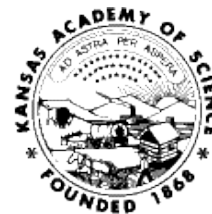


KAS BULLETIN



NEWSLETTER OF THE KANSAS ACADEMY OF SCIENCE

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154th ANNUAL MEETING OF THE KANSAS ACADEMY OF SCIENCE

April 1st - 2nd, 2022
Sterling College
Sterling, Kansas

Abstract Submission and
On-Time Registration deadline

March 11, 2022

For more details, visit:

www.kansasacademyscience.org/meeting.html

The Effects of Purple Light Pollution on Insects

by April Haight, Free State High School Student

Nighttime lights pose a huge threat to insects. This is most commonly seen in moths, and other nocturnal insects. Moth larvae emerge at night to eat, however streetlights often cause them to confuse night for day. According to Douglas Boyes, a PhD researcher at the United Kingdom Center for Ecology and Hydrology, the skewed day-night proportions stress the larvae out, which leads to over-eating, and premature pupation. Moths who pupate prematurely are smaller than their counterparts. This can be a problem as size dictates much of the moth's natural abilities. Smaller moths cannot fly as far, or lay as many eggs as an average moth. Infertility is another common side effect of underdevelopment in moths. This is because moth hormones are regulated by their circadian cycle. Misinterpreting daylight hours can cause fluctuations in hormones and lead to infertility in moths. In addition to the developmental problems streetlights cause moths, lights also increase the consumption of moths, Boyes says in an interview with Science Friday, a podcast hosted by National Public Radio (NPR). Streetlights attract adult moths to their light, which makes them an ideal feeding ground for bats and other moth predators. All these factors contribute to an ever-declining moth population, centered around nighttime light pollution.

In Lawrence, Kansas, some streetlights have been mysteriously turning purple. These purple streetlights are a new threat compounding the problems that nocturnal insects already face every night. Evergy, Kansas' energy provider, says the lights are turning purple due to a "subcomponent of the light fixture that is prematurely failing". The streetlight manufacturer is taking responsibility for the defect, and residents will not have to pay for the replacements because the lights are under warranty. In July, 2021, Evergy's goal was to replace all purple streetlights by the end of November, 2021. However at the end of the projected timeline, there were more purple streetlights than ever before. A spokesperson for Evergy, Andrew Baker, says the lights aren't hazardous, and that they are just an unusual color. While this may be true for humans, it is not so for insects. These purple lights are even more disruptive to insect life than regular street lamps.

Evergy's purple streetlights are worse for nocturnal insects for two reasons. According to David Moore, a board certified entomologist who works for Dodson Pest Control, from an insect's point of view, the purple lights are far more visible. Insects can readily perceive ultraviolet lights. These blue and purple colors have short wavelengths that range from 650 to 300 nanometers. However, orange and yellow colors, those with the longer wavelengths typically used for streetlights, are far less visible to insects. The mixture of wavelengths emitted from a yellow light bulb still contains a small amount of blue, which is what the insects see. But the proportion of blue light emitted from a purple streetlight is far greater, and thus far more disruptive to insects. Not only is the purple light more visible to insects, but it's shorter wavelength scatters more in the atmosphere. So there is a larger zone of insect-visible light surrounding each lamp to disrupt moths circadian cycle, and increase developmental defects and predation.

If Evergy delays the replacement of their faulty streetlights, irreparable damage could be caused to the insect population in Lawrence. As a community it is important that we stand up to Evergy, and let them know that these purple streetlights are unacceptable. Insects that were already struggling with light pollution are now being confronted by even more distracting colors of light. And light pollution is now travelling farther in each direction, so previously unaffected insects are being damaged. Light pollution is a 21st century problem, so we are responsible for finding a 21st century solution.



Amendment of Kansas Academy of Science Bylaws

On February 3, 2022, KAS Treasurer Shaun E. Schmidt proposed the following revision to the KAS bylaws. An internal audit of financial matters is deemed necessary to ensure objective oversight of the Treasurer by the Council, lower the financial risk for the academy, and to address requirements for bonding of the Treasurer.

Current Language

Article II. The Officers.

Section 4. The duties of the elective officers shall be as follows:

b. The President-elect shall fulfill the duties of the President when the latter is absent; shall succeed the President at the termination of the latter's term; and shall assume the Presidency should that office become vacant during a term.

Proposed Language

Article II. The Officers.

Section 4. The duties of the elective officers shall be as follows:

b. The President-elect shall fulfill the duties of the President when the latter is absent; shall succeed the President at the termination of the latter's term; ~~and~~ shall assume the Presidency should that office become vacant during a term; and shall conduct a financial audit for the previous year to be presented to the KAS Council for review by August 1.

