How Lush My Garden

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Outside my Tucson, Arizona, home a Gamble's quail stands sentry on a granite boulder near an agave patch, the bird's russet topknot quivering as it swivels its head. Why so on high alert, I wonder. Usually the quail covey scratches for seeds or dust-bathes under the lush canopy of a large velvet mesquite anchoring the garden. But then a light-yellowish fluff ball scurries out from under an agave and darts across the cobblestone path to the mesquite tree. A second ball runs, then a third: hatchlings. They disappear into purple-blossomed verbena, the groundcover grown thick in the shade of the tree's canopy. A fourth and a fifth join the others. Their barely visible toes shuffle duff and teeny-tiny amber bills poke out among the mesquite's dried leaf bits. More scamper underneath the tree, twelve babies altogether, with another adult bringing up the rear. Inside, I haven't poured my first mug of coffee; outside, life unfolds.

For a start, there's reproduction, photosynthesis, nitrogen fixation, and decay. The processes I learned in science classes, told in jargon with arrows, diagrams, chemical notation, and formulas: story plots and action through-lines deciphered by way of hypotheses and experimentation. As a wildlife ecologist, such stories are part of my lexicon. But there are other stories as well. History, anthropology, art, literature—the humanities—all of which add context and meaning to my garden. The mix of science and humanities, like a good stew, deepens the flavor and aroma, and thus creates fuller understanding of a subject.

However, my garden was once rather bland.

Bermuda grass, two cypress trees, and three date palms grew in the front yard when I bought the house twenty-five years ago. The verb "grow" was a misnomer, as all barely clung to life, the house vacant and irrigation system turned off for over a year. The landscaping was a relic of a bygone time, when the subdivision was platted before World War II, the land then at the very fringe of the wild Sonoran Desert. From the species of plants they installed, I believe the original owners wanted to be surrounded by familiar-to-them landscaping rather than indigenous vegetation. Standing next to the For Sale sign, I evaluated the property's natural resources as deeply as I inspected the building's exterior. Mourning doves and mockingbirds, common birds found throughout the US, flitted about. All in all, three species of plants and two species of birds inhabited the property.

My investigative lens was multifaceted. I used scientific understanding (HVAC efficiency, windowpane R values, presence/absence of carcinogenic building materials) as well as humanities (room layout, views, tile color and pattern, paint shade, architectural style). My scientific understanding allowed me to evaluate the safety and energy efficiency of the place. My humanities understanding allowed me to guess at how I would feel living both within the home's walls and as a member of the property's living community. Integrating science and humanities is important according to Fealings et al. (2022) because different kinds of knowledge, whether STEM (Science, Technology, Engineering, Math) or HASS (Humanities, Arts, Social Sciences), are fundamentally connected. The world is complex. Fluency across disciplines helps navigation, and understanding of both STEM and HASS creates better solutions to today's problems, both big and small (Krebs et al. 2023).

Once I purchased the house, landscaping became my problem to solve.

The house is located in an urban area, a mile from the University of Arizona, where I received my PhD in wildlife ecology, and two blocks from a six-lane boulevard jammed with cars and trucks traveling at fifty miles an hour. Yet, I desired to create an oasis of plants native to the Sonoran Desert, the closest swath of protected natural open space nine miles away in Tucson Mountain Park. Since I advised clients to restore habitat for a living, I decided to restore my own patch of disturbed earth. Habitat restoration is often thought to occur in denuded areas like abandoned mines and not the front yard of an old house in a densely occupied old neighborhood, and by dense I mean four to six homes to the acre. I didn't have a plan other than to "walk my talk" and persuade visitors and neighbors to care about preserving wild desert areas.

The desire to revegetate land that humans have altered stems from my childhood. I often roamed the woods alone wherever we lived—California, Oregon, Tennessee, Missouri, Illinois. I was in middle school when we lived in a St. Louis suburb and explored a wild patch abutting our property. I followed a stream and documented with my camera where raccoons and opossums lived, and where a copperhead snake sunned on a downed buckeye log. I sought out wildflowers—blazing star, columbine, blood root, May apple. In the stream, I watched frogs and discovered horsetails growing in the shade. This reach of the stream became my happy place, until one day bulldozers scraped a swath of woods, all the way to the edge of the stream, destroying the raccoon, opossum, and copperhead's homes (and probably killed the raccoon, opossum, copperhead, as well as everything else in the path of the dozer), and destroying the cool microclimate that the horsetail needed along the streambank. While I

could not stop the advance of building homes for people and return my neighborhood woods to wildness, at age twelve I vowed to save other wild patches.

