



In Context

A Publication of **The Nature Institute**

Letter to Our Readers 2

NOTES AND REVIEWS

Once Upon a Night / *Elaine Khosrova* 3

Being with Buds / *Jon McAlice* 3

NEWS FROM THE INSTITUTE

Events 5

Publications and Website 6

Staff/ Faculty News 7

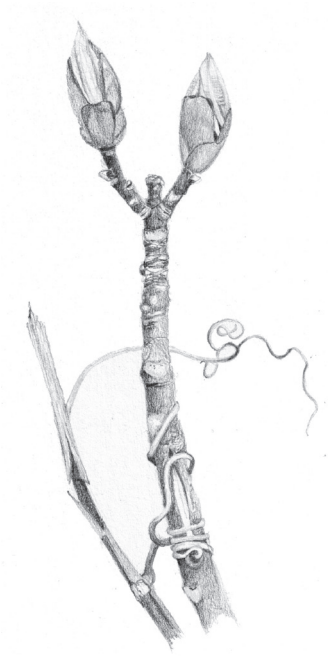
From Our Mailbox 7

Thank You! 8

FEATURE ARTICLE

Where Does an Animal End? The American Bison

Craig Holdrege 9



#45

Spring 2021



The Nature Institute

Dear Readers,

This issue of *In Context* marks a significant transition. Steve Talbott has stepped back as the editor. The first issue of this publication came out in the spring of 1999, only six months after our founding celebration in September 1998. During that fall we had received the advice to create a publication that would let people know about what we were doing and give them the opportunity to participate in the fruits of the work. As a young man in his twenties, Steve was already writing articles and had started a publication. Later he worked for many years as a senior editor for the publisher O'Reilly. In 1995, Steve started *NetFuture*, an online newsletter on technology and human responsibility, for which he wrote most of the articles. After Steve joined our work in 1998, *NetFuture* became a Nature Institute publication. So who could have been better positioned to edit the new publication than Steve? Wanting to express something of the core spirit of our work, we called the publication *In Context*. Here you have issue 45.

I had actually never dreamed that publishing would be such a significant part of the institute's work. We have Steve to thank for always setting high standards for what we publish. I had become familiar with Steve's editorial skills when he edited my 1996 book *Genetics and the Manipulation of Life*. He helped me to find ways to say what I wanted to express more felicitously, and he continues to be an important reviewer of everything we write. We have always strived to bring content that is accessible to the wide variety of readers of *In Context's* pages. At the same time, we recognize that each writer has a different style and voice; we want to honor that.

While the editorship passes on to new hands, Steve will continue to work on his research and writing connected with evolution (see p. 6). We are fortunate to have Elaine Khosrova as the new editor of *In Context*. Elaine has been working at the institute since October 2019, guiding outreach efforts. She brings a wealth of writing and editing experience to the task of shepherding each issue of the newsletter from conception to realization – you can read about some of what she has done on page 7. On that same page, you can read too about the expanding roles of colleagues Jon McAlice and John Gouldthorpe, both longstanding collaborators. I'd also like to take this opportunity to thank graphic designer Mary Giddens who, since the very first issue, has done the layout for this publication with reliability, creativity, and more than a little patience. We look forward to fruitful co-working for many issues to come.

With thanks for your readership,

Craig Holdrege

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EDITOR: Elaine Khosrova
LAYOUT: Mary Giddens
COVER ART: Kristelle Esterhuizen

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The Nature Institute
20 May Hill Road
Ghent, New York 12075
Tel.: 518-672-0116
Email: info@natureinstitute.org
Web: <http://natureinstitute.org>

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Once Upon a Night

THE NATURAL PHENOMENA we report on in this publication usually take us outdoors, well beyond the walls of the institute. Here we bring you inside to spotlight a plant that lives not more than six feet from Craig's desk. Biologically known as *Epiphyllum oxypetalum*,



this botanical resident goes by various colloquial names that rightly suggest its unique nocturnal splendor: Queen of the Night . . . Beauty Under the Moon . . . Night Lotus, and more. A sprawling vine-like cactus (now inching along the ceiling of the institute), it looks unremarkable most of the time but transforms into a captivating beauty — literally overnight — when blooming. It's allure, however, is short-lived. Each of the plant's lavish shimmering flowers opens for one night only, with peak display before midnight and then, Cinderella-like, it wilts before dawn.

For the staff at the institute, the flowering of this plant is an honored event. Not only for the brief dazzling phenomenon itself, but also because its occurrence happens so unpredictably. Some time between early summer and early fall, our Queen may bloom once, several times, or not at all. Only when flower buds appear — small and pale peach-colored, drooping from thick “stalks” — can we anticipate the night show to come. The buds grow and mature for a couple of weeks. In the days just before flowering, each bud (we have seen as few as one, as many as twelve) will begin to gently arch its pointy tip upward toward the light, changing orientation from hanging to horizontal. In the process, its body of tightly rolled petals grows longer, thicker, and more veiled in an outer layer of wispy tendrils. As longtime observers of this quickening in the plant, the Holdreges are usually able to predict from its orientation which night a particular bud, or several, will flower.

Late on the appointed eve last September, my daughter and I returned to the institute, flashlights in hand, our noses detecting that the prediction of bud opening was correct as soon as we stepped through the front door; the Queen is highly aromatic when flowering. The heavy scent, a kind of herbal vanilla, trailed through the air growing stronger as we climbed the stairs to reach

its source. As we got closer to the unruly tangle of vines, shining our tiny light in the pitch dark, a cluster of large pearl-white flowers suddenly came into focus. Gasp. Their beauty does not disappoint. The flowers have both a wild exuberance in their form as well as a delicate — even regal — architecture. With luminous pointed petals radiating from a center filled with gold-topped stamen, each nocturnal blossom creates its own starriness. All the more striking then to find, next morning, all the flowers limp and deflated as if exhausted by their one extravagant night.

Our particular *Epiphyllum oxypetalum* is a long way from its native habitat in the rainforests of Central America. Given to the institute as a cutting 20 years ago, it has thrived in its pot by a large picture window where

it gets a feast of light. Like other cacti, it is technically leafless, but its broad, flat aerial stems are leaf-like in appearance — until flower buds emerge from the margins. The plant's night-blooming behavior



is connected with its pollinators. In the wild, the Queen's nocturnal offering attracts bats. But at the institute, we are the lucky ones drawn in. Elaine Khosrova

Being with Buds

FOR SEVERAL YEARS I have been especially attentive to the budding and leafing of the trees in the springtime. Or perhaps it would be more appropriate to say the “budding-out,” the leafing-out of the trees. The budding-in — the formation of the buds — takes place during the summer. When autumn comes, deciduous trees lose their leaves and the buds that have formed in the warmth and light of the passing summer remain. They carry the spoor of the tree's summer growth through the winter and into the following spring. The winter buds are small. They are easy to overlook. We find them at the tips and along the sides of the twigs that formed during the summer,



The budding out process of an immature shoot from a pignut hickory (*Carya glabrus*) developing over the course of a week in early May.

wherever the tree bore leaves. With the exception of the terminal bud (the bud on the outermost tip), the buds form in the axil of the leaf, where the leaf stalk meets the twig. Beneath each axillary bud, we find a leaf scar.

Just as each tree species has characteristic leaves, bark, branching, and growth patterns, each also has characteristic buds. Some, like the American hornbeam, (*Carpinus caroliniana*) are very small and barely noticeable unless one looks closely. They are slender, delicately scaled, almost the same dark brown color as the smooth bark on the young twigs. The buds of the red oak are larger, thicker, more compact. They angle out away from the branch, whereas the hornbeam buds tend to lie alongside the branch. The oak twigs terminate in a tight cluster of buds. The shagbark hickory has short, stocky axillary buds and a prominent terminal bud that grows directly out of the end of the branch. The scales are of a light brown, sometimes tan color.

