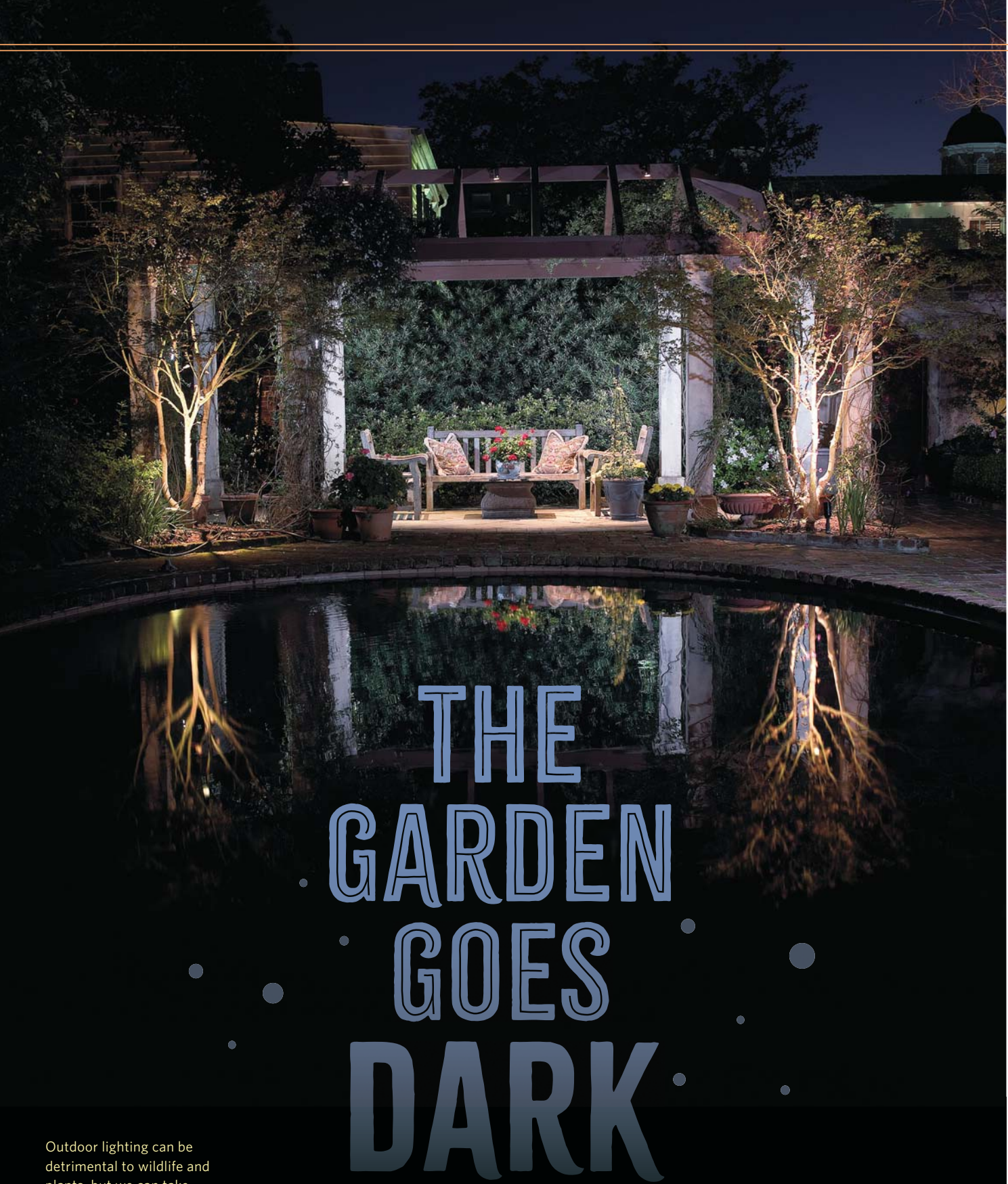

THE GARDEN GOES DARK

Outdoor lighting can be detrimental to wildlife and plants, but we can take steps to reduce the harm while still enjoying an evening outdoors.