After I purchased my Tucson home, I dug up the lawn and cut down the cypress trees. I kept the palms because they bore fruit for the birds. With the ground barren, a *tabula rasa*, or "blank slate," I planned to dig-in plants that wildlife would utilize.

I wasn't always a wildlife ecologist. Science was a second career. My foundational education was in the liberal arts with coursework in literature, philosophy, history, economics, art history, archeology, and languages (French, Spanish, Latin, Portuguese). By studying the humanities and social sciences, I investigated human culture and developed critical thinking, communication, and writing skills. I was older when I returned to school for a second graduate degree, this one in a STEM discipline.

Because my education has encompassed both STEM and HASS, I approach all problems with the skills I learned from both. Teasing apart systems and finding solutions is akin to looking through a kaleidoscope, one lens gives one picture while another lens grants me a different, parallel interpretation. Taken together, the view through multiple lenses creates a deeper and more meaningful picture. What better place to merge my passion for both humanities and science than restoring my front yard.

At a plant nursery, I looked for species native to the Sonoran Desert. I wanted plants that would give my Tucson home a sense of place, a humanities-driven phrase that describes the distinctive character of a location, including its culture, history, and environment. The Sonoran Desert is the most diverse of the world's deserts, oozing south from roughly mid-Arizona into Mexico, encompassing most of the Mexican

states of Sonora, Baja California, and Baja California Sur. The Sea of Cortez, with its many rocky islands is also part of the Sonoran Desert. Our desert's precipitation arrives during two seasons: summer monsoons (derived principally from the Sea of Cortez) and winter rains. Sometimes the temperatures are below freezing, other times in the triple digits. The geography includes mountains, rivers, estuaries, marine environments, *bajadas*, and grasslands. Thus, the Sonoran Desert consists of diverse landscapes and subsequently diverse floras.

I focused on what made sense for my plot, which, before the house was built, would have been covered with vegetation classified as an upland Sonoran Desertscrub community. I knew straightaway that I would plant three plants found in nearly all areas of desertscrub uplands: velvet mesquite, saguaro cactus, and creosote.

The mesquite would be planted first, since the tree would be the focus of the garden and eventually grow into a grand green sculpture at the home's entryway. Searching at the nursery among rows of baby trees in five-gallon tubs I looked for a multi-stemmed sapling, an undesirable form for a landscape shade tree since most people want trees to grow into lollipops with a straight trunk topped by dense canopy. But I wanted a form that would mature into art and eventually drape over a horseshoe-shaped walkway leading to my front door.

The velvet mesquite (*Prosopis veluntina*) is a woody perennial that can grow up to thirty feet tall. It produces tiny yellow flowers pollinated by bees. The leaves are bipinnately compound, with up to thirty pairs of gray-green leaflets. A distinguishing feature of this species is the dense trichomes on the leaf and stem surfaces giving these structures a velvety texture. Spines grow on young trees, probably as a deterrent to herbivores. As a member of the legume family, the mesquite forms beneficial relationships with nitrogen-fixing bacteria in the soil. In the

late summer, after monsoon rains, the tree produces seeds in a bean pod. Importantly, for a desert gardener, a mesquite tree casts good shade.

This morning as I watch the quail, one adult flies to the lowest branch of the mesquite, the limb tall enough for me to walk under without stooping. The quail's rapid wingbeats produce a whirring noise. If the quail had been present when I first planted the baby mesquite seventeen years ago, the bird's weight would have bent the tree over. Landing now, the quail struts along the rough-barked branch. He lifts his head and issues a three-note song: chip-chip-chip.

I tend to hone in on how nature smells, sounds, feels, and tastes, as well as how the components of nature appear. As a writer of essays, many with a conservation message, I appeal to readers to be attentive to my characters and their situations by involving our five senses. Incorporating sounds, visuals, taste, touch, and smell creates an emotional connection more so than communicating bare facts from an exclusively scientific point of view. I came to writing essays through writing scientific reports; developing technical and lab papers that follow a formulaic outline. Yet the authors I read—Joy Adamson, Wallace Stegner, Edward Abbey, Gene Stratton-Porter—wrote about nature in lyrical phrases. As my goal is to convince readers to protect wildlife and wild spaces, literary techniques taught in creative writing and English classes craft a bridge to the heart not only to the head. I latch onto and care about characters in stories and their fate with more intensity than I cherish equations and facts. My favorite authors' styles interested me more than the formulaic style of articles in scientific journals, so I copied the nature writer's way with words to tell my stories.

Several years ago, while cycling with my friend Jane in the grasslands south of Tucson one blistering-hot September Saturday, we stopped

under a mesquite's canopy. Jane, a neurologist, guzzled water from the bottle clipped to her road bike. I scanned tall amber-colored grass, shin-high beyond the barbed wire fence abutting the two-lane road.

"Look," I said, "pronghorn." A herd of five buff- and white-patched animals grazed under a massive mesquite. Hearing my words, they stopped pulling at grass and stilled. Five sets of eyes watched us, five sets of ears turned our direction.

"I thought they lived in more open places, like prairies and real grasslands," Jane said.

"These are grasslands." I pointed to the other side of the road, to cattle grazing on the same type of grass as the pronghorn. They too, stood underneath a cluster of mesquite trees.

"But the mesquites look like they're taking over." Jane swept her water bottle at the landscape, grass speckled with clumps of mesquites. If it wasn't for the study of history, biologists would think mesquites had always grown amongst grasslands throughout southern Arizona. Biologists would believe the landscape Jane and I cycled through wasn't grasslands per se, but a plant community of mesquite-grass.

"Yup," I said. "Five-hundred years of mesquites taking over."

Southern Arizona was once part of Spain. When the Jesuit missionaries established settlements in the late 1600s, they described and sketched the landscape (Kessell 1970). Mesquite trees were primarily associated with waterways like the one up ahead that Jane and I would soon cross. A ribbon of trees snaked along an arroyo, the wash dry but the density of vegetation indicating a high water table and surely surface water during summer monsoon rains. The Jesuits

brought cattle, and more settlers with more cattle followed the Jesuits to the area that was then referred to as Pimería Alta (the "Land of the Upper Pima Indians"). Through letters, accounts, and old photographs, historians have learned that the settlers suppressed naturally occurring fires which would have killed young mesquite (Bahre 1991), thus facilitating the invasion of mesquites into grasslands. Cattle prefer not to eat spiny-stemmed plants, leaving cacti and mesquites to grow, while they munched on other vegetation. Thus, for five-hundred years, since the cattle were introduced, mesquite trees have spread and flourished. Cattle also eat mesquite beans, their stomachs scarifying the seeds, and the animals spread these seeds in dung, establishing new trees throughout the landscape.

"That's a long experiment," Jane said, stowing her water bottle. She was right. As scientists, we can't develop controlled experiments that cover enough time to test a hypothesis about these many-year habitat changes. But historians (including art historians) can and through their work researching missionaries, missions, and ranching in Pimería Alta, scientists have theorized the reasons behind the presence and spread of mesquite trees from riparian areas to grasslands and uplands. A deep-time natural experiment that we can explore and understand through documentation of both the humanities and science.

After I installed the velvet mesquite in my garden, I searched for experts to suggest understory species. My mother, an ardent gardener, had dragged me to botanical gardens during family travels. So, to landscape my own garden, I turned to Tucson's Arizona-Sonora Desert Museum, where I had volunteered as a docent when I first moved to Tucson for graduate school. The museum had planted its grounds with natives. A patch outside the art gallery was my favorite

spot and served as my model. I documented the species present and found them at various plant nurseries over a period of several years.

My garden mesquite has grown from a three-foot sapling to well over twenty feet tall. Its multi-trunks (five altogether) serve as roosts for the quail sentry as well as other birds, and its branches cascade over the garden and flagstone walkway as a fountain of tiny green leaves. In the summer's evening heat, a cereus cactus growing at the tree's base twines up the trunks and produces bodacious ivory-colored blooms. The cactus flowers omit a sweet scent, like honeysuckle, that attracts bats. I have yet to see a bat lapping at the sticky nectar, but on some nights more than one hundred blossoms open, so I hope to see a bat drinking sooner or later.

Long-spined barrels and various mammillaria cacti hide amongst dense agaves but grab my attention in springtime when they bloom fuchsia, scarlet, and chartreuse. Beargrass, not a true grass but a member of the asparagus or agave family, stands guard. Prickly-pear, or *nopales* in Spanish, and cholla cacti grow thick. The long, curved beaks of thrashers poke at crimson prickly-pear fruit or *tunas,* and the birds build twiggy nests amongst the cholla cactus's thorny joints. There is slipper plant, a succulent from Baja California, its orange-red blossoms like Cinderella's slipper. Mountain marigold bunches in the mesquite's shade and desert marigold clumps in the sun. Purple-blossomed verbena lounges near irrigation drippers. The tufted small annual *Dyssodia*, dogweed, with tiny golden flowers, fills in gaps. Their scientific name is derived from Greek, meaning "disagreeable-smelling;" a description I concur with since I find they smell spicy and pungent, like the scent after rubbing marigold leaves between my fingers.

In literature, plants and plant communities often serve to establish setting, sense of place, and mood. For example, in *The Devil's Highway*

(Urrea 2004), an account of a migrant group's demise crossing from Sonora, Mexico, into southern Arizona, the author, Luis Alberto Urrea, uses plants to create an ominous situation:

> *The plants are noxious and spiked. Saguaros, nopales, the fiendish chollas. Each long cholla spike has a small barb, and they hook into the skin, and they catch in elbow creases and hook forearm and biceps together. Even the green mesquite trees have long thorns set just at eye level* (Urrea, page 6).

Urrea's description of the actual Devil's Highway, or *Camino del Diablo,* a historic route from Caborca in Sonora, Mexico, to Yuma in southern Arizona, applies to my garden as well. Yet busy birds make a cheerful home in my "ominous" saguaros, nopales, and chollas. In addition to the Gamble's quail and curved bill thrasher, verdin, southwestern willow flycatcher, broad-tailed hummingbird, Anna's hummingbird, vermillion flycatcher, northern cardinal, broad-billed hummingbird, gilded flicker, cactus wren, Gila woodpecker, house sparrow, lesser goldfinch, Cooper's hawk fly in and out. Cactus wrens, along with the thrashers, nest in the cholla; broad-billed hummingbirds in the catclaw; Gamble's quail underneath a *Cordia* bush. A greater roadrunner frequents, sometimes standing next to me as I rake dead leaves toward the base of plants, the bird gobbling up exposed bugs. Rabbits are common, as well as coyotes and javelina.

Beyond the canopy of the mesquite, I've planted out the rest of the front yard in natives as well: barrel cacti, saguaro cactus, wolfberry, elephant tree, palo blanco, bursage, agave, wild cotton, bunchgrasses, *Cordia*, yucca, blackfoot daisy, ocotillo, creosote, catclaw acacia, organ pipe cactus, datura, mallow, brittlebush, fairy duster, ironwood and ebony trees. Columnar cacti include organ pipe, senita, cardon, as well as saguaro. Annual native wildflowers pop up: lupin, primrose, owl's clover, poppies. The prior owners wouldn't recognize the place.

While my coffee brews, I nibble on a mesquite-flour muffin and watch the quail chicks. They have scurried under a shrub-sized acacia tree, another member of the legume family. My muffin tastes nutty and sweet so I understand why the quail seek out legume seeds. The ancestors of the local indigenous tribes sought mesquite and acacia beans too (Hodgson 2001). On hikes into the nearby Santa Catalina Mountains, I've found divots—mortars—in granite bedrock near streams. These were made by pounding and grinding legume seeds with a pole (pestle) to make meal or flour. Again, my knowledge of the plants in my garden has been broadened by my knowledge of humanities, in this situation anthropology and history. I could make my own mesquite flour, by collecting, shelling, and drying the beans, then pounding them into meal. But it's easier to buy a sack at my local food co-op.

The quail continue to sort through the detritus beneath the acacia tree. I don't prune it, so the thorny branches fall to the ground and offer plenty of cover and shade. I don't remove fallen leaves either but let them decompose, further enriching the soil, mimicking the microhabitat found in the wild. My under-gardening creates habitat for insects, including pollinators like the one-thousand species of solitary bees that inhabit the Sonoran Desert.