With a steady hand and a sharp blade, it is possible to slice a bud lengthwise. Inside we find, in a sense, a miniature whole plant: a tiny stem with primordial or embryonic leaves laid tightly one against the other or curled into one another. Some buds also contain embryonic flowers. If the cut is clean it is sometimes possible, with a magnifying glass, to glimpse the embryonic traces of what will become next winter's buds. Within the bud, in a primordial or embryonic state is not only everything that will unfold and expand outward into the light and warmth of a new growing season, but also the polar gesture of concentration that comes to expression in bud and seed. We often become aware of the rhythm between expansion and contraction in plant growth as a temporal sequence; in the bud, both potentials are present simultaneously. The bud contains both embryonic stem with leaves and flowers and embryonic bud — expansive and contractive elements together in a state of potency.

As the spring grows warmer and the days longer, the buds begin to change. We notice first a swelling, then an elongation. This is more marked in some species than others. At first the entire bud swells and stretches, the scales become softer and more colorful. The changes in color are often as noticeable as the changing shape of the buds. The beginning of new growth is colorful like the display of autumn foliage, just more restrained. The spring colors are gentler and tend to be more translucent than the autumn colors. As budding-out continues, the scales begin to roll back as the young leaves and flowers emerge and unfold into the light.

Among the trees here, in northeastern New York on the edge of the Berkshires, one of the more expressive budding processes is that of the hickories. The images at left are of the pignut hickory (*Carya glabrus*) and show the budding out process over the course of about seven days in early May. The buds shown are from immature shoots, thus no flowers are apparent. The budding-out process takes hold of the bud in its entirety. The scales grow with the maturing leaflets. They become increasingly diaphanous; the greening of the new leaves shines through. The characteristic gesture of the leaves emerging is reminiscent of a contemplative joining of the hands at their fingertips. This disappears overnight to be replaced by the rather windblown appearance of the leaves unfolding into the sunlight.

A very gratifying springtime practice is to choose two or three trees to visit each day during this budding-out period. By returning each day and spending time with the buds as they change and grow, you get a deep sense of the subtle beauty of this yearly birth of new growth. It progresses slowly over the course of any number of days (and nights). For anyone used to the fast pace of modern society with its constantly changing stream of stimulation, the process can appear maddeningly slow. You have to slow down inwardly and experience the joy of living into and engaging with the tree's time. If you then take the time to re-imagine the budding process — that is, to picture the buds in their changing — you can catch a glimpse of “tree” bringing itself to expression in the particular way of this tree, in this place, in this springtime. *Jon McAlice*

News from the Institute

Events

- Our staff continues to work with and mentor two cohorts of students enrolled in our **Foundation Course** in Goethean science. With the advent of Covid-19 and its restrictions, we had moved our teaching online and extended the course by one full year, engaging the students with a substantial study program in readings of foundational texts in holistic and phenomenological science, podcasts in which staff discuss the readings, live group discussions with staff and students via Zoom, and independent observational work. This summer, students from both cohorts will convene at the institute for a two-week long intensive.



- We are collaborating with the M.C. Richards Program, a full-time, year-long course in trans-disciplinary, contemplative learning for young adults, run by Free Columbia in Ghent, NY. In November, Craig led a course in animal morphology and evolution; in December,

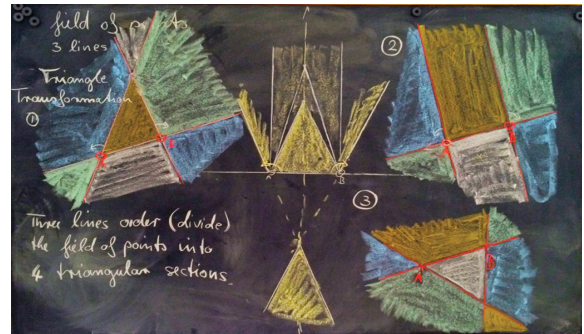
Henrike taught a course on optics, light and color; in February she taught projective geometry as a way of strengthening and expanding thinking capacities; in March, Gopi Krishna and Mark Gardner led a course in physics and technology; and in May, Craig will teach plant observations, botany and plant metamorphoses. More information on the program is available at freecolumbia.org/m-c-richards-program.

- In February, Henrike gave a class on astronomy to parents in a Waldorf-inspired homeschooling group. In March, Craig gave a half-day workshop on Goethean science for participants in a one-year training course in biodynamic agriculture at the **Pfeiffer Center** in Spring Valley.

- Craig was the inaugural speaker for a series of online lectures, beginning in March, on holistic science sponsored by **Schumacher College** and the **Field Centre** in the UK. To an audience of more than 240 participants, Craig addressed the topic of “Goethe and the Evolution of Science,” presenting examples of Goethe’s participatory and dialogic way of studying nature, and highlighting its significance in the present and for the future. View the video at: natureinstitute.org/videos-and-podcasts.

- On **Nature Meditations**, a series of monthly programs hosted online by **Inayatiyya**, a global Sufi organization, Craig was the featured speaker in March. Promoting a transformative connection between person and planet, the live series was streamed in English, French, German, and Turkish to 500 participants worldwide. On the topic “The Beauty of Spring,” Craig spoke of how attending to the developing life of plants in spring can bring us closer to the creative forces of nature and also stimulate a transformation of our capacities to perceive and think in more nature-integrated ways.

- The pandemic has increased online demand for our staff to give presentations on Goethean science and education to various Waldorf schools and groups. In the past months, for example, we were asked to: teach plant and animal studies to participants in the Sound Circle Waldorf Teacher Training (in Seattle); mentor a group of 14 middle school Waldorf teachers in California on teaching science and math to distance learners; offer support to individual Waldorf teachers who reach out for help with lesson plans.



- On three Saturday afternoons in March/April, Craig and Henrike practiced Goethean methodology through light/color studies and through plant observations with participants of the local Alkion Center, a foundation course in Waldorf pedagogy.

- At an online symposium in April entitled, “**The Mind of Plants**,” Craig was one of several authors invited to share their experiences, perspectives, and various approaches to plants.

- At the end of April, Jon McAlice, Craig and Henrike taught a three-day course on Goethean methodology, plant observation, and the qualities of the four elements. Participants included those in the biodynamics training at the **Camphill Academy** in Camphill Copake, NY.

- In June, Steve Talbott will give an invited talk at an online conference sponsored by the Biological Journal of the **Linnean Society** in London. The conference includes a gathering of top-flight biologists, systems theorists, and philosophers of biology who will address the topic, “Evolution on Purpose: Teleonomy in Living Systems.” The public can register for the event at linnean.org.

Publications and Website

- This year Henrike will publish *Part 2 of To the Infinite and Back Again*, a *Workbook in Projective Geometry*, the companion to *Part 1*, released in 2019. Both volumes are meant for schools, self-study, and the lay-person. Part 2 focuses on duality in projective geometry and encourages a nimble thinking with exercises that allow the reader to shift perspective, to think in polarities and see things from both inside and outside.

- In a six-page feature interview with Craig in the October 2020 issue of *Acres* magazine (a national magazine in the U.S. that offers a comprehensive guide to sustainable agriculture), he discussed the ability “To Rescue the Whole: Seeing Nature as an Infinite Galaxy of Relationships.” In particular, Craig addressed how growers and farmers can benefit from Goethean approaches to observing field and crop phenomena. You can find the interview on our website, natureinstitute.org/article/craig-holdrege/to-rescue-the-whole.



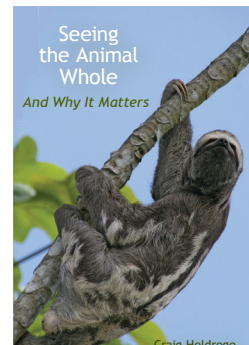
- In 2021, a new monograph written by Craig, *Living Perenniality: Plants, Agriculture, and the Evolution of Consciousness*, will be published by New Perennials Publishing. The monograph illustrates a contextual understanding of plants and explores the development of agriculture as it relates to the evolution of human consciousness.
- Steve Talbott will continue the development and online release of chapters for his work in progress, *Evolution As It Was Meant To Be: And the Living Narratives That Tell Its Story*, which can be freely accessed on our adjunctive website, bwo.life. To date, 18 chapters of this groundbreaking work are available. Several new chapters are planned for 2021, including the latest: “How Our Genes Come to Expression.”