Reducing nighttime lighting benefits plants, pollinators and people, too

BY **PHYLLIS GRICUS**

Yes, gardens have their dark side. But—surprise! A garden's darkness can be good, not sinister. Indeed, I mean to enlighten you about how darkness at night can improve your garden's ecological function.

Many gardeners today are trying to work with, not against, nature. We're learning more about our garden's effect on local ecosystems, and we're choosing plants that support native bees, feed caterpillars of butterflies and moths and provide birds with food and habitat over the winter.

ILLUMINATING A PROBLEM

We know pollinators are decreasing worldwide because of habitat loss and pesticide use, and we are creating eco-friendly gardens to help combat that loss. But another factor has come to light—namely, artificial light itself. Too much of it is shining on our gardens at night.

Landscape lighting has many practical purposes. It illuminates paths, stairs and entrances, reducing tripping hazards and helping to ensure the safety of family and guests. But it can also be hazardous to the environment.

Landscape designer **PHYLLIS GRICUS** is principal of Landscape Design Studio, a Pittsburgh, Pa., company focused on creating sustainable gardens and ecologically balanced outdoor living spaces. She also regularly writes for gardening publications and speaks to groups.

Opposite: David C. McClure. This page: Jack Coyier.

Above: DarkSky International advocates for reducing exterior lighting to benefit wildlife, but it's not necessary to go completely dark. It's more a matter of targeting useful light, as has been done with these sconces that illuminate an entryway.

DarkSky International—an organization that promotes the value of unlit places for humans and wildlife—defines light pollution as the human-made alteration of the outdoor light levels that occur naturally. They explain further that when we over-light, fail to use timers and sensors or use the wrong color of light, we can negatively affect many parts of our world, such as migratory birds, pollinators, sea turtles and mammals, including humans.

Anyone who has gardened knows that plants use light as an energy source and need periods of darkness to thrive. The natural 24-hour cycle of light and darkness and its seasonal variations are disrupted when plants are exposed to artificial light at night. This over-lighting can affect flowering, leaf bud, seed set and dispersal and possibly delay leaf fall, a plant's natural process of preparing for colder temperatures.

I spoke with Diane Turnshek from the Department of Physics and Astronomy at Carnegie Mellon University in Pittsburgh, Pa. She was the driving force behind Pittsburgh becoming the first city in the nation to create ordinances for city parks, facilities and streetlights to reduce unnecessary light pollution, a move many other cities are following.

In conversation with Ms. Turnshek, I learned that our overuse of outdoor lighting affects not only our ability to see the stars and planets—the original motivation behind her advocacy for dark skies—but also the circadian rhythms of nighttime pollinators.

"Some nocturnal pollinators will stay away from lighted gardens because they become more easily hunted by predators," she explained.

Jack Coyier; Lisa Bauer, designer, Chartreuse Landscape Design

Above, left to right: Moths—here, a hummingbird moth feeding on *Salvia guaranitica*—vastly outnumber butterflies in their shared order, the Lepidoptera. Experts warn against uplighting trees because it can interfere with their behavior.

Moths, in particular, are irresistibly drawn to artificial light, which harms them by preventing them from mating and pollinating.

"When nighttime pollinators aren't pollinating due to light stress, daytime pollinators are also stressed because they can't make up the deficit," she added.

In addition, she advises homeowners against uplighting trees because their growth and behavior are affected by day length. In regions that experience cold winters, artificial light can be more influential than temperature on causing a tree to bud and bloom early, putting the flowers at risk of frost damage. In fall, artificial light can delay leaf dormancy, making trees more susceptible to cold injury.

BRAVE THE DARK

When done well, outdoor lighting creates an inviting atmosphere while highlighting the attributes of your home and garden. In the interest of security, though, some homeowners have taken the "if a little is good, more must be better" approach.

But brighter does not mean safer; it creates a glare that makes it harder to see. Too much light creates dark shadows that can give criminals hiding places.

In addition, there is no clear scientific evidence that increased outdoor lighting deters crime. In fact, studies done by the home-security industry across several metropolitan areas show that most crimes occur between noon and seven p.m., not later at night. Nevertheless, lighting at night makes us feel safer, which is important.

If the proverbial lightbulb has gone on in your head, and you want to know what you can do to support nocturnal pollinators, follow these steps:

First and foremost, install timers and set them to turn off your lights at 11:00 p.m. This is especially important in the spring and fall, when nocturnally migrating birds, which depend on the moon and the stars to navigate, can become disoriented by light pollution. Artificial light causes them to go off course, exhausting their energy reserves. And year-round, birds need darkness to hide from predators and get a good night's sleep.

Secondly, use motion-sensor lighting, which turns on only when movement is detected. This is the best way to have light when needed.

Jack Coyier; David C. McClure

You can also choose Dark Sky–approved light fixtures and bulbs. Such fixtures are fully shielded, and they allow you to target the light so that it falls only where you need it. When selecting light fixtures with integral lamps, or when changing existing fixtures with replacement bulbs, there are a few key things to pay attention to:

The first is lumens. The brighter the bulb, the higher the lumen rating. Choose landscape lights at 50 to 300 lumens; path lights at 100 to 200 lumens; lamp posts at 120 to 180 lumens; and motion-sensor lights at 300 to 700 lumens.

Next, consider the color temperature, measured in Kelvin (K). As a rule of thumb, a lower Kelvin rating means the bulb gives more yellow/orange light, a warmer color temperature. A higher Kelvin rating indicates more blue light, which is cooler. Warmer light makes objects look more natural, while blue light scatters into the atmosphere, negatively impacting wildlife's biological clocks and plant growth. A good choice would be amber LED lighting at 2,200 K. Any light rated higher than 4,000 K is considered blue lighting.

BRIGHT IDEAS

DarkSky International's five lighting principles for responsible outdoor lighting will help gardeners further improve the ecological function of their gardens. These principles say that light should be:

1. **USEFUL** Use light only if needed. All lights should have a clear purpose. Consider how the use of light will impact the area, including wildlife and their habitats.
2. **TARGETED** Direct light so it falls only where needed. Use shielding and careful aiming to target the direction of the light beam.
3. **LOW LEVEL** Light should not be brighter than necessary. Use the lowest light level required. Be mindful of surface conditions, as some surfaces may reflect more light into the night sky than intended.
4. **CONTROLLED** Use light only when needed. Use controls such as timers or motion detectors to ensure that light is available when needed, dimmed when possible and turned off when not needed.
5. **WARM COLORED** Use warmer-colored lights where possible. Limit the amount of shorter wavelength (blue-violet) light to the least amount needed.

Source: DarkSky.org

David C. McClure

KEEP IT CONTAINED

Another aspect of light pollution is light trespass—the intrusion of unwanted lighting, such as into your garden or even your windows from a neighbor's exterior lights. Many communities today consider light disturbance a nuisance similar to noise. Before approaching the offending neighbor, consider that light from your property, including within your windows, could likewise disturb them. Besides addressing your outdoor light fixtures, make it a practice to close your blinds and draw your curtains to trap your interior lighting.

If you would like to discuss your neighbor's excess lighting, stay positive and be courteous. They may not even be aware of the problem. At DarkSky.org, the organization provides advice for approaching neighbors and even a sample letter to start the conversation. The website also offers ideas for community outreach and even advice on initiating a local light ordinance.

RELATED EFFORTS

Once your garden is under the cover of darkness, you might spend time outside observing the evening to discover what pollinating insects and animals actively forage for nectar in your ecosystem.

Nocturnal moths, flies and bees pollinate night-blooming flowers. Yes, twilight-flying (crepuscular) bees find it advantageous to arrive right after the day-shift (diurnal) bees depart. Then, they can forage without competition.