Beneath the acacia, the chicks scratch through leaf litter at the base of a twenty-five-year-old saguaro cactus (*Carnegiea gigantea*), the icon of the Sonoran Desert. I planted the saguaro fifteen years ago, as a two-inch tall "pup," the name botanists have given to seedling saguaros.

Saguaros are slow growing and the first decade of growth translates to two inches of height (Saguaro National Park 2015). The pup had been a party favor at a fundraising event for a conservation organization. Removing the seedling from its small pot, I tucked the baby saguaro under the acacia and didn't coddle the cactus, neither

watering nor protecting the pup from birds, insects, or frost. The acacia would act as a nurse plant.

Years ago, while I ruminated about a career change, switching from marketing Kraft Philadelphia Cream Cheese and S. C. Johnson's Pledge Furniture Polish to a career in STEM, I enrolled in an ecology seminar at the University of Chicago. There were six other students in the course, all University of Chicago ecology graduate students. Each of us was tasked with presenting a paper from the scientific literature and moderating a class discussion. I chose a newly published article on legume trees, such as acacia, mesquite, or palo verde, serving as "nurse" trees to seedling saguaros (McAuliffe 1984). The concept spoke to my marketing/economic training—the ruthless pursuit of limited resources (in this case water). The concept was straightforward: the nurse tree created an ideal growing situation for the cactus pup. The tree's foliage and amassed leaf litter created a microclimate of shade, lower ambient temperature, increased soil moisture, and less exposure to seed-eating birds compared to an exposed area of the desert. As the saguaro grew in size, it began competing with the nurse tree for soil nutrients and water and, according to McAuliffe (1984), eventually sucked up so much rainwater that the nurse tree suffered and ultimately died. The article even had a dramatic surprise ending: the saguaro was a "killer."

A graduate student snickered at my conclusion. "Plants can't be killers," she said. "They are plants. You are anthropomorphizing the situation. Since saguaros grow so slowly, the trees simply die from a pathogen or old age."

From the surprised look on my face that she didn't find this idea of a predator cactus fascinating, the student assumed I didn't understand what anthropomorphizing meant. "It's a term we apply to the concept of projecting human emotions and actions onto animals," she said.

"Like authors of children's books." The other students agreed: I was naively assuming plants shared my human emotions. Silly me, who had earned a liberal arts degree, with a heavy emphasis on HASS, just didn't know better.

I was humiliated by their attitude that because I was not STEM trained (yet) my interpretation didn't hold value. Needleless to say, because of this experience I matriculated in a graduate program elsewhere.

Since then, the scientific community has embraced the concept that saguaros may act in an antagonistic manner and very likely kill nurse plants (Franklin et al. 2016; Saguaro National Park website 2015). A saguaro grows roots just beneath the earth's surface and the thread-like root matt has a diameter twice the height of the cactus, thus grabbing much of the water before the nurse plant can. In addition, because of scientific investigations we now know that plants communicate through emitting chemicals from their leaves and roots (Karban, 2021).

Conservation scientists sometimes lean into anthropomorphism to create empathy in the public so that a broader audience learns and cares about wildlife, and supports habitat conservation and species protection. For example, while it was once frowned upon in zoo management to describe the feelings of captive animals in similar terms to those of humans, concepts such as happy or lonely, zoo managers now use some anthropomorphic language in their exhibits and environmental education programs so that visitors may better relate to the animal, empathize, and thus hopefully desire the animal to survive in the wild (Burnet 2024, Sherman et al. 2024). But, science has now shown that most vertebrates, especially mammals and birds, probably actually do feel these kinds of emotions—so is it really anthropomorphizing? Anyone who has had a vertebrate pet long

enough to get to know them has probably seen these emotions in their own non-human vertebrate guest.

I am glad I finally embraced my younger wildland-roaming self and became a wildlife ecologist with a HAAS background. I left marketing after spending a beautiful sunny April day trapped in a downtown Chicago building's conference room discussing the placement of an ad for furniture polish in a well-known print magazine. I wanted to contribute positively to saving nature, not hawk the need to buff dining room tables. Staring out the window at hickory trees in a park, it dawned on me that I had probably chosen to work at the advertising agency because of the potted ficus tree in the company's lobby and now needed more green in my life.

My saguaro pup is now four feet tall. I hope to one day see it bloom. They set flowers when they reach about seven feet in height, between thirty to sixty-five years of age, with budding at the apex of arms and the main column, many feet above human heads. At Saguaro National Park, rangers have developed a saguaro-flower selfie stick, a digital camera mounted on a thirty-foot pole. With this tool, they have photographed saguaros during the blooming season, April through June. Blossoms are short-lived, opening at night and closing the following day. After several years of study, park researchers have found that flowers open in a counter-clockwise pattern. Researchers hypothesize that the plant may be taking advantage of the morning sun on the east side at the beginning of the blooming season when temperatures are mild. Then, as temperatures climb toward the end of blooming season in mid-June, buds may be located on the north side of the plant to avoid the heat of direct sunlight.

While STEM researchers have recently identified the saguaro's blooming pattern, the Tohono O'odham people have known for a while. Their circular ceremonial dances mimic the direction of

opening blossoms with a counter-clockwise movement, a demonstration of the cultural significance of the cacti to the tribe (Zepeda and Van Ballenberghe 2019). The picking of ripe saguaro fruit in June and July signifies the New Year for the Tohono O'odham, another example of the intersection of humanities (culture) with STEM (biology). After harvesting the crimson fruit, they make jam and wine for ceremonial use. Traditionally, the only sugar in their diet was from prickly-pear *tunas* and saguaro fruit. I've made jam from my prickly-pear. The end results were fingers full of spines and jars of neon-pink jam that tasted like grape juice, which gave me new appreciation for the skill of Tohono O'odham cooks (Harris 2023).

Swallowing the dregs of my coffee, I walk to the family room window to check on the quail. I find all fourteen under a creosote (*Larrea tridentata*), an evergreen shrub with tiny waxy leaves, an evolutionary adaptation to slow water loss to the scorching sun, low humidity, and infrequent rain events. My creosote is dotted with small canary-yellow blossoms and white fluffy seed pods, which attract the quail. In another month or so, rains will arrive with the summer monsoons moving up from the Sea of Cortez, and the creosote bush will release p*henolic compounds*, like cresol, as well as trans-caryophyllene, which actually comes from a fungus that lives inside the plant rather than the plant itself, according to ethnobotanist Gary Nabhan. The aromas of these chemicals are distinctive and pleasant, and to desert rats like me, associated with rain, which is why Nabhan coined the creosote scent with the phrase, "the desert smells like rain" (Nabhan 2022).

In the Tohono O'odham language, the word for creosote is *sesgei.* Ofelia Zepada, a poet and Tohono O'odham tribal member, writes in Mograne and Cokinos (2016):

Breathe.
Sesgei, s-ap u:w
The aroma of the story imbeds itself in
our memory like the pain of a broken heart
A memory cut fresh like a summer rain.

The creosote is a long-lived and resilient plant, sometimes surviving more than a thousand years. The Tohono O'odham recognize the creosote's resilience and use cuttings in blessings before community events. With a small bit of the plant, a tribal member will say a prayer in each of the four cardinal directions. Their words express gratitude for the creosote's hardiness and longevity and symbolize the interconnectedness between their ancestors and the desert environment. Understanding symbolism through poetry and ceremony deepens our understanding of the creosote plant, and offers more meaning to its place in the desert ecosystem as well as the creosote's contribution to the sense of place of the Sonoran Desert via the scent of upcoming life-giving rain.

Returning home from my evening walk, I search my landscaping for the quail but find none. I will check on them daily until the youngsters morph into adults. Their success mirrors mine, in creating a garden that meets their habitat needs. I'll give this year's seasonal growth and the clutch a thumbs up if at least two of the youngsters survive (replacing the adults) as heat, drought, hawks, cars, and feral cats have decimated past clutches.

My neighbor Peter greets me as our paths intersect at the corner of our cul-de-sac with another residential street. He carries pruners.

"I thought I'd whack the creosote back," Peter says, nodding to a large, dense creosote growing within the city's right-of-way. "Make visibility better."

I infer from my neighbor's comment that he might not be able to see through the creosote's foliage while driving.

"It's been here forever," I say, "Certainly as long as I've lived here." I expect him to trim just a bit—a haircut—respecting the plant for its age. But Peter lops off branch after branch, some to their base. His intention seems to be to kill the plant.

My marketing-psychology-anthropology background kicks in and I focus on communicating a persuasive argument that will appeal to Peter's emotions. "And the quail," I say, "they need a shady spot to recover from racing across the street." I point to our neighbor kitty-corner who feeds birds in her front yard. The quail run between my house and hers, and in doing so are exposed to the road's blacktop heat and cars. I've seen them rest and regroup under the corner creosote before advancing to my yard or hers.

Peter, unmoved by my plea, continues trimming, though his cutting slows.

"And the smell," I add. "We won't smell the rain if you cut it down." I turned on my persuasive skills, using emotions to "sell" an idea, a strategy I'd learned from my HAAS education and years in marketing.

Peter stops snipping. "I do like the smell of rain when I walk by," he says. He closes his pruners.

The creosote is half gone but hopefully it will recover.

Gone too is a lot of nature during what some scientists have labeled the current geological epoch—the Anthropocene—with today's human-caused global warming, habitat destruction, and accelerated

biodiversity loss. To save species, including creosote and quail, along with all the species living throughout the Sonoran Desert and other ecosystems, requires thinking beyond one science argument, one discipline. To solve our current problem, we must interweave STEM thinking with HASS thinking and develop a broader approach that creates lasting solutions, persistent as the creosote.

References Cited

Ardoin, N. M, A. W. Bowers, M. M. Burnet and W. Sherman. 2025. Building empathy for wildlife in zoos and aquariums: What we know about inspiring conservation action and caring. The Social Ecology Lab at Stanford University and Woodland Park Zoo.

Bahre, C. J. 1991. *A Legacy of Change: Historic human impact on vegetation in the Arizona borderlands*. The University of Arizona Press, Tucson.

Burnet, M. 2024. Rethinking Anthropomorphism. Association of Zoos and Aquariums. https://www.aza.org/connect-stories/stories/rethinking-anthropomorphism.

Fealing, K. H., A. D. Incorvaia and R. Utz. 2022. Humanizing Science and Engineering for the Twenty-First Century. Issues in Science and Technology 39(1): 54–57.

K. Franklin, P. N. Sommers, C. E. Aslan, B. R. López, J. L. Bronstein, E. Bustamante, A. Búrquez, R. A. Medellín and B. Marazzi. 2016. Plant Biotic Interactions in the Sonoran Desert: Current Knowledge and Future Research Perspectives. International Journal of Plant Sciences 177(3): 217-234.

Harris, L. K. 2023. A prickly-pear history lesson. Orion Magazine. https://orionmagazine.org/article/prickly-pear-opuntia-jelly-native-foodways/

Hodgson, W. 2001. *Food Plants of the Sonoran Desert*. The University of Arizona Press, Tucson.

Karban, R., 2021. Plant communication. Annual Review of Ecology, Evolution, and Systematics, 52(1):1-24.

Kessell, J. L. 1970. *Mission of Sorrows, Jesuit Guevavi and the Pimas, 1691-1767*. The University of Arizona Press, Tucson.

Krebs, P., N. Gaskins, C. Potts, C. B. Hill and M. Flanigan. 2023. The Vital Humanities. Issues in Science and Technology 39(2). https://issues.org/vital-humanities-hass-stem-forum/

Nabhan, G. 2022. *The Desert Smells Like Rain: A Naturalist in O'odham Country*. The University of Arizona Press, Tucson.

McAuliffe, J. R. 1984. Sahuaro-Nurse Tree Associations in the Sonoran Desert: Competitive Effects of Sahuaros. Oecologia 64(3): 319–21.