- In a new collection of essays, *The Seasons: Philosophical, Literary, and Environmental Perspectives*, published by SUNY Press, Craig contributed a section on “The Seasons Embodied.” His piece narrates the developmental dynamics of the skunk cabbage as a means of portraying the relational nature of the seasons. “I get to know the seasons,” he writes, “when I attend to rhythmical phenomena of life . . . the character and interweaving of the seasons show themselves in different ways depending upon my focus.” The hardcover book (\$95) is available at sunypress.edu.

- Furthering research that our staff started with the advent of the pandemic (see “Viruses in the Dynamics of Life” on the home page of our website), we will continue to examine the history and phenomena of viruses, particularly within the larger context of life and societal narratives.

- As of this writing, the first episodes of The Nature Institute’s new podcast is in development. Produced and hosted by John Gouldthorpe, who teaches in our Foundation Course, the episodes are intended for a general audience and will highlight conversations with our staff and special guests about phenomenological practice and experiences in the natural world. “My intention,” says John, “is to develop this dialogue between practice and insights, as understood in Goethean science, and its inherent metamorphic potential to change the way we encounter ourselves, one another and the more-than-human-world.”

- Craig Holdrege’s new 348-page book, *Seeing the Animal Whole, And Why It Matters* (Lindisfarne Books; \$25) is now available at our online bookstore (natureinstitute.org/store). In vivid portrayals of nine different animals, Craig provides a nuanced sense for what it means to be a sentient living being. His work demonstrates a unique integrative practice of viewing animals and nature.



Spring Matching Grant!

This spring, one of our generous supporters has offered to match all donations for The Nature Institute up to \$5000. With your help and this matching grant, we can raise significant funding to support our education programs, provide scholarships to our courses, and reduce fees for upcoming programs. Every dollar we receive by June 19 will be doubled, up to \$5000. You can make a gift by check or credit card, using the enclosed envelope, or by credit card through our website (<http://natureinstitute.org/friend>). Thank you for your support.

Staff/Faculty News



This year **Jon McAlice** joined the staff of The Nature Institute. Although he's been one of the educators in our Foundation Year program since its inception and for many years an adjunct

teacher in science education programs, Jon's new commitment reflects the expanding scope of our work. Requests for our staff to facilitate live online classes, lectures, mentoring, and meetings have surged while we're also creating podcasts and pursuing new research relevant to our mission of phenomenological inquiry. Jon steps in to all this activity with a depth of experience in contextual research, program development, publishing, lecturing, and organization. Currently continuing his work online with our two cohorts of Foundation Course students—an ongoing “striving to be awake,” as Jon says—he is also collaborating with Craig on a new study of scientific and social responses to viruses. “It involves studying a lot of the literature,” he shares, “and stripping away paradigmatic limitations so we can engage in the virus as phenomenon . . . it's been very surprising.” Jon and Craig hope to produce a publication with the results of their virus research.



John Gouldthorpe is a core faculty member in our foundation course who comes to us with experience as both a graduate teacher in psychology and a radio broadcaster. He has helped us develop a collection of foundational readings

for our yearlong Foundation Course and then intensively explored its contents online with students in our two cohorts. That process inspired John's latest project: producing The Nature Institute's new podcast, now in development. Through a guided encounter with specific texts, thematic presentations, and conversations, John will lead an exploration of treasures from our work (and occasionally the works of others) that bring awareness to a mode of engagement with the natural world that is whole and experiential.



In addition to managing Outreach and Development for the institute, **Elaine Khosrova** is now also editor of publications, and, along with Seth Jordan, co-editor of our website. Before coming to the institute,

Elaine spent many years as an editor and writer for several national magazines. She has contributed to the *Washington Post* and the *New York Times*, and is the author of *Butter: A Rich History* (Algonquin Books). She welcomes comments, suggestions, and queries at elaine@natureinstitute.org.

From our Mailbox



Students in Foundation Course, 2019

“My experience with The Nature Institute has been wonderful so far, in the literal sense of full of wonder. Through the intensive, year-long program, I have found friends, peers, and mentors who have come together to explore nature anew in a warm and supportive atmosphere. These exploratory practices take a variety of forms but what they have in common is a sweet spot between playfulness and rigor that I find deeply rewarding. This is especially true when these practices become habitual . . . I will always be grateful to the faculty and staff at the Nature Institute for the people they have brought together, the practices they preach, and the haven they have created.” - Danial Qaurooni

Thank You!

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Where Does an Animal End?

The American Bison

CRAIG HOLDREGE



FIGURE 1. Bison bull in Yellowstone National Park.

This article is a chapter from Craig's new publication, Seeing the Animal Whole — And Why It Matters, published by Lindisfarne Books. Presenting a unique integrative view of animals and nature, the book is available at natureinstitute.org/store.

ON A HIKE IN THE HAYDEN VALLEY of Yellowstone National Park, my wife and I could see in the distance a few bison grazing. As we came closer, we noticed that they were bulls. They were very close to our trail. We figured it was not wise to walk between them, so we made a wide arc around them on the sagebrush-covered hillside. It didn't seem that they paid much, or any, attention to us. We continued on our way and they continued grazing.

On such an occasion I have a clear and distinct awareness of where the bison are and where they end. They are over there and I am over here. I can judge the distance between us. I don't question where the bison ends—it ends at the boundary of its massive body, and that body is over there. This knowledge of a physical boundary gives me a certain feeling of security. I can adjust my distance to the animal accordingly.

As true and as important as this may be, it is certainly not the whole story. When I am observing a group of bison cows and their calves, and one of the calves looks up and gazes at me, where does that calf end? And where do I end, the "I" that is attending to the calf trotting behind its mother? When the

calf sees me, she is with me. When I perceive a bison's dark glistening eye, a young bull rolling in the dirt releasing a cloud of dust, or a bison swimming across a river with only its head above water, I am with those bison. I am here and I am there. The bison extend into me and I into them. We intermingle.

So while the knowledge of an animal's physical boundary—and of my own physical boundary—is essential in my navigating through the world, it is a limited perspective. I have in mind only the spatial aspect of the animal and myself. But when we perceive one another and respond to one another we are in those moments not separate. We extend beyond our physical boundaries. It is no longer a simple matter to say where an animal ends. That is what I want to explore.

The Embodied Center

An individual bison is easy to recognize as such, whether a large old bull, a young calf, a ruminating cow, or a spike-horned yearling. Each has its own distinct boundary and moves as a unitary creature without fusing with its environment in such a way that it would become indistinguishable from it. That only happens when the animal dies, its body decays, and it becomes part of the soil.

Of course, this distinct physical form with all its bulk does not exist on its own. Every bison needed parents to reproduce and a mother in whose body it developed. A bison fetus developing in its mother's womb is still wholly connected

with her and part of her. At birth the calf becomes a separate body and center of independent activity. But even then this separateness is only partial. It feeds on its mother's milk and, after weaning, on grass. This "separate" being will always need the sun, air, water, grass, the solid earth to move on, and more, in order to exist. Without these it would not be.

But it is also the case that these conditions for its existence do not "explain" the bison, that is, make understandable its impressive size, its unique shape, or its manifold habits. Every bison is a specific center of activity, even though this center could never exist on its own. It needs a periphery from which it draws and to which it gives, a periphery that it incorporates, transforms, and excretes in order to remain itself until it dies.

Before I venture into building up a picture of this manifold periphery that supports the center—or perhaps I could say, a picture of the "peripheral bison"—I want to consider the unique physical presence that every bison embodies as it wanders over the grasslands.¹

The bison is the largest of all terrestrial mammals in North America. Mature bulls can weigh over 2,000 pounds and stand six feet high at the shoulders. Cows are considerably smaller, weighing "only" up to around 1,100 pounds and standing four to five feet high at the shoulders.

A striking feature of the bison's form is its massive front half that contrasts starkly with its relatively slender hindquarters (see Figure 2). The bison carries its head low to the ground, and long and shaggy fur covers the head. The pointed beard—which can nearly touch the ground when the bison stands and walks—emphasizes the downward orientation of the head. The shaggy fur extends over the shoulders and the upper part of the front legs, and then ends abruptly. This fur is not only longer than on the rump, but also "two to five times thicker than the hair on the slimmer hindquarters."² During the winter the fur is more uniform as the hair grows longer and thicker in the rear half of the animal, but the contrast between front and rear is still apparent. Bison are quite comfortable in cold climates—"A square inch of buffalo skin has ten times as many hairs growing from it as a square inch of [domestic] cow skin."³



FIGURE 2. (top) Mature bull; National Bison Range.

FIGURE 3. (above) Pronghorn; Yellowstone National Park.

To appreciate its unique form, we can compare it with that of the pronghorn, a fellow grazing mammal of the prairies and grasslands (see Figure 3). The pronghorn, which is much smaller and lighter, carries its head high and its horns emerge vertically out of the skull. Its long neck holds the head above the body, and long slender legs carry its barrel-shaped trunk.

In contrast, the bison's emphasis is forward and down. It has short legs and a short thick neck, and holds its head below shoulder height. From the wide, low-held head, the neck rises into the hump above the shoulder. This hump is not, as it is in a camel, a cushion of mainly fat tissue. It consists of the long processes of the thoracic (rib-carrying) vertebrae (see Figure 4). The heavy, low-held head is supported by strong muscles that are connected to these long processes. No other hooved mammal has such long processes or carries its head so low to the ground. It is not surprising that when

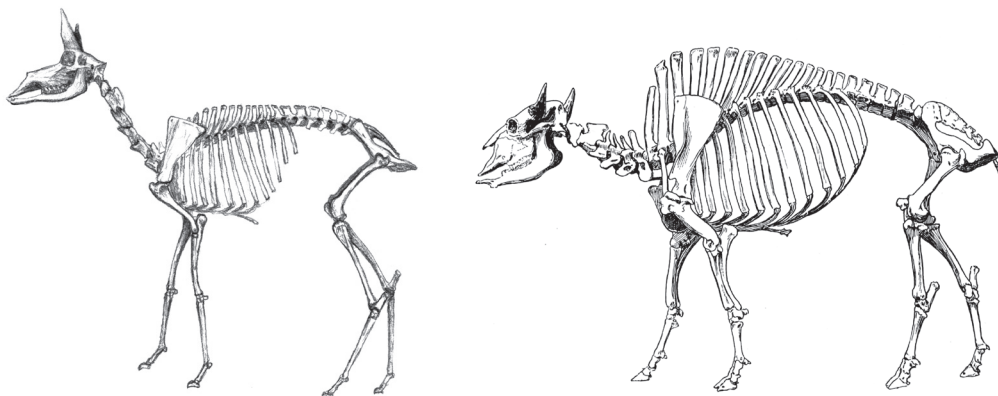


FIGURE 4. Skeletons of pronghorn and bison. (Bison: modified from Hornaday 1894, Plate XXI)



FIGURE 5. Two young bulls sparring at a wallow; National Bison Range, Montana.

two bulls spar, they butt with lowered heads that nearly touch the ground (see Figure 5).

A bison calf hardly resembles the adult—you could easily mistake it for the calf of a domestic cow (see Figure 6). It neither holds its head so low, nor does it have a hump or the marked distinction in fur between the front and back of the body. These characteristics develop over time in concert with one another as the animal grows. The calf's coat is a much lighter reddish brown and becomes darker with age.

The bison's horns grow throughout its life (see Figure 7). They start as small protrusions, become within a year fairly straight spikes, and then curve upward and grow thicker over the coming years. With greater age, the horns begin to curve inward at the tips and become very thick at the base. This growth and the in-turning curve increase the impression of concentration and power in the head. All the while, the head is growing and changing its shape, becoming much broader and more massive (see Figure 8). This gradual growth and lowering of the head is complemented by the thickening above the shoulders through the growth of the processes of the thoracic vertebrae and neck muscles. During this time the fur on the head, neck, and shoulders becomes much longer and thicker. The unique gestalt of the adult bison takes shape.

The bison radiates concentrated force. When an adult bison walks, you witness the gravity of every step coming to earth. But for all its bulk, a bison can run fast and leap when needed. When watching a group of bison gallop down a slope, you behold an immense forward thrusting energy barreling through the landscape

Sensory Expansion and the Herd

An animal's senses mediate its perceptions of its own body and also allow it to expand beyond its physical boundary. The sense of touch is spread over the entire body and gives the animal both a perception of this boundary and an

awareness of other solid objects that it comes into direct contact with. Bison love to roll and rub their bodies on bare ground, creating momentary dust clouds as well as lasting depressions in the ground called wallows. They seek contact with other solid objects to rub against—trees, bushes, or rocks. Trees on the edge of grasslands are often girdled bark-free from rubbing bison. When telegraph poles were being erected through the prairies in the nineteenth century, they were occasionally toppled by rubbing bison, and at least one settler reported that his cabin was pushed over by a group of vigorously rubbing bison!⁴ Here we get a glimpse into an imposing, compactly constituted animal that seeks resistance and contact with the solid features of its world.

With its head held so low to the ground as it walks along, a bison's face is in tactile contact with the plants that it feeds on. In this sea of plants it also orients through its keen sense of smell, discerning the qualities of the plants before it imbibes them, and then tasting them as they are briefly chewed and swallowed.



FIGURE 6. Older calf with mother; National Bison Range.

It seems that a bison can extend a mile or two outward through its senses, just as the bellowing of a bull in the rutting season can be heard from such distances. Bison detect scents that waft their way from great distances, a fact well known to scientists and hunters who want to get close to a herd without disturbing it and have learned through experience to approach a herd from the downwind side.⁵

It is easy for us to think of a herd of bison as a collection of individuals. But if you take the perspective of any individual bison, then its existence is clearly bound up with that of the herd. Through their senses of touch, smell, hearing, and vision, the members of a herd weave into one another. A cow identifies her calves in the first days mainly by smell; then she recognizes it visually, and finally by its calls. Grunts and bellows resound and carry manifold meanings for members of the herd. A bull smells the urine and rear end of females, which can tell him whether she is in heat or not. The tail is a highly expressive organ, and through vision bison can



FIGURE 7. Horn development in the bison. 1: calf; 2: yearling; 3: spike bull, 2 years old; 4: spike bull, 3 years old; 5: bull, 4 years old. 6: 11 years old; 7: old “stub-horn” bull, 20s year old. (Adapted from Hornaday 1887/2002, Plate VIII)



FIGURE 8. Skulls of a yearling bison (left) and an approximately five-year-old bull (right). Scale bar: 10 cm.

participate in the ebbs and flows of dispositions and moods that show themselves through the tail, as well as through movements of the body and head.

The herd is not an add-on to individual bison life; you can't understand the life of any individual without considering it as a herd member. Being part of the herd does not mean having a specific role or function. Rather, the animals live in a landscape of shifting relations that at times intensify and at times loosen. An old bull, for example, may spend a good part of the year by himself, but in breeding season (July and August) he will usually return to a herd and interact with other bulls—often vehemently—and mate, or try to mate, with cows.

Watching the northern Yellowstone Park herd along the Lamar River in June, you can form one picture of this extended organism of the herd. Over a thousand animals spread out and move around through this valley. Each day you view a different scene and different groupings. At this time of year virtually every cow has given birth to a calf that stays close to its mother throughout the day. It lies near its mother, and when she feeds and moves along the calf soon follows (see Figure 9). Perhaps 20 to 40 cows with calves and yearling females and males often form a cluster that grazes, ruminates and moves together. But such groupings are not stable or fixed. Some of the cows and calves may swim across the swift current of the Lamar River and begin mingling with other cows and calves, while the remaining animals stay behind and become part of some other fluctuating cluster.

During early summer you rarely see bulls among the cows. The bulls form separate bull groups, or wander about singly, especially if they are older bulls. You often see three to seven bulls—younger and older—grazing together and moving across the landscape together. Often the bulls spread out from each other and then move closer together. When they are close, younger bulls will often head butt and wrangle, only to spread out again and give themselves over to grazing.

One time I saw a lone older bull approach a bull group.

When he was among the others, he moved very slowly and raised his tail into an arc. A bull from the group started grumbling. It was a tense atmosphere—as the saying goes, the air was so thick you could almost cut it. The older bull stomped with his forefeet, dug repeatedly at the dirt, and lowered his head, swishing it forcefully back and forth against a sagebrush bush. Soon the bull group moved along and the bull was alone again. From the other direction three bulls trotted down the hillside and walked toward the lone bull. In this meeting there was no palpable tension—no grumbling, snorting, stomping, or head shaking. The lone bull turned around and joined the three bulls as they moved east in the direction of the other bull group. For a while at least, the lone bull was part of a group.

These few vignettes show that the herd is neither an agglomeration of individual animals nor a group with fixed roles and functions. It is a continually shifting relational dynamic. At times, dense and focused soul spaces are created, if I may put it this way—when a calf suckles; when a cow crosses the river to meet her calf that had been running back and forth along the bank to find her; when a bull enters a group of other bulls. And at other times, the tension and attention among herd members loosens as they give themselves over more to

FIGURE 9. Part of a grouping of cows and calves in June in the Lamar Valley of Yellowstone National Park.



grazing or ruminating—turning toward the plant world that sustains their lives. The relational life of the animals contracts and expands during the day and year.

The Intertwined Existence of Grassland, Bison, and Microorganisms

In 1800, millions and probably tens of millions of bison lived on the midcontinental grasslands.⁶ Their range extended from Mexico in the south up into Canada, and from the Rocky Mountains into Indiana. Bison were virtually exterminated by 1890, when only around 1,000 animals were still alive in all of North America.⁷

Still, into the 1870s bison formed immense herds throughout their range. Colonel R. I. Dodge writes, for example, about traveling a distance of 35 miles in Kansas in May, 1871, when “at least twenty-five miles of this distance was through one immense herd.... The whole country appeared one mass of buffalo, moving slowly to the northward; and it was only when actually among them that it could be ascertained that the apparently solid mass was an agglomeration of innumerable small herds, of from fifty to two hundred animals, separated from the surrounding herds by greater or less space, but still separated.”⁸

Bison herds moved in relation to the seasons and to food availability, wandering hundreds of miles in any given year. When bison move through the prairie they are moving through a sea of their food. A bison doesn't tend to snip off the tips of plants, but moves with its snout near ground level, tears off shoots close to the soil, chews briefly, salivates copiously, and swallows.

The grass enters a small chamber of the stomach called the rumen. This muscular chamber massages the grass by rhythmical muscle contractions, and it grows and develops through this interaction. Over time it becomes the largest chamber of the stomach, thanks to its continuous engagement with grass. In the rumen the grass is churned around in swallowed saliva and balls (“cud”) of food are formed that are then regurgitated and chewed thoroughly before swallowing—a process called rumination. We ruminate on thoughts and feelings; bison ruminate on the prairie they have internalized, which eventually becomes part of their bodies.

It is no simple matter to live from grass.⁹ Grass plants are remarkably tough structurally—it is no small feat of nature to create exceedingly thin, upright, stable yet resilient stems and leaves. The fibrous cell walls even incorporate silica in the form of opal as a structuring element.¹⁰ In a way it is paradoxical that bison and many other large grazing mammals, live from grass, which is both hard to digest and, from the perspective of carnivores and herbivores, poor in nutrients.

A large animal like a bison must take in very large amounts of grass to live. As a bison feeds on grass, it is not only ingesting grasses and some other types of plants. It is also taking in microbes (bacteria, protozoans, and fungi) that live on plants, in the upper layers of soil, and on other animals. So when a calf licks its mother, or its mother licks the calf's lips, the calf is also ingesting microbes. Conversely, when a bison is feeding on grasses, it is leaving behind microbes in its saliva on the grasses. So there is an abundant sharing of microbes between animals, plants, and the soil.

Without this sharing, a bison could never digest grass. In the dark, warm, and fluid environment of the rumen, microbes find ideal living conditions. Their food is grass (and each other). Many microbes can form enzymes that break down cellulose into other carbohydrates (starch and sugars) they can utilize for their own growth. In turn, the microbes release fatty acids into the rumen that the bison can use for its own growth. Some of the microbes move into the other chambers of the stomach and in the final fourth chamber (the abomasum) they are themselves digested and provide a vital source of protein for the animal.

As the bison grows and feeds, it develops what we could call a microbial organ within the organ of the rumen, which itself develops in interaction with the grasses and microbes.¹¹ So the bison gathers microbes from the surroundings, including other bison, and the microbes rapidly become an integral part of the animal without which it could not live. The internal microbial ecosystem develops into an organ of the bison.

The Mutual Dependency and Enhancement of Bison and Prairie

While a prairie consists mainly of a variety of grass species, there is also a great variety of wildflowers (forbs) that are, however, not so great in number. Because bison feed preferentially on grasses, they leave many forbs ungrazed. Areas that have been grazed by bison have greater plant diversity and the plant community is more varied than in ungrazed areas.¹² (All this assumes, of course, that the bison are free to roam and are not forced to overgraze due to confinement.)

When a bison has grazed on a grass plant, the plant responds by increasing its growth. Young shoots are more nutritious than older ones, and researchers have observed that bison tend to return after a time to already grazed areas to feed on the fresh young grass. In such patches more forbs grow than elsewhere. Eventually the grass growth diminishes and the bison feed elsewhere.

When there are more wildflowers, more insects and other invertebrates thrive, and they are also present in greater diversity.¹³ They are, for example, important pollinators and are connected in myriad ways with plant and other animal



FIGURE 10. (above) Bison and many wallows; Lamar Valley, Yellowstone National Park.
FIGURE 11. (right, above) A bison wallowing; Lamar Valley, Yellowstone National Park.
FIGURE 12. (right, below) Bison at a wallow; National Bison Range, Montana.

life. As naturalist John Muir famously remarked, “When we try to pick out anything by itself, we find it hitched to everything else in the universe.”¹⁴

When the bison ingests and digests grasses and microorganisms, it builds up and maintains itself. In this process it produces substances that it gives back to the prairie—its urine and dung. These stimulate plant growth. Since they are provided in a localized and concentrated form, they contribute to the diversity and patchwork nature of plant distribution in the prairie. For example, plants growing in a urine patch have higher nitrogen content and are sought out by bison, which graze the patch intensely. Such intensive grazing of a small area inhibits grass growth and at the same time allows forbs to thrive.

White settlers traveling through the prairies in the 1800s noted that the trails of bison herds stood out from the surrounding prairie through their bright greenness.¹⁵ The defecating and urinating bison left a trail of nutrients, and the manure was continually being ground up and mixed with the soil through the bison’s hooves. In the spring, the plants found ideal conditions for lush green growth.

One feature of “giving back” to the prairie we might not think about is animal carcasses. When a bison dies, its body decays and, if not scattered and eaten by scavengers, becomes over time part of the soil. This soil is nutrient-rich and harbors vibrant plant life.¹⁶

Bison bring variety into the prairie in yet another way. They wallow (see Figures 10, 11, 12). They scrape away plants with their hooves and create an area (around three to five meters in diameter) of bare soil in which they roll around.¹⁷ Gradually the wallow becomes an oval, bowl-like depression that can be a foot deep at the center. A prairie that is home to a herd of bison is pocketed with many such wallows. The same wallow may be used by many different animals for long periods of

time, but bison also make new ones. Early settlers coming onto the prairie remarked on the countless wallows—some of which can still be observed as depressions with a unique composition of plant species in prairie preserves that have had no bison activity for 125 years.¹⁸

A wallow contains compacted soil and holds rainwater better than the surrounding prairie. Aquatic plants can populate such oases, and wallows can even serve as breeding pools for frogs.¹⁹ By contrast, during longer dry periods only drought-resistant species germinate and develop in the bare, compacted soil of a wallow. All in all, wallows make unique microenvironments that contribute to the overall patchiness and diversity of prairie life.

When bison shed their fur, it can find its way into the nests of birds and small mammals.²⁰ And as bison make their way through the prairie, seeds get caught in their fur. They become walking seed bearers. One study found 76 different plant species in 111 hair samples from different bison.²¹ At some point the seeds may become dislodged, fall to the ground, and germinate. Bison also ingest seeds along with leaves and shoots, and often these pass through the digestive tract without being broken down. In both these ways the bison spread seeds, one more contribution it makes to the prairie that sustains it.

All these detailed observations help us to appreciate how the bison and its environment support each other, affect each other, intertwine with each other. The ecological bison spreads out way beyond its body’s boundary. And while neither the bison, nor grass plants, nor microorganisms are composite creatures in the sense of being put together out of external raw materials, each of these centers of activity is unthinkable by itself and necessarily intermingles with and in part merges with the others.

Fire, Plains Indians, and the Prairie

While the large numbers of roaming bison played a significant role in maintaining and diversifying the prairie, they were not alone in doing this. One other major player was fire. As we know today, fires tend to kill shrubs and trees, while grasses are more resistant to fire since they have growing points beneath the surface of the soil and can resprout after a fire. Most of above-ground parts of grass plants that die in the fall, decompose during the following year. But a significant amount—perhaps 20 percent—remains if the grasses are not grazed or burned by fire.²² When undecomposed litter accumulates, the grasses become less productive. So both fire and grazing keep the prairie thriving.²³

Fires arise from lightning and from human action. Today, ecologists set fires in prairie preserves, in some cases annually and in others in three-to-five-year intervals. Historically, Plains Indians regularly set fires in the vast grasslands.²⁴ Human-set fires have been far more important in creating and maintaining grasslands than lightning.²⁵ Missionary Timothy Flint, who was traveling in 1826 in the area around St. Louis, wrote:

I have often witnessed in this country a most impressive view, which I do not remember to have seen noticed by any travelers who have preceded me. It is the burning of the prairies. It is visible at times in all parts of Missouri, but nowhere with more effect than in St. Louis. The tall and thick grass that grows in the prairies that abound through all the country, is fired; most frequently at that season of the year, called Indian summer. The moon rises with a broad disk, and of bloody hue, upon the smoky atmosphere. Thousands of acres of grass are burning in all directions. In the wide prairies the advancing front of flame often has an extent of miles. Many travelers, arrested by these burnings, have perished. The crimson-coloured flames, seen through the dim atmosphere, in the distance seem to rise from the earth to the sky.²⁶

One important effect of burning in the fall (“Indian summer”) was that the following spring grass grew vibrantly in the burned areas and attracted bison to these “grazing lawns,” as they have come to be named. Native tribes could expect to find bison herds in these areas, which often became their spring hunting grounds.

Native tribes also used fire as an aid in hunting bison. Here is a description by the French Jesuit Pierre de Charlevoix from the early 1720s:

In the Southern and Western Parts of New France, on both Sides the Mississippi, the most famous Hunt is that of the Buffaloe, which is performed in this Manner: The Hunters range themselves on four Lines, which form a great Square, and begin by setting Fire to the Grass and Herbs, which are dry and very high: Then as the Fire gets forwards, they advance, closing their lines: The Buffaloes, which are extremely afraid of Fire, keep

flyng from it, and at last find themselves so crowded together that they are generally every one killed. They say that a Party seldom returns from hunting without killing Fifteen Hundred or Two Thousand. But lest the different Companies should hinder each other they all agree before they set out about the Place where they intend to hunt.²⁷

The prairie was home of the bison and the bison, along with fire, encouraged prairie growth. The main source of fire were the Native peoples, who in turn lived from the bison that lived from the prairie that thrived due to the fires that the tribes set. A truly interwoven fabric of existence.

Serving the Needs of Plains Indians

The life of the different Plains tribes revolved around bison. Tom McHugh, in his book *Time of the Buffalo*, describes in detail the variety of ways in which the bison served the life of Plains tribes.²⁸ Virtually every part of the bison carcass could be put to use for some purpose:

- Meat, internal organs, blood, and bone marrow were used for food.
- Whole hides, painstakingly dressed, provided robes, rugs, and walls for sweathouses and tepees, which required anywhere from seven to twenty hides. Clothes, moccasins, hats, belts, and mittens were made from skins.
- Rawhide, which consists of skins that have only had the flesh and hair removed, served as “knife sheaths, cups, dippers, kettles, mortars, rattles, drumheads, cradles, cages, fencing, boats, cases, shields, bridles, lariats, and other pieces of saddlery—including small bags that were wrapped around a horse’s hoofs and served as shoes.”²⁹
- Horns were fashioned into spoons and ladles, as well as “arrow points, drinking cups, powder flasks, trimmings for war bonnets, spinning tops . . . heads for war clubs, cupping horns for bleeding patients to relieve infections, and—after simmering with spruce needles—a medication for sore eyes.”³⁰ The Crow and Cheyenne made high quality bows by cutting horns into strips, piecing them together, and binding them with sinews that had been soaked in glue.
- Hooves along with the muzzle, eyes, penis, and other parts of the animal were boiled together to make glue.
- Bones became “war clubs, pipes, knives, knife handles, arrowheads, arrow-making tools, and runners for small, dog-drawn sleds.” The frontal bones of the skull were shaped into hoes and spades, while the fleshing tool used in tanning hides came from the leg bones. The porous inside of the tops of limb bones could be shaped into a sanding tool and also became paint “brushes”—the pores soaked up the colored fluid, which could then be spread onto leather.

- Teeth were mainly used for jewelry and ornaments.
- Tendons (sinew) are very tough, and strands could be stripped from them to make durable threads. When twisted together, such threads became ropes, bowstrings, and bindings used for a variety of purposes such as fastening points to arrows.
- Hair (separated from the hide) became a lining for moccasins, or was shaped into dolls and balls for children. The hair strands were also braided or twisted into cords that were used, depending on thickness, as loop earrings, bracelets, halters, belts, and ropes.
- Rumen, bladder, the membranous sac around the heart (pericardium), the large intestine, and even the whole skin of a calf could be used to hold water and food.
- Gallstones provided a yellow pigment for paint, and the Cheyenne made “a black pigment by stirring cottonwood buds or ashes of burned grass into fresh buffalo blood.”³¹
- Dung (“buffalo chips”), when dried, could be burned like peat. Dried dung could also be pulverized into soft fibers and pressed into pads that were used as absorbent baby diapers.

How integral the bison—after death—was to the life of the Native people! The bison sustained them as food, and its re-crafted manifold parts enveloped them and made their day-to-day life possible. The transformed bison was an active and essential component of the Plains tribes. Clearly, in this sense, a bison does not end when it dies. Its life as an individual organism is gone, but through its body parts the bison integrates into a whole new life world—that of the Native people.

The Bison as Spirit Being in the Culture of the Plains Tribes

What I’ve ignored in the above description is the role bison played in what we would today call the spiritual life of the Plains Indians. To separate day-to-day life from the spiritual is something we do in modern Western cultures. This separation was not present in the life of the Plains Indians.³²

A bison hunt, for example, was not just a matter of killing an animal for its useful products. It was an extension and expression of the Plains Indians’ relation to bison as physical-spiritual beings. Most of us today who grow up in Western cultures and use an animal or plant for food or other needs do not feel a connection to some larger spirit nature of the animals or plants we consume. But this was very different for the Plains Indians, as this story from the Blackfoot (Nitsitapii) tribe reveals:

Long ago, in the winter time, the buffalo suddenly disappeared. The snow was so deep that the people could not move in search of them, for in those days they had

no horses. So the hunters killed deer, elk, and other small game along the river bottoms, and when these were all killed off or driven away, the people began to starve.

One day, a young married man killed a jack-rabbit. He was so hungry that he ran home as fast as he could, and told one of his wives to hurry and get some water to cook it. While the young woman was going along the path to the river, she heard a beautiful song. It sounded close by, but she looked all around and could see no one.

