



THE PHOTOGRAPHER'S FRAME

Through the magnifying glass

understanding conservation on a microscopic scale

Alexandria Warneke and Keith Lombardo
Michael Ready, Photographer



If you go too fast, you might miss it. If you forget to look close enough, you might miss it. It's the miniature, but bright-eyed, jumping spider hiding amongst the blooming flowers of buckwheat. It's the neon sea slug only as big as a pink jelly bean feeding in the seagrass, overlooked despite its vibrant coloration. It's a world of easily overlooked species, a microcosm teeming with life, secrets, and wonder.

So much of our natural world is undervalued simply because it is not easily recognizable, and its contribution to the planet, ecosystem, or humanity seems even less valued. This is especially true of the smaller forms—the strange ones that require us to get down into the undergrowth with a magnifying glass, snorkel a stream, or explore the nooks of a reef to know they are there. We aren't wired to notice these small things. Instead our focus, and often our conservation priorities and funding, are drawn to the large charismatic megafauna such as the bison of Yellowstone, or to the vast, epic landscapes of Yosemite. While these figures and spaces are important, the "lesser forms" are equally essential to the planet's biodiversity and ecological

functioning; indeed they are just as critical to life as we know it. Even the mighty giant sequoia relies inextricably on a hidden and interconnected network of species we don't often consider. The world through the magnifying glass holds both striking beauty and utility, if only we slow down and look closely enough to see it and are mindful enough to conserve it.

Like the greater environment around them, these small-scale systems are not immune to large-scale problems, such as pollution, habitat destruction, and climate change. The list is long and ever-growing. If we don't begin now to understand these tiny creatures, their fellow inhabitants, and the roles they play, we might lose them. Here we create windows to these hidden spaces to foster a greater perception and appreciation of the natural world and its enormous biodiversity. By doing so, we hope to encourage the action required to preserve wildlife and wild places. We can learn to move deliberately, with intention, keeping our eyes and ears open and our magnifying glasses at the ready. *The time to look deeper into nature and within ourselves is now—let's not miss it.*

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Looking beyond the big picture

We are regularly captivated and inspired by the compelling scenes protected within our public lands. The expanse of the rocky intertidal zone and coastal sage scrub draws over 1 million visitors a year to San Diego's only national park. Yet, a vast majority of the park's inhabitants often go unnoticed.



A glimpse under the magnifying glass and why it matters

Though small in stature, this tiny paradise jumping spider (*Habronattus* sp.) hidden among the buckwheat flowers belongs to the largest group of spiders on Earth at approximately 6,200 known species. They are master ambush predators and help control populations of other insects.



We aren't wired to notice small things

Gabb's checkerspot butterflies (*Chlosyne gabbii*) are primary consumers and important pollinators of several native plants within their coastal range. The larvae and adults of this species also provide food for many of the inhabitants of their ecosystem.



Hidden worlds beneath our feet

As they blend effectively into the rocks of the high intertidal zone, acorn barnacles (*Chthamalus dalli*) are often overlooked despite being one of the most prolific members of this marine ecosystem. They are skilled in adapting to harsh environments and can withstand extended periods of desiccation.



Dare to look closer

Buried within sandