



PRAIRIE BREEZE

THE LIVING PRAIRIE MUSEUM NEWSLETTER

FALL 2019

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FALL INTERPRETIVE CENTRE HOURS

September: Sundays,
10-5 pm
Programs by
Appointment

UPCOMING EVENTS

**Volunteer Seed
Collecting**

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Get the latest news here:

friendsoflivingprairie.org



A New Way to Enjoy the Trails

We have a new way for guests to learn about the prairie. We revealed our plans to complete a new trail system in our spring issue, and we've made it happen. We now have a beautiful interpretive sign at our trail head and new markers for self-guided hikes.

Our goal was to mimic the signage that one would find at provincial or federal parks. Our guests can now get a primer on site history, ecology, cultural significance, and management. The sign includes a trail map and some reminders about responsible trail use. Our hope is this sign will improve the appreciation of the site, especially at times when staff may not be present to explain.



The base of the sign is cut to represent the logo of the Friends of the Living Prairie Museum, whose grant helped us create this artful piece. The sign height allows the reader to see the prairie while learning about the preserve. The stressed metal of the base matches the beams of the annex and the exterior aesthetic of our interpretive centre. Our old stone markers were deteriorating, so 16 trail markers with laser cut numbers were also installed. This was in addition to a complete reversal of the trail system. Our trail once started after exiting the museum through the back door. Now, the trail begins after having the opportunity to read the new sign.



The last piece will be a plexiglass case to hold the trail brochures used on self-guiding hikes. We hope you enjoy the new sign and markers on your next visit.

Kids ask the best questions: Bison teeth and phytoliths

An inquisitive child, while learning about bison teeth in our education programs, blurts out: "What wears away bison's teeth? Don't they just eat grass?" It's a good question; kids always ask the best ones. Why do the teeth of grazers wear away over time?

When looking at the wear on a bison tooth, you'd think they were chewing rocks. In a way they are - plants accumulate "rocks" in their tissues. The water absorbed by their roots contains minerals that occur in the soil. Plants will naturally accumulate these substances as "phytoliths" (phyto = plant + lithos = stone), which are most commonly composed of silica, calcium, or opal. Different plants produce different phytoliths, and phytoliths can come in different shapes and sizes. Members of the Poaceae family (grasses), for example, accumulate high levels of silica - approximately 2-5% of the dry matter in grass leaves. Phytoliths may form as micro-hairs, prickles, fan-shapes, plates, and more. Plants benefit from these structures through increased strength, drought tolerance, and protection from herbivores. You can almost think of phytoliths as thick, medieval castle walls providing a structural barrier against invaders. Yet herbivores have found a way to circumvent some of the harsh effects of these little stones.

If you are a bison, North America's largest herbivore (the average male weighs 739 kg/1,629 lbs.; females 440 kg/970 lbs.) you will eat an average of 11 kg (25lbs) of grass a day. That's a lot of chewing, and since researchers have found that some phytoliths are harder than tooth enamel, a lot of potential damage. Bison and other prairie ungulates have evolved with adaptations that allow them to cope with inevitable wear. They have high-crowned molars (hypsodonty) that extend well beyond the gums, giving them more longevity in the face of constant abrasion. Herbivores have been coping with tooth-grinding grasses for a long

time, even before modern mammals dominated the landscape. Paleontologists have found phytoliths in the dung of herbivorous dinosaurs.

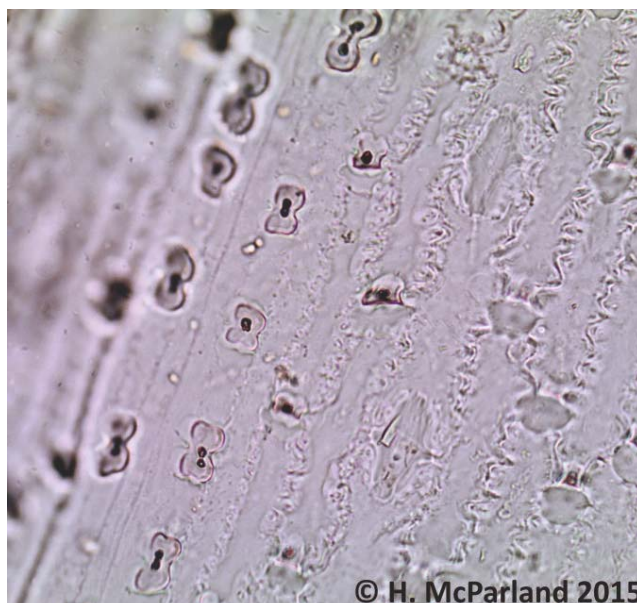


Image showing bilobate (bow tie-shaped) phytoliths in millet. Photo by H. McParland-Clarke