Proposed Effective Date: *Upon passage at the 2022 KAS Annual Meeting*

Spider Rehydrates Food

by Hank Guarisco, Editor.

An interesting observation was made in Australia recently. A long-jawed spider (*Tetragnatha* sp.) (Araneae, Tetragnathidae) was seen descending on a silk thread to a pool of water, grabbing a water droplet between its jaws, then climbing back into the web and depositing the droplet onto a previously wrapped food item. It has been previously reported that desiccation of prey results in less nutrient uptake by spiders, which use extra-oral digestion. Spiders feed on prey items for a long time after they have been killed. Therefore dehydration can become a problem, and rehydrating a prey item could be a good solution. More research is needed to find out how widespread this behavior actually is. Is it restricted to species who build webs near water? Spiders do the darndest things!

Gould, J., L.F. Garia, and J.W. Valdez. 2022. Dunking for droplets: Long-jawed spider (Araneae, Tetragnathidae) bungees on silk line to collect water droplet from pond using its mouthparts. *Ethology* 00: 1-4. <http://doi.org/10.1111/eth.13270>



Book Review: “Braiding Sweetgrass” by Robin Wall Kimmerer. 2013.

by Hank Guarisco, Editor.

This 390 page paperback is truly a “gold mine” of both a spiritual awareness of nature, and practical experiences that reveal how we are an integral part of nature and how ecosystems respond to human actions. The author, a member of the Citizen Potawatomi Nation, as well as a distinguished professor of Environmental Biology at SUNY, has combined the unique perspectives of native peoples and those of a trained botanist.

Beginning with an attitude of gratitude for all that the living, natural world provides, she recounts events in her life that take us on wonderful journeys into endless bounty and glory. The chapter entitled, “Learning the Grammar of Animacy,” begins with the simple truth: “To be native to a place, we must learn to speak its language.” The flavor of the book can best be appreciated by sharing the words of the author herself:

I come here to listen, to nestle in the curve of the roots in a soft hollow of pine needles, to lean my bones against the column of white pine, to turn off the voice in my head until I can hear the voices outside it: the shhh of wind in the needles, water trickling over rock, nuthatch tapping, chipmunks digging, beechnut falling, mosquito in my ear, and something more – something that is not me, for which we have no language, the wordless being of others in which we are never alone. After the drumbeat of my mother’s heart, this was my first language.

Listening in wild places, we are audience to conversations in a language not our own. I think now that it was a longing to comprehend this language I hear in the woods that led me to science, to learn over the years to speak fluent botany. A tongue that should not, by the way, be mistaken for the language of plants. I did learn another language in science, though, one of careful observation, an intimate vocabulary that names each little part. To name and describe you must first see, and science polishes the gift of seeing. I honor the strength of the language that has become a second tongue to me. But beneath the richness of its vocabulary and its descriptive power, something is missing, the same something that swells around you and in you when you listen to the world. Science can be a language of distance which reduces a being to its working parts; it’s a language of objects. The language scientists speak, however precise, is based on a profound error in grammar, an omission, a grave loss in translation from the native languages of these shores.

The profound grammatical error she speaks of is one that I have often experienced: Life is not a third-person noun, but a verb! The author noted that in a book of traditional uses of fungi by an Anishinaabe ethnobotanist, the word *Puhpowee* translates as “the force which causes mushrooms to push up from the earth overnight.” She remarks, “I was stunned that such a word existed. In all its technical vocabulary, Western science has no such term, no words to hold this mystery. You’d think that biologists, of all people, would have words for life. But in scientific language our terminology is used to define the boundaries of our knowing. What lies beyond our grasp remains unnamed.”

She goes on to explain that we would never refer to a family member as an “it.” This would be disrespectful. Native languages refer to all living beings as well as rivers, rocks etc, the entire natural world, as “he” or “she” or “someone.” This attitude is so contrary to western scientific inquiry, where to do so would be to commit a major sin, namely, *anthropomorphism*. This would tend to relegate your research to the category of sentimental hearsay, or at best, anecdotal information.

