shoo Fly, Don't Bother Me

What comes to mind when you think of flies? Annoying fruit flies, noisy houseflies, biting horseflies? Flies (*Diptera*) come in many shapes and sizes. During the 2024 City Nature Challenge I came across several I had never seen before.

Genus *Physoconops*

My initial guess was that what I was seeing was a wasp. The body clearly narrowed between the thorax and abdomen. But iNat identified it as genus *Physoconops*, a genus of thick-headed flies in the family Conopidae. To narrow it down to one of the 13 species in the genus, I would have needed to take a picture from the top. The thickness of the petiole along with the pattern are important field marks.

Genus *Ozodiceromyia*

This fly belongs to a genus of stiletto flies in the family Therevidae. The larvae prey on insect larvae in the soil, while adults are adapted to drinking liquid food. Although there are about seven species in the genus, the species most commonly observed in Houston is *O. notata*.

Bristle Flies (Family Tachinidae)

My original guess was that I was looking at one of many small native bee species nectaring on frogfruit. Not so! This is a bristle fly, possibly mimicking a bee. Most Tachinids begin their lives as protelean parasitoids of arthropods, mostly other insects. The larvae consume the insect, then emerge as free-living adults.

So next time you see an unfamiliar insect, remember that it may be a fly disguising itself. Discovering a new-to-me organism or two is part of the fun of the City Nature Challenge.

Bowled and Beautiful – or How Trees Compartmentalize Their Problems

If you remember from the March newsletter, I was pondering questions about what I was seeing in the bowl my husband had made from a fallen Hackberry tree. This month's article will address the dark lines you can see that separate the blue-stained zones from the yellow zones. See Photo 1. As Dr. Blanchette mentioned in the March article, these lines show that this Hackberry was trying to protect itself by isolating the areas infected with blue fungi from the rest of the tree. Unlike humans or animals, whose bodies work to heal wounded and infected areas, a tree will separate and seal off wounds and infections from the rest of the tree as it continues to grow.

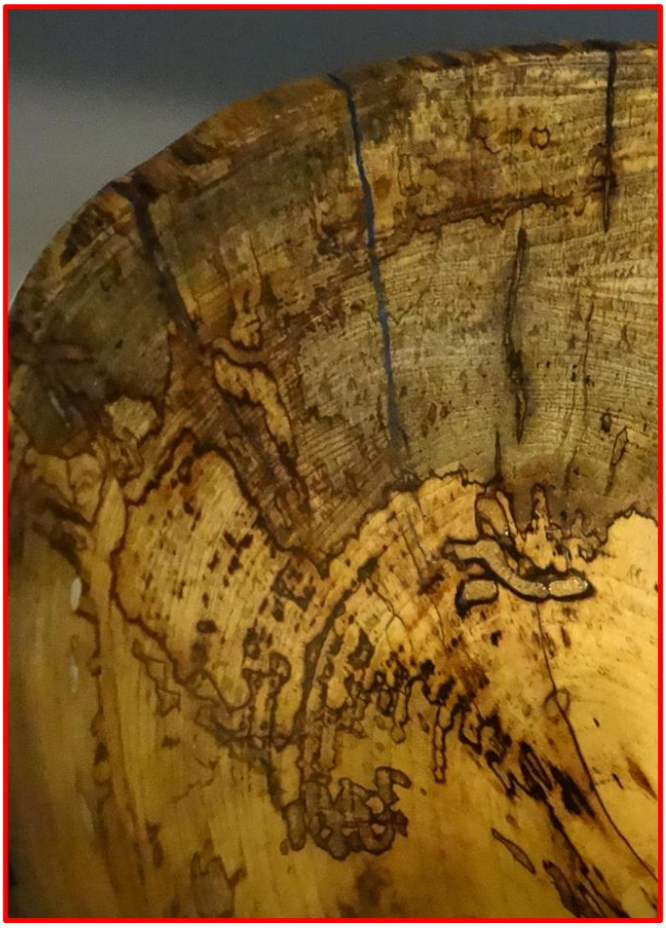

Photo 1: Hackberry bowl and expanded view to highlight blue stain and compartmentalization. Note that bright blue in the bowl is epoxy filling a large void, though blue stained wood is natural.

To begin with, trees are highly compartmentalized vascular plants. Look at the cross section in Diagram 1. You can see compartments made from the bark and intersecting growth rings and medullary rays[1]. In three dimensions, growth rings are analogous to concentric walls that encircle the pith[2] and extend the entire length of the tree. Medullary rays are analogous to walls that radiate out from the pith, though they are not

continuous top to bottom, nor do they intersect all the growth rings. The bark protects the tree from pathogens. When a tree is wounded, whether by animals, insects, storms, or weed whackers, the bark may be breached, and the tree's first line of defense is gone. Wounds that penetrate bark expose underlying tissues to successions of invading pathogens (e.g., fungi and bacteria) that destroy these tissues that are essential for tree function and structural support.

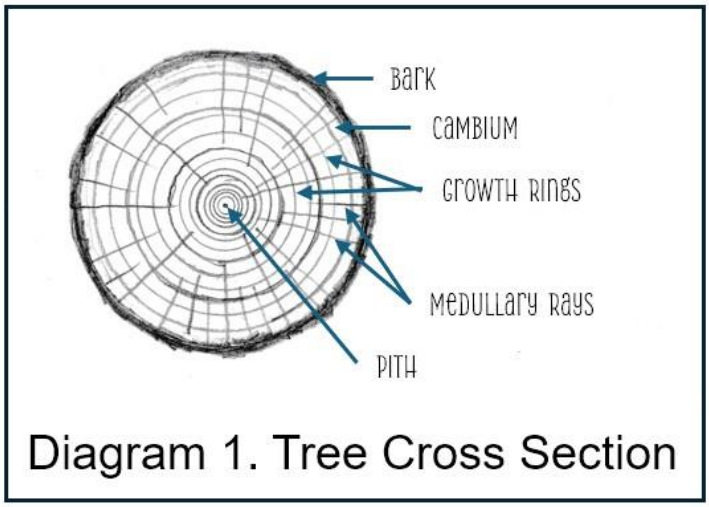

Diagram 1. Tree Cross Section

So how do trees protect themselves when wounded? Dr. Alex Shigo, a Biologist and Plant Pathologist with the US Forest Service, studied decay in trees. He developed a concept called compartmentalization to describe how trees respond to wounds. Both existing (aka constitutive) and those created at the time the tree is wounded (aka induced) features are employed to compartmentalize or 'wall off' the wound to stop the spread of microorganisms and associated decay into the wood. Dr. Shigo called this process CODIT – **C**ompartmentalization **O**f **D**ecay and **D**amage **I**n **T**rees.

CODIT is comprised of two parts:

Part One sets physiological boundaries in the wood present at the time of injury. Three chemical boundaries or 'walls' develop within the wood to stop the spread of decay within the tree:

Wall 1: The main flow of materials in a tree is vertical, so one of the first things that happens after wounding is when chemical compounds plug this vertical flow system, thereby creating horizontal walls above and below the injury.

Wall 2: The last few series of cells in a growth ring form the vertical Wall 2. It is continuous around the growth ring except where it intersects a ray.

Wall 3: The medullary ray cells define the side walls of the compartments.

Part Two forms a barrier zone after the tree is wounded – Wall 4. The cambium[3] forms the fourth wall, closing off the wound at the surface, where the pathogens and resulting decay were introduced. Wall 4 creates a barrier that keeps the decay from spreading outward as the tree continues to grow. Note that though Wall 4 is the strongest, it does create a weak point where internal cracks may originate as the tree grows.

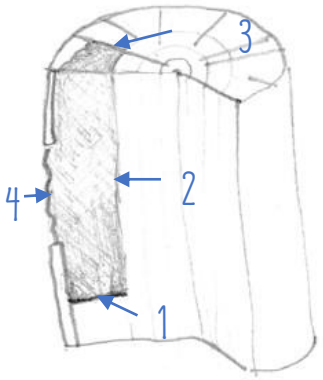

Diagram 2. CODIT 'Walls'

Back to Photo 1. The dark lines you see are the 'walls' the Hackberry built to stop the spread of the blue fungi. It looks like a battlefield.

You can imagine the battle: the tree erects walls to contain the invading pathogens and stop the decay; the pathogens beat at the walls, go around them or outpace the tree's wall building efforts. The need to compartmentalize might exceed the tree's ability to create and store energy to sustain itself and to keep the pathogens at bay. As the walls fall, the pathogens move from compartment to compartment and expand their presence and the associated decay. The tops and bottoms (Wall 1) go first, then the inner walls (Wall 2), and then the side walls (Wall 3). Most of the time the barrier wall (Wall 4) holds and confines the invaders to the wood present at the time of wounding. Haven't you wondered how a hollow tree can have a green, leafy crown? Well, now you know. Wall 4 succeeded and the tree continued to add growth rings, while walls 1, 2 and 3 failed.

For generally healthy trees, the blue staining fungus that you see in Photo 1 will not kill the tree and it will co-exist happily in its compartment within the tree. The Hackberry that fell was a seemingly healthy tree. It had a full, green-leafed crown, its trunk was almost two feet in diameter, not hollow, and the tree was at least 50 feet tall. I don't know why it fell – weakened from having to build too many compartments? Internal cracks? Too much decay? All of the above? What I do know is that the bowl created from the trunk is beautiful and I have learned something new!

Next issue: Ambrosia beetles, blue fungi and other phenomena that stain wood

NOTES:

1. Medullary rays, aka vascular or pith rays, are cellular structures in some trees that are responsible for the radial conduction of water, minerals and other organic substances between the center and the periphery of the tree.

2. Pith refers to the soft, spongy material that is present in the center of the stems and roots of vascular plants. This tissue is also known as the Medulla. It is composed of large cells with thin cell walls whose function is to store and deliver nutrients throughout the trunk, branches, leaves, and roots.

3. The cambium is the growing part of the trunk just inside the bark.

References

Compartmentalization of Decay in Trees, by Alex L Shigo and Harold G Marx, USDA, Forest Service, Agricultural Information Bulletin 405, July 1977. https://www.nrs.fs.usda.gov/pubs/misc/ne_aib405.pdf

https://everythingarboriculture.com/codit-in-trees-explained/, 'Tree Facts – CODIT in Trees Explained 101', 2024.

https://www.indefenseofplants.com/blog/2018/1/23/how-trees-fight-disease 'How Trees Fight Disease', January 23, 2018.

https://www.northcountrypublicradio.org/news/story/41982/20200725/how-trees-protect-themselves-from-wounds-disease-and-pests-including-us by Paul Hetzler, in Val-Des-Monts, QC, July 25, 2020.

Compartmentalization Today, by Kevin T. Smith, Arboricultural Journal 2006, Vol. 29, pp. 173–184 © AB Academic Publishers 2006 Printed in Great Britain
https://www.nrs.fs.usda.gov/pubs/jrnl/2006/nrs_2006_smith-k_001.pdf

A Busy Spring for Outreach

Thanks to everyone who has volunteered with outreach this Spring, our chapter has been able to participate in events throughout our service area. Under David Gwin's leadership we have reached people who've not heard from us previously. Look for a more detailed report on outreach activities and impact in one of the summer newsletters.

As the mind drifts

Memories

Flutter down from overhanging cottonwoods,
Whirl in unexpected eddies

- Nancy Kenney Connolly, 2009
"Drifting"

Chapter Field Trip to Quintana Neotropical Bird Sanctuary

Six of us met up on April 26 for the chapter field trip to the Quintana Neotropical Bird Sanctuary. Shannon Morrison, who regularly volunteers at the sanctuary, and Stephanie Turnstone were our leaders and birding experts. I was the newbie—new to GCMN and new to serious birding. Shannon gave me tips on proper use of binoculars and showed me the best birding spots, including a blind deep in the woods overlooking a pond. Altogether, we spotted 32 species of birds, including the first sightings of the season of the migratory Cape May Warbler (below), seen in the woody vegetation and flying in and out of the blooms of a century plant.

Cindy Forbes, Photos by Andrea Matthews