The song seemed to come from a cotton-wood tree near the path. Looking closely at this tree she saw a queer rock jammed in a fork, where the tree was split, and with it a few hairs from a buffalo, which had rubbed there. The woman was frightened and dared not pass the tree. Pretty soon the singing stopped, and the I-nis’-kim [buffalo rock] spoke to the woman and said: “Take me to your lodge, and when it is dark, call in the people and teach them the song you have just heard. Pray, too, that you may not starve, and that the buffalo may come back. Do this, and when day comes, your hearts will be glad.”

The woman went on and got some water, and when she came back, took the rock and gave it to her husband, telling him about the song and what the rock had said. As soon as it was dark, the man called the chiefs and old men to his lodge, and his wife taught them this song. They prayed, too, as the rock had said should be done. Before long, they heard a noise far off. It was the trample of a great herd of buffalo coming. Then they knew that the rock was very powerful, and, ever since then, the people have taken care of it and prayed to it.³³

This story of the first *iniskim*, or buffalo rock, has been passed down, in variations, until the present. When an Indian found an *iniskim*, it became

strong medicine, and, as indicated in some of these stories, gives its possessor great power with buffalo. The stone is found on the prairie, and the person who succeeds in obtaining one is regarded as very fortunate. Sometimes a man, who is riding along on the prairie, will hear a peculiar faint chirp, such as a little bird might utter. The sound he knows is made by a buffalo rock. He stops and searches on the ground for the rock, and if he cannot find it, marks the place and very likely returns next day, either alone or with others from the camp, to look for it again. If it is found, there is great rejoicing.³⁴

The *iniskim* became part of a sacred bundle that was important in ceremonies to call the bison. So we see here a powerful story culture in which an object has a latent force that can be freed when people give attention to it and use it in an appropriate way. There is, in this way of being in the world, no such thing as a merely inanimate object.³⁵

The sacred pipe of the Lakota Sioux was brought to the tribe by White Buffalo Cow Woman, and she instructed them about its significance and use. When she was leaving them, she turned first into a “young red and brown buffalo calf,” then into a “white buffalo,” and finally into a “black buffalo. This buffalo walked

farther away from the people, stopped, and after bowing to each of the four quarters of the universe, disappeared over the hill.³⁶ The pipe itself was a kind of microcosm of the universe. White Buffalo Cow Woman told the tribe:

With this sacred pipe you walk upon the Earth; for the Earth is your Grandmother and Mother, and she is sacred. Every step that is taken upon Her should be as a prayer. The bowl of this pipe is of red stone; it is the Earth. Carved in the stone and facing the center is this buffalo calf who represents all the four-leggeds who live upon your Mother. The stem of the pipe is of wood, and this represents all that grows upon the Earth. And these twelve feathers which hang here where the stem fits into the bowl are from Wanbli Galeshka, the Spotted Eagle, and they represent the eagle and all the wingeds of the air. All these peoples and all the things of the universe are joined to you who smoke the pipe—all send their voices to Wakan-Tanka, the Great Spirit. When you pray with this pipe you pray for and with everything.³⁷

The pipe is very “*wakan*,” meaning powerful, holy, sacred. It is not merely an outer symbol of the universe. It embodies the universe, is a presence of the universe. When we hear, for example, that the buffalo calf carved in the pipe “represents” all four-leggeds, we might think of it as an illustration or design element. But for the Plains Indians each feature was a re-presencing of a universal power. The pipe was used in at least seven different ceremonies.³⁸ These ceremonies were human enactments—often involving purification—to create renewed relations in the tribe and in the rest of the universe to the power and sacredness of the world, to *Wakan Tanka*.

In this sacred world, the bison and the human being are people. As part of the instructions for preparing the sun dance ceremony, the tribe is told:

You should cut from rawhide the form of tatanka, the buffalo. He represents the people and the universe and should always be treated with respect, for was he not here before the two-legged peoples, is he not generous in that he gives us our homes and our food? The buffalo is wise in many things, and, thus, we should learn from him and should always be as a relative to him.³⁹

Or in the Blackfoot story of Scarface, the sun asks: “Which one of all the animals is most *Nat-o’-ye* [having sun power, sacred]? The buffalo is. Of all animals, I like him best. He is for the people. He is your food and your shelter.”⁴⁰

And the bison could also be a teacher. The young Iowa boy, Lone-walker, followed his father and other men on a buffalo hunt and was weeping, since he too wanted to hunt.

In the distance he saw them shoot a buffalo bull, a small one, and leave it lying there while they passed on. Just as he was passing the carcass, sobbing and crying, the bull

spoke to him. “Oh, so it’s you, Lone-walker? I’m glad you came, for I’ve recovered and am just about to get up again. Now I’m going to tell you what to do from this time on. You must skin me over the forehead, taking my horns and a strip of fur down over my backbone to my tail, and you must use me in doctoring. Also take a piece of flesh from my leg, dry it, and pulverize it. Take some of my back fat to grease yourself and the wounds of your patients. Next remove my dew claws and make them into a rattle. You have been trying to dream something, so today I’ll show you what we buffaloes will give you and you may hereafter do to your own people as we do to ourselves. This doctoring will be called *tce!hówe*, the buffalo’s ways.”

Then the buffalo taught him the roots and herbs they used to heal the sick. They were especially potent for broken bones and wounds. He showed the lad how to use splints in binding them up and he taught him the potent buffalo songs, and what preachments and prayers to make.⁴¹

Extending beyond its remarkable and crucial material service to the Plains tribes, the bison inhabited their souls and became part of their actions. The bison was a fellow spiritual person, a guide, and a teacher who taught from the inside out and served materially from the outside in. The bison extended into the very core of a human culture. Or we could also say, a human culture stretched out into the many-layered being of the bison.

Can the Bison Expand Again?

The rich coexistence of Plains tribes and bison was brought to an end during the course of the nineteenth century. The Plains tribes were being decimated by illnesses (such as smallpox) carried by Euro-Americans and by the military campaigns against them. Concurrently, the population of bison dropped from millions to a few hundred by the beginning of the twentieth century. Drought, increased hunting by Native tribes on horses, exotic diseases, and especially the market for bison fur were reducing bison numbers into the latter half of the nineteenth century. The wanton slaughter of bison by hunters and soldiers came in full force in the decades after the Civil War, when railroads extended into the western plains. The power of greed (“the market”) and the desire to open up the continent for Euro-Americans by ridding it of Native Americans and their source of life—the prairie and the bison—drove the decimation.⁴²

The Plains Indians foresaw in dreams and visions this tragic interweaving of their destiny with that of bison. For example, Black Elk, the Sioux holy man, states:

A long time ago (about seventy years) there was an Indian medicine man, Drinks Water, a Lakota, who foretold in a vision that the four-leggeds were going

back into the earth. And he said in the future all over the universe there shall be a spider's web woven all around the Sioux and then when it shall happen you shall live in gray houses (meaning these dirt-roof houses in which we are living now), but that will not be the way of your life and religion and so when this happens, alongside of those gray houses you shall starve to death.⁴³

The Plains Indians' deep connection to the bison came to vivid expression when Plenty Coups, a Crow tribal leader, said as an eighty-year-old in the late 1920s, "When the buffalo went away, the hearts of my people fell to the ground, and they could not lift them up again. After this nothing happened."⁴⁴

After the near extermination of the bison by 1900, populations gradually grew again. Today there are around 20,000 bison in 62 different conservation herds in North America and around 400,000 in herds raised for commercial use (mainly meat).⁴⁵ Even the few free-roaming herds, such as the one in Yellowstone National Park, are not truly free to roam wherever they go, since outside park boundaries they can be hunted.

A question weighs heavily on anyone who gains a sense of the full life of a bison—its centered and its peripheral nature as I have tried to portray it here. Can we human beings choose to speak for the bison as they have become part of us, and provide conditions for them to expand again, on earth, into a larger world of relations?