Image of a bison jaw and teeth showing hypsodonty. Photo by Kathryn Hoppe

Phytoliths drive evolution, but they may have also contributed to extinctions. We know that shifts in climate caused major changes in flora and fauna in North America six million years ago. But could plants have played a role? James Ehleringer and Thure Cerling - University of Utah - reported that the composition of fossil teeth from ancient horses and other grazers reveals a major shift in late-Miocene plants from C3 to C4. Plants in the C3 category have a

Kids ask the best questions: Bison teeth and phytoliths

simpler photosynthetic pathway for making energy, while C4 plants have a more complex pathway, and produce more phytoliths. In fact, C4 grasses, which have more veins than C3 plants, produce more than five times as much silica. Paleontologist Steven Stanley of Johns Hopkins University has suggested that some herbivores couldn't adapt to the tough grasses that began to dominate with changing climate. Species with high-crowned molars survived the Miocene epoch, but North American camels, rhinos, and many species of horse with low-crown molars did not. The combination of changing climate and forage could have doomed animals that were not long in the tooth.



The skull of an early North American horse, Meshippus sp. with low crowned molars. Photo credit: AMNH 2007

Using grass as a food source certainly isn't limited to mammals. If these structures influence grazers so strongly, we must be able to see their effects on other plant-feeding life. Fergus Massey (University of Aberdeen) and Sue Hartley (University of York) found silica wears down invertebrate herbivores too. Their study monitored the impacts of silica on armyworm caterpillars. Some impacts the caterpillar could cope with, but some accumulated with negative effects over time. The mandibles, or jaws of the caterpillar, were worn down by the silica in the grasses very quickly. The wear was enough that it reduced the ability to feed in each instar (the period of life between moults as a caterpillar

grows). Insects have a clever response to this wear - each moult replenishes the mandibles with a new, sharp cutting edge. So while there may be a reduction in feeding in each instar, the caterpillar gets a fresh start when it sheds its skin. Other results showed that insects do have difficulty coping with high silica over time. The ability to absorb nitrogen from their food diminished as the insect continued to feed on the high silica plants, which limited their ability to grow at an optimal rate.

Mandibular wear isn't limited to caterpillars. Any insect that feeds on a plant with phytoliths will have some form of damage. Grasshoppers are some of the most common grass-feeding insects. They have hard jaws adapted to snipping away at grass leaves, but once they're adults they cease to moult, so would have to endure the wear as they feed. How does an insect like this cope? Looks like that's a dive into the literature for another day.



A red-legged grasshopper. Photo by Randy Lowden.

Thanks to that inquisitive child, we've had the opportunity to learn just how grasses bite back. From large animals like bison to small caterpillars, grasses leave their mark, drive adaptations, and potentially change the major fauna on our landscape. All of this due to some little stones with big impacts.

Thank You



A big thank you to all of our Monarch Butterfly Festival volunteers!

This was another great success, with over 1500 people in attendance. We gave away about 600 milkweed plants - that's a lot of habitat!

MUSEUM STAFF

Sarah Semmler
Lois Grieger
Kelly Ferrand
Josh Pearlman
Cam Bush



Thank you for receiving your newsletter electronically.

UPCOMING EVENTS

Volunteer Seed Collecting Workshops

We are seeking volunteers to help collect native seeds at our seed plots and in natural areas! Volunteers will learn about the museum's efforts to conserve the genetic diversity of prairie landscapes, as well as sustainable harvesting practices.

Events begin at 6:00 p.m. and end at approximately 7:00 p.m. Please call 204-832-0167 to register for one of the following dates:

September 12 at Little Mountain Park

September 18 at the Living Prairie Museum's seed plots in St. Norbert*

September 25 at the Living Prairie Museum's seed plots in St. Norbert*

September 26 at the Living Prairie Museum

*We will lead a convoy to the seed plots - the meeting place will be provided when you register. Bring gardening gloves and water!

Winter Speaker Series

We know, we know...the last thing you want to think about is winter right now! Especially with this recent heat wave. But, we do want you to keep in mind that our Speaker Series is coming up!

The 2020 series kicks off on January 14th. Remember to watch our website for the list of upcoming speakers.



LIVING PRAIRIE MUSEUM

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