This spread: Light-colored, tubular flowers, often bearing a sweet scent, are favorites of pollinators that feed in the evening or overnight. Examples include (from far left) the large-flowered, fragrant *Hosta plantaginea*; obedient plant (*Physostegia virginiana* 'Alba'), a wildflower of eastern North America; flowering tobacco (*Nicotiana* 'Lime Green'); and border phlox (*Phlox paniculata* 'David').

Moths are the largest group of night pollinators, and they account for more than 90 percent of the Lepidoptera winged insects. Butterflies amount to just 10 percent of that order. Moths pollinate flowers just like butterflies. As they drink the carbohydrate-rich nectar with their long tongues, they pick up pollen dust and carry it on to the nextflower.

As we've learned to do for day-flying butterflies like the monarch, we need to support moths through all their life-cycle stages, providing nectar plants to feed the adults and larval-host plants to feed the young. You can find host and nectar plants appropriate for your ecological region from the Xerces Society (xerces.org), the National Wildlife Federation (nwf.org) and your state's extension service.

Providing shelter and habitat is another factor in safeguarding pollinators. Moths need fallen leaves, stems and other plant debris for their eggs, pupae and larvae to hibernate and hide from predators. An overly manicured garden does not provide such refuge.

Please resist the urge to clean up every last leaf and bit of yard debris. If you want to remove these from your lawn and beds, the Xerces Society recommends creating a leaf pile and allow it to break down naturally. They warn against shredding leaves because you may be shredding eggs, caterpillars and chrysalises, too.

And, of course, using pesticides is counterproductive if you're trying to establish a healthy environment for moths and more. Organic gardening is beneficial for all wildlife, especially pollinators. It will increase the beneficial insects that help to control pests. If you must treat a problem, choose OMRI-rated products and follow the directions carefully.

Jack Coyier

Opposite: Pale leaves and light-colored flowers will take on a special glow as evening decends. Such plants are suited to a moon garden, which should always include a seat for the gardener to watch for nighttime pollinators. **This page, left to right:** Night fliers love evening primroses, and every region of the United States has at least one species native to it; this is *Oenothera pallida*, a biennial of the Interior West. A yucca moth clings to a yucca leaf.

Opposite: Jack Coyier; Andrew Grossman, designer,andrewgrossman.com. This page: David C. McClure; Public domain.

MOON GARDENS

Did you know there is an evening primrose (*Oenothera*) native to every region of the country? Thanks to Emily May, a Pollinator Conservation Specialist with the Xerces Society, for sharing that fact with me. Now we all know.

These night-blooming, deer-resistant plants have flowers in shades of yellow, pink and white. They may be perennial, biennial or annual, depending on the species. Their fragrant flowers attract a variety of nocturnal pollinators, including crepuscular native bees, hawk moths and sphinx moths.

Like evening primroses, many night bloomers have pale or light-colored, fragrant, trumpet-shaped flowers. Some plants have a special partnership with a pollinator, such as the soapweed yucca (*Yucca glauca*) with a yucca moth species (*Tegeticula yuccasella*). In fact, several species of yucca share a mutually beneficial relationship with their pollinators. According to the US Forest Service, yuccas are growing well beyond their original geographic range, and the yucca moths have traveled with them. That is a great example of adaptation to a changing climate.

The night-blooming plants that attract moths and other pollinators can be the start of your very own moon garden, one specifically designed to be enjoyed after dark. Such a space should contain mostly white or light-colored flowers and silver-leafed plants that reflect the glow of the moon.

If you place these pale-featured plants adjacent to a seating area, you can enjoy the sight and scent of night-blooming plants and, hopefully, catch a glimpse of pollinators at work.

LIGHTS OUT TOGETHER

Each of us can make a difference by making small but sustainable changes. Together, we can increase the number of resilient gardens and landscapes in our neighborhoods, benefiting nature and ourselves.

Implementing a nature-conserving lights-out habit around our homes has the added advantage of saving money on energy costs. And that equals more money for buying plants!