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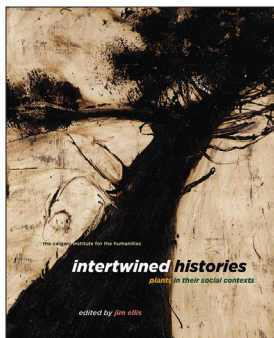
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INTERTWINED HISTORIES: Plants in their Social Contexts

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an ancient partnership



prairie grass, bison, & First Nations
wes olson

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At first glance, the relationships between native grasses, plains bison, and Indigenous people seem obvious and simple. It's the perfect ecological triangle: grass grows, bison eat grass, and people eat bison. But when you delve a little deeper into this assemblage, it quickly becomes clear that it is more complex, linked by intricate relationships and dependencies that are invisible at first glance. So where to begin?

Let's begin with snot, and more particularly with bison snot. Without bison snot, none of the connections between grass, bison, and Indigenous people could exist. It is the foundation upon which everything else is built, and without it this ecological triangle would collapse.

As bison graze across a prairie landscape they do so with their noses swishing through the grasses in a rhythmic back-and-forth motion, their rough prehensile tongues curling out to grab small bunches of grass. Every time she breathes in, the bison is inhaling microbes; fungi, bacteria, and protozoa that coat the surface of every blade of grass. The number and diversity of microbes are mind-boggling. For example, Torsvik et al.¹ identified more than four thousand microbes per gram of soil in a forested environment. Astounding, but what has this to do with the ability of a group of First Nations to survive on the northern Great Plains?

As the bison grazes she periodically stops to chew her mouthful and follows up with a quick cleaning of her nostrils. All those microbes get caught in the moist mucus lining her nostrils, and she periodically needs to clean her nasal chambers. She does this by reaming each nostril with her tongue and, in doing so, swallows all of the accumulated microbes caught up in her snot. These microbes are what allows her to digest the cellulose in the vegetation she just consumed.² As the seasons progress, the types of microbes on the vegetation also change,³ and consequently, so too does the rumen (the first of four stomachs) microbial populations. This continuum of gut microbes allows bison to adapt to constantly changing forage conditions. Without these specialized cellulose digesters, she would starve, and without her, so would the people who depended upon bison for their survival.

As bison move across the landscape in space and time, they are constantly searching for the most nutritious and most easily digested forage. They primarily hunt for grasses, and on the plains, two general types of grasses exist, known as cool and warm season grasses. Each is adapted to a suite of environmental conditions that enable it to thrive.⁴ Cool season grasses are the first to emerge from under the winter blanket of snow, and the bison know this. The bison's annual round of activity is at least partially dictated by the location and abundance of cool season grasses from March through June—the period when these grasses provide a high-quality diet.

Maternal bands form two different groups during the spring: the “haves” and “have-nots.” As each cow in the group drops her calf, she moves away from the main herd and is quickly followed by other mothers with calves, forming maternal bands—the haves. Those barren cows, or cows too young to breed, form groups of have-nots—those without calves of their own. Both groups seek out patches of cool season grasses that are expansive enough to feed large groups of bison. Being in large groups and mass calving is an anti-predator strategy, one that swamps predators with so many identical choices that selecting one calf among the many is difficult.⁵ Bulls, during the spring, are scattered in small groups or as lone individuals, each seeking out small patches of rich forage. Isolation makes it difficult for predators to find these bulls, and they leave the large grazing areas for the cows.

First Nations people understood the relationship between grassland type and the seasonal movements of bison from one type to another and were able to predict with some certainty when and where the bison could be found. This predictive ability was a science that took thousands of years to perfect, and with this knowledge, each facet of their societies could be maintained. This includes such factors as when to harvest bison for tipi covers or for food and clothing.

Needle-and-thread grass (*Stipa comata*) is a classic cool season grass, one that produces the highest-quality forage for bison during the early spring. Its spring protein content can be over 20 per cent, but by early summer it drops to just 5 per cent.⁶ By July the golden brown seeds with their distinctive needle-sharp awns have formed, and Indigenous people knew that when they began to see these seed heads sway and shift in the winds, bison cows were fat and at their prime.⁷ Coincidentally, bison, with their shaggy beards and long pendulous chaps, were active participants in the reseeding of their own pastures. The barbed seed head evolved with grazing ungulates, and through a process referred to as epizoochory, these seeds can be carried tremendous distances by migrating bison. At some distance from the parent plant the seed falls off and new plants become established.

Spring is the time for harvesting bison for new tipi covers, and spring cow hides were always the first choice.⁸ By the end of winter, cow hides, and in particular those of the barren cows, had the least amount of subcutaneous fat to remove from the fresh hide. The hide was at its thinnest and lightest, and at this time of year, the winter coat was being shed—all criteria for the perfect tipi cover. Coincidentally, groups of walking tipi covers were forming (the have-not cows) just at the time when new hides were required. The women of the village must have felt a sense of urgency to get these hides, because even gaunt old cows gain weight and fat quickly on the diet of fresh cool season grasses, and once missed, the opportunity to acquire the ideal tipi hides would not come for another year.

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An average of ten hides was needed to cover a tipi during the pre-horse era.⁹ Severe cold, heavy rains, and bleaching suns take their toll on leather, and as a result, a cover lasted between one and two years.¹⁰ For a village of just ten tipis, this would require an annual spring harvest of 50–100 female bison for the sole purpose of creating tipi covers. Since there was no fat on the meat, it was not considered fit for consumption.¹¹

Bison snot enters the picture again in the spring. As the gut microbes do their work, they are passed along through the digestive system and eventually make an inglorious arrival on the prairie in the form of a bison patty. This patty is instantly attacked by ravenous insects, and the first to arrive are those that eat the bacteria and protozoa that once swam in the rumen.¹²

In their hunt for prey within the dung pat, they break it up, dry it out, and scatter it across the prairie, fertilizing the grasses from which it was formed.

Bison patties are also the perfect medium for the planting of new grasses. Species like blue grama grass (*Bouteloua gracilis*) benefit from being eaten by a bison, as the scarification of the hard shell by grinding molars and digestive juices helps to prepare the shell for later germination. Blue grama grass was culturally significant for many First Nations people because they used it to predict the severity of an oncoming winter.¹³ The Blackfeet of Montana believed that if the blue grama grass had one seed head it would be a mild winter, but if it had two or more a severe winter was coming.¹⁴ Knowledge of how severe a winter could be was essential in planning how much food would be required to sustain a village.

Bison dung was a critical component in the tanning of fresh bison hides, and later for the preservation of meat during the drying process. On the vast open plains, there is little in the way of wood, so for thousands of years people used dried bison dung to fuel their fires.¹⁵ During wet weather when dung would not burn, bison skulls smeared with grease would be burned to provide a steady heat.¹⁶ Once the new tipi cover was assembled and draped over the tipi poles, it needed to be cured. This was done by building a fire in the central hearth with smouldering bison chips to cure the hides with smoke. This smoke was also used later in the summer and fall to cure and dry the meat harvested to make pemmican.¹⁷ Without abundant bison dung scattered across the prairie, it is doubtful that people could have survived on this landscape.

As spring advanced into early summer, the lean bulls were finally putting on enough body fat from the cool season grasses to withstand the rigours of the upcoming rut. Indigenous people knew that when the buffalo bean (*Thermopsis rhombifolia*) began to speckle the

prairie with their distinctive yellow flowers that these bulls were finally in prime condition for harvesting.¹⁸ It was also a time when scattered groups of bulls began leaving their isolation behind in their search for the maternal bands of cows, calves, and immature animals. The great coalescing of scattered bison groups was beginning. The bison rut was about to take place and the very essence of the prairie was about to change.

It was these vast summer aggregations of rutting, roaring, fighting, dust-creating masses of bison that so astounded European explorers. Herds of tens of thousands formed on the open plains to conduct their annual breeding rituals. These vast herds required enormous amounts of high-quality food, just at a time when the nutritious cool season grasses of spring were drying and declining in nutritive value. Fortunately, this was also the time when the warm season grasses were reaching their maximum value to bison, and these were found on the open plains. Grasses such as switchgrass (*Panicum virgatum*), western wheatgrass (*Agropyron smithii*), and porcupine grass (*Stipa curtisetata*) provided excellent forage for rutting bison during mid to late summer. Their tendency to hold the snow off the ground during the winter also made them a preferred source of food.¹⁹ These tall grasses would have made an excellent bedding material, or for packing as insulation around the bottom of winter tipis.²⁰

Stalking these herds were bands of hunters. Like the bulls before them, these small bands of wintering people left the seclusion of wooded valleys to seek their prey.²¹ To do so they formed large intertribal encampments of people from across the region.²² This gathering of people was a significant event, one long anticipated and prepared for with excitement and detailed planning.

While the people were preparing, the bison rut was progressing. One of the truly remarkable processes taking place then was the creation and use of bison wallows. Created by older bulls but used by all members of bison society, these circular earthen patches were used as the “coffee shop” of bison society. It is where dominant interactions between rival bulls took place, and where dust baths were taken to rid themselves of biting insects and to coat their skins with an impermeable layer of rain-shedding dust. Bulls seeking cows in heat urinate in the dusty wallow, then roll and thrash to grind this attractive scent into their hair to attract females and to declare to rivals that this place is theirs. The aftermath of a rutting season is a prairie landscape pockmarked with tens of thousands of wallows. On a landscape characterized by hot, dry conditions, the exposed soil patches were also a perfect place to pitch a tipi and to build a bison dung-fuelled fire where the risk of causing a prairie fire was reduced.

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Flashback to spring and these wallows were helping to provide breeding sites for countless prairie chickens, sage grouse, and sharp-tailed grouse. Each of these species requires a flat open area to perform its ritualized courting dances,²³ and bison wallows were the perfect dance floor. Strutting, stomping, swirling male grouse performed elaborate dances to attract their mates, and all of this took place on the dancing grounds of the bison.

This did not go unnoticed by the people of the prairie and is reflected in their centuries-long traditions of dancing at powwows and seasonal group assemblages, such as the preparation for a summer or fall bison hunt. The males of each of the three grouse species sport an elaborate bustle of flared tail feathers, feather-covered feet, and brilliantly coloured head feathers. These attributes were mirrored in the regalia worn by the men at these communal dances. Even today the modern regalia worn by men during grass dances, chicken dances, and traditional dances mimic the look and breeding behaviour of these grassland grouse, reflecting the fact that the grass dance was originally used by scouts to beat down a circular area of grass²⁴ in preparation for the arrival of the camp—an echo of the bison wallow and its use by dancing grouse.

All grouse perform a similar dance in the fall, and this may have been another signal to people that winter was fast approaching. The lengths of the days in April and September are identical, and this confuses the gonads of male grouse, causing a phenomenon known as testicular recrudescence. It is a period when male grouse behave as they did in the spring, and once again perform their ritualized dances. It was also the time when people were getting serious about fall hunting.²⁵ The ritualized dances of men at fall gatherings again reflected the behaviour of these birds dancing on bison wallows.

Fall was a time of scattering, a time when both bison and people dispersed into small groups across the prairie. There are many accounts of First Nations people seeking the shelter of wooded creeks and valleys, close to fuel and water and hidden from the prying eyes of other people and wary bison. However, many ancient winter encampment sites are found on high windswept ridges far out on the open plains. This seemingly harsh, barren landscape offered numerous advantages over life in sheltered valley bottoms.

As winter storms howled across the open prairie, especially in rugged terrain, the falling snow would be driven by relentless winds into small coulees and along valley rims. Here it collected into deep drifts that hung suspended for many metres into the valley. The winds scoured snow off the uplands, leaving behind pristine patches of exposed grass—a perfect place for bison to access the cured warm season plants. Even in mid-winter some of these plants, winterfat (*Eurotia lanata*) for example, can carry protein levels of more than 11 per cent throughout the winter.²⁶ Every grazing animal on the prairies searches for winterfat, and often it is found on these exposed patches of windswept prairie.

With all of the grasses cured by summer's end, bison must switch their strategy of grazing succulent new growth to foraging on tall, dried-out vegetation. When they do this they create small grazing patches—places where they have cropped the grass close to the ground. The combined actions of grazing, urinating, and defecating in a small area enhance the ability of the grass to produce new growth the following spring. These grazing lawns are also the first vegetation to green up in the spring.

For Indigenous peoples, these grassland islands in a sea of snow were a reliable and predictable location for hunting bison, and provided forage for their horses, open areas for the tipis, abundant fuel in the form of buffalo chips,²⁷ and viewpoints from which to observe passing wildlife. The deep drifts offered an excellent opportunity to mire bison where they could be quickly killed and processed. The history of people using such sites is evident in the distribution of double-walled tipi rings across the northern plains.²⁸

As the winter snows melted away and new spring growth began across the grassland, the circle of life on the plains would continue; bison calves would romp and play, buffalo bean would once again speckle the prairie, and people would conduct their activities scheduled by the phenology of prairie grasses.

notes

1. Torsvik, Goksoyr, and Daae, "High Diversity of DNA of Soil Bacteria."
2. Nagy, "Biological Relations of Rumen Flora and Fauna"; Hobson and Stewart, *The Rumen Microbial Ecosystem*.
3. Bergmann et al., "Seasonal Shifts in Diet and Gut Microbiota of the American Bison."
4. Barnes, Tieszen, and Ode, "Distribution, Production, and Diversity of C3 and C4 Dominated Communities"; Wang, Liu, and Bai, "Photosynthetic and Morphological Functional Types for Native Species from Mixed Prairie in Southern Saskatchewan, Canada."
5. Mooring, "Sexual Segregation in Bison."
6. Looman, *111 Range and Forage Plants of the Canadian Prairies*.
7. Johnson, "Blackfoot Indian Utilization of the Flora of the Northwestern Great Plains."
8. Brink, "Blackfoot and Buffalo Jumps"; Brink, *Imagining Head-Smashed-In*; Hungrywolf, *The Tipi*, 40; Laubin and Laubin, *The Indian Tipi*.
9. Brink, "Blackfoot and Buffalo Jumps."
10. Hungrywolf, *The Tipi*.
11. Brink, *Imagining Head-Smashed-In*.
12. Kadiri, Lumaret, and Floate, "Functional Diversity and Seasonal Activity of Dung Beetles."

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13. Johnson, "Blackfoot Indian Utilization of the Flora of the Northwestern Great Plains."
14. Turner, *Remarkable Plants of Texas*.
15. Brink, *Imagining Head-Smashed-In*; Mlekuz, "The Materiality of Dung."
16. Hungrywolf, *The Tipi*.
17. Brink, *Imagining Head-Smashed-In*.
18. Moerman, *North American Ethnobotany*.
19. Telfer, "Adaptation of Some Large North American Mammals."
20. Hungrywolf, *The Tipi*.
21. Verbicky-Todd, "Communal Buffalo Hunting Among the Plains Indians."
22. Brink, *Imagining Head-Smashed-In*.
23. Harrell, "Peak Lek Attendance for Greater Sage-Grouse."
24. Saskatchewan Indigenous Cultural Centre website, "Men's Grass Dance," <http://www.sicc.sk.ca/grassdance.html>.
25. Brink, *Imagining Head-Smashed-In*.
26. Ogle et al., *Plant Guide for Winterfat*.
27. Binnema, "The Common and Contested Ground."
28. Kehoe, "Stone Tipi Rings"; Verbicky-Todd, "Communal Buffalo Hunting Among the Plains Indians"; Hungrywolf, *The Tipi*.

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