We cannot simply reverse the tragic contraction of the bison. But we can move forward to a human culture that once again acknowledges the value of the expansive creatures that animals are. And we can work—despite all obstacles—to provide large areas where they can become agents in the revitalization of landscapes.⁴⁶ A variety of initiatives—in Native tribes, NGOs, and government—are working in this direction.⁴⁷

One initiative is that of the Intertribal Buffalo Council, which was founded "for the purpose of restoring buffalo to Tribal lands to promote and rekindle the spiritual and cultural relationship between Tribal people and buffalo, to promote ecological restoration and to utilize buffalo for economic development."⁴⁸

Fred Dubray, a founding member, had a conversation with historian Dan Flores about the Council's idea of bringing the buffalo back to reservations. An elderly Lakota woman approached them and said, in effect: "Best you ask the buffalo if they *want* to come back." They performed a ceremony and asked the buffalo. They want to come back, the ceremony revealed, but they don't want to come back and be cows. They said that they want to be buffalos; they want to be wild again.⁴⁹

A Many-Layered Being

How expansive animals can be today is largely in the hands of human beings. A crucial step is to expand our awareness to recognize and understand animals in both their centered and peripheral aspects. In this endeavor, we can discover different qualities and kinds of centers and peripheries. Physical centeredness is not the same as the centeredness of life processes, just as the web of physical relations is not the same as the web of living relations.

As a *physical entity*, a bison's robust body has a fairly clear boundary that sets it apart from other bison, and from the ground, rocks, trees, streams, and other features of its surroundings. We can view it as a thing among things, each filling its own space and having a boundary. This is what allows us to say, "Look, that bison over there is so much bigger than the one up on the hillside." We can count the members of a herd. When we focus on this centeredness, we consider a bison as an independent entity, ending at its physical boundary.

But every physical thing is also bound up in relations with the larger physical world. As a spatial entity, a body needs space around it. A space-filling, material body rests on the ground that supports it. Bodies don't exist in a vacuum. As a physical being, a bison stands on the earth, and is subject to gravity, to changing temperatures, and much more. It is a member of the physical earth.

As a *living being*, a bison is also centered. Just think of its ability to generate a constant body temperature, which remains around 98°F (36°C) despite exposure to continually fluctuating outer temperatures. The constancy of body temperature is not a "thing"; it is an ongoing achievement of the life of the animal. As a living being the bison is activity. All its parts and characteristics are being actively built up, maintained, and, if needed, broken down. In the course of its life, the bison develops new characteristics, grows, and, perhaps, reproduces. All this is part of its centered life. So

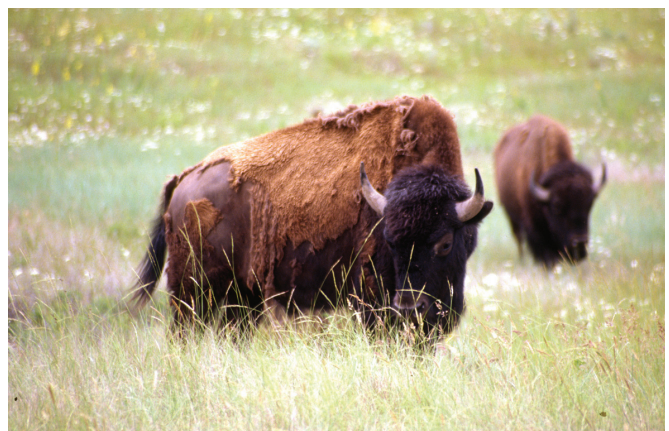


FIGURE 13. Bison in Yellowstone National Park

while we can say of a physical entity, such as a rock, that it remains over time, of an organism we must say that its identity over time is “not the inert one of a permanent substratum, but the self-created one of continuous performance.”⁵⁰

But this life could not exist—the bison could not be a living agency—without a supporting periphery. The bison feeds on the grasses and needs to digest plant life to continually maintain its own life. An organ forms in the rumen out of the microbes that the bison has taken in from its environment. It exchanges gases with the atmosphere. Its life exists as the intertwining of active center and abundant, receptive, energizing periphery. When we think of the living bison, its “boundary” is not a physical partition; it is an active, selectively permeable, and dynamic interface. And as we have seen, the life of the bison, for example in feeding, spreads out into the life of the environment that supports it. The living prairie is, in a sense, the peripheral half of the bison’s life.

We experience the bison as a *sentient being* when we attend to its behavior. We observe how it notices when we come too close, how it walks toward a new grazing patch and begins feeding. We see the difference between its gaze when ruminating or when sparring with another animal. We realize that the various grunts and bellows have meanings in the relations among the members of the herd. All such activity radiates out from the bison as a centered, attentive being. Sentience is an expanding and contracting agency by which the animal opens through its senses to participate in a specific world of qualities. The bison expands into a wide world through senses such as hearing, sight, and smell and draws more into itself when tasting, ruminating, and digesting. It is with what it senses.

Every movement the animal makes embodies sentience, whether flicking of flies with its tail or swimming across a river. Every part of its body is ensouled, but the sentience itself—the soul of the animal—is not, just as the animal’s life is not, a “thing” that can be localized. We need to become comfortable with the seeming paradox that sentience is both everywhere and nowhere. It cannot be grasped by a mentality that only wants to deal with what can be clearly circumscribed as a thing or a causal chain of discrete events.

When interacting with its fellow herd members or when fleeing a predator, the bison is living in its “soulcape,” a world of relations that belong to it. A bison’s sentient periphery is not the same as an eagle’s or a mole’s, though they may intersect. So while the physical bodies of different kinds of animals are clearly distinct, their sentient lives can intermingle and do so every time two animals interact. So through its sentience the bison spreads as far as its senses and limbs will take it.

Finally, the Plains tribes clearly experienced the bison as a *spirit being*. For them it was a great being that is embodied in

every single member of the species. This being can interact with other spirit beings—human beings, other animals, plants, or rocks. This is the most expansive—and most elusive—aspect of the bison. Ceremonies and the attainment of special states of consciousness were necessary for the Native peoples to experience the bison as spirit being.

As a child of Western culture, I don’t have an experience of the bison as a spirit being in the way the Plains tribes describe. And yet, I sense that they have encountered something real. I have a strong urge to reconnect with something larger and deeper that I intimate but don’t yet fully experience. So my striving is to find ways to reconnect that feel authentic and respectful.

As I mentioned earlier in the conclusion of Chapter 2, a guiding question for me in my studies of animals is, “Who are you?” I engage with the many details of an animal’s being through the study of morphology, physiology, ecology, behavior, and evolution. But I don’t want to get lost in myriad facts or in a particular perspective. I don’t want to “explain” an animal or its features. In getting to know the animal through its manifold features, I let it come alive in my imagination, and then I get glimpses of its unifying character. When the unifying character of the animal begins to show itself, I can speak of the *nature* of an animal. This nature is what reveals itself through all the other layers of physicality, life, and sentience as the specific way of being of an animal species. It is the bison in the bison, the sloth in the sloth. I could call this the spiritual nature of the animal, and thereby give expression to my sense that I am approaching, from a very different starting point, what the Native people called the spirit being of the animal.

If we take the fact seriously that an animal is both a centered and a peripheral being—that it does not end at its physical boundary—then we can see that a landscape, a soulscape, and a spiritscape belong to the animal. This peripheral being of the animal is not so tangible as the robust, centered animal we encounter as a bodily presence. And we can all too easily overlook the larger being of animals since they are adaptable and resilient and can therefore live under conditions in which peripheral relations have been reduced and made poorer. Animals can live in confinement as long as certain basic needs are met. But an animal is not a whole animal when it is not embedded in the rich world of relations with other beings and the earth.

To view this article’s notes and references, go to: <http://natureinstitute.org/article/craig-holdrege/where-does-an-animal-end-American-bison> and click on the pdf version.



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“When I am drawing I am usually very content in the pleasures of focusing outward. I think of drawing not as an end in itself but as a learning process, of doing research with a hand lens and pencil instead of a book and note cards. I think of it as seeing what I did not see before, of discovering, of walking around in the stamens and the pistil, of pacing off the petals, of touching the plant and knowing who it is.”

- ANN ZWINGER