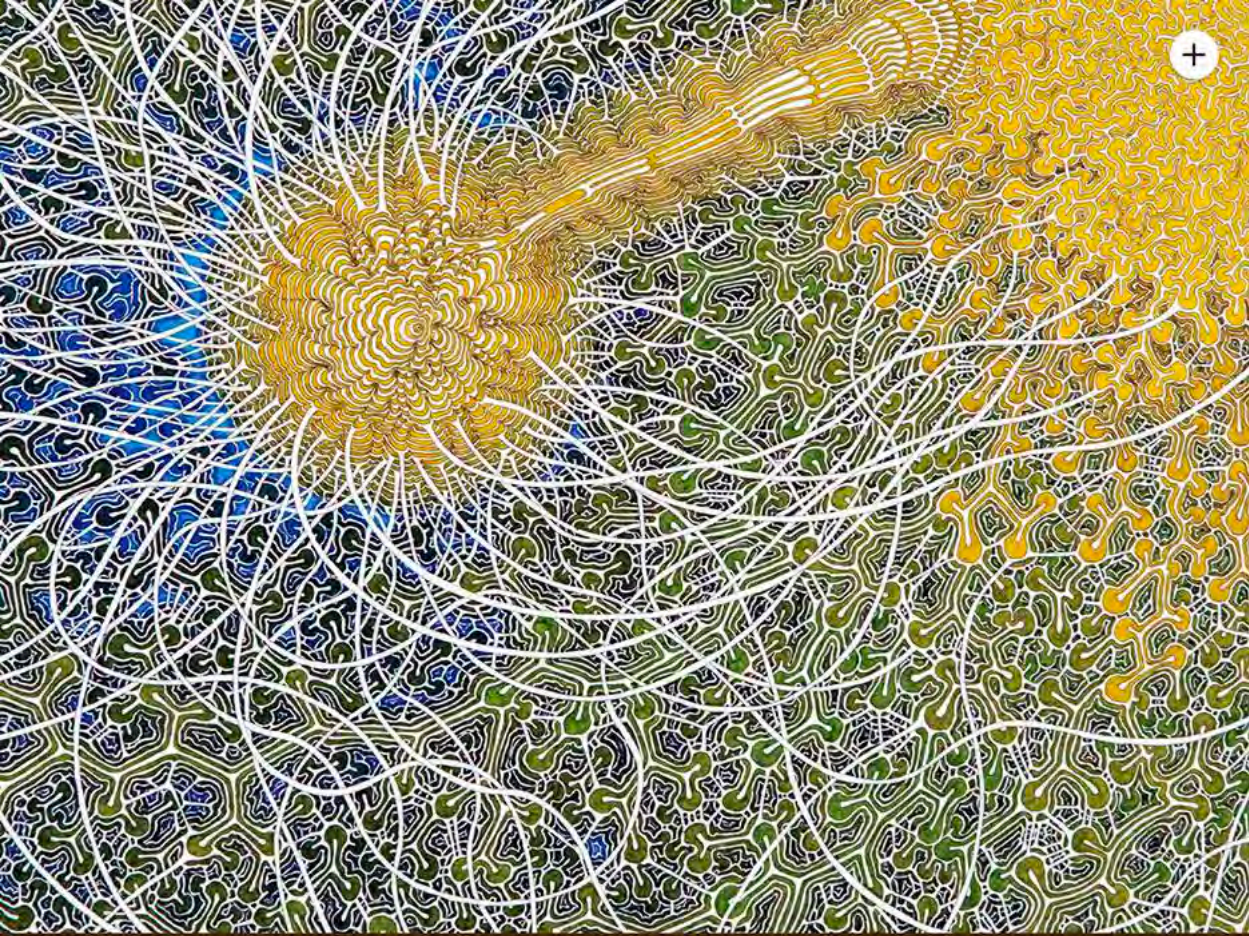
Saguaro National Park, National Park Service. 2015. How Saguaros Grow. https://www.nps.gov/sagu/learn/nature/how-saguaros-grow.htm?a_aid=3598aabf

Urrea, L. A. 2004. *The Devil's Highway*. Back Bay Books, New York.

Sherman, W., T. Ashley and A. Bowers. 2024. Identifying indicators, empathy, and anthropomorphism in zoo visitors' perceptions of animal wellbeing through qualitative interviews. Curator: The Museum Journal. Advance online publication. https://doi.org/10.1111/cura.12635

Zepeda, O. 2016. Creosote. Pp. 16-18 *in* E. Mograne and C. Christopher, eds., *Sonoran Desert: A literary field guide*. The University of Arizona Press, Tucson.

Zepeda, O. and J. Van Ballenberghe. 2019. O'odham Dances: A Moving Rural Verse Poetry-Film. Western Folklife Center, Elko, NV. https://www.westernfolklife.org/oodham-dances



THE DIVIDE BETWEEN HUMANITIES AND SCIENCE

Why It Matters and How it Can be Repaired

Edited by
Richard C. Brusca

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