These different view points collide in the chapter entitled, “The Teachings of Grass.” It was observed by native people who still harvest sweetgrass for basket weaving that it was getting harder to find in some places. The indigenous peoples’ ecological knowledge stated: “If we use a plant respectfully, it will flourish. If we ignore it, it will go away.” The author’s graduate student, Laurie, developed a master’s degree project designed to test this theory. After presenting her proposal, her committee begrudgingly gave its permission, but, “The dean looked over the glasses that had slid down his nose, fixing Laurie with a pointed stare and directing a sidelong glance toward me. ‘Anyone knows that harvesting a plant will damage the population. You’re wasting your time. And I’m afraid I don’t find this whole traditional knowledge thing very convincing.’” The project was conducted according to rigorous scientific methods, with an appropriate number of replicates of test plots and control plots. “The surprise was that the failing plots were not the harvested ones, as predicted, but the unharvested controls.” “Many grasses undergo a physiological change known as compensatory growth in which the plant compensates for loss of foliage by quickly growing more.” “It has even been discovered that there is an enzyme in the saliva of grazing buffalo that actually stimulates grass growth.” Therefore, the indigenous wisdom was vindicated by the scientific study. This should be no surprise, since many useful medicines have been “discovered” by western science by investigating plants known as medicines of native peoples. Why not believe in traditional ecological wisdom as well?

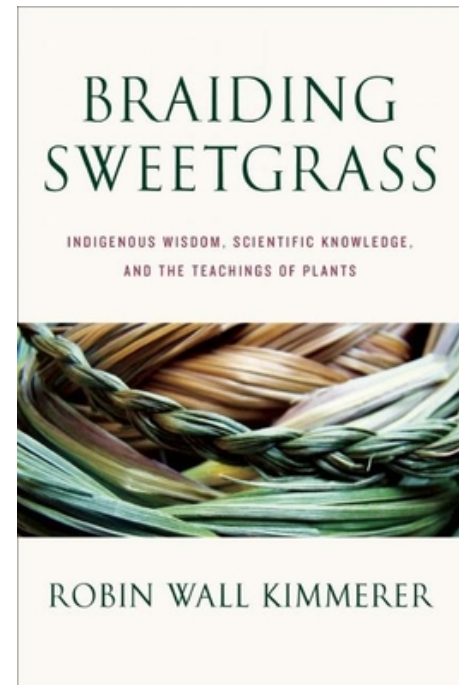
This book is filled with other beautiful stories of people at one with nature: making maple syrup, harvesting salmon when they return to the Oregon coast, and many others. Each portrays traditional native wisdom, and how it has harmoniously blended with the healthy functioning of ecosystems.

Towards the end of the book, in the chapter entitled, “The Sacred and the Superfund,” she describes how the once pristine shores of Lake Onondaga became grossly polluted due to factory and city waste. People were forbidden to swim in the lake by the 1940s. Restoration can mean many different things to different people. To some, just covering the barren landscape with vegetation is enough. For engineers, re-establishing the functionality of the ecosystem is what was stressed.

This kind of fix is at the core of the mechanistic view of nature, in which land is a machine, and humans are the drivers. In this reductionist, materialist paradigm an imposed engineering solution makes sense. But what if we took the indigenous world view? The ecosystem is not a machine, but a community of sovereign beings, subjects rather than objects. What if those beings were the drivers?

Over the years, the author has noticed how plants have slowly adapted to the wasteland, and how few have become established. When birds came to eat the fruits of the few trees, soil began to build. “We could name this tableau Land as Teacher, Land as Healer. With plants and natural processes in sole command, the role of land as a renewable source of knowledge and ecological insight becomes apparent.” “I hope we’ll have the wisdom to let them continue their work. Restoration is an opportunity for a partnership, for us to help.”

There is also a chapter on the “Windigo,” a native american boogie man who goes abroad during harsh, winter storms in search of human flesh. This ten-foot tall being has a heart of ice, and a craving that is never satisfied. The more it consumes, the hungrier it becomes. This is a personification of addictive behavior and the current economic system of unlimited growth - growth that consumes everything and does not cease. Interestingly, the characteristics of the Windigo have been personified in Western tradition as well. In Dante’s Inferno, the protagonist encounters three beasts that attempt to prevent the start of his journey: a lion, representing anger and violence, the leopard portraying deceit, and a she-wolf whose hunger never ceases. The more she consumes, the more famished she becomes.



The very earth that sustains us is being destroyed to fuel injustice. An economy that grants personhood to corporations but denies it to the more-than-human beings: this is a Windigo economy.” “What is the alternative? An how do we get there? I don’t know for certain, but I believe the answer is contained within our teachings of ‘One Bowl and One Spoon,’ which holds that the gifts of the earth are all in one bowl, all to be shared from a single spoon. This is the vision of the economy of the commons, wherein resources fundamental to our well-being, like water and land and forests, are commonly held rather than commodified. Properly managed, the commons approach maintains abundance, not scarcity. These contemporary economic alternatives strongly echo the indigenous worldview in which the earth exists not as private property, but as a commons, to be tended with respect and reciprocity for the benefit of all.

I highly recommend this widely acclaimed volume for the author’s superb writing style, as well as its content. A friend of mine recently remarked that reading it was like reading a sacred text. There is so much wisdom here that is sorely needed at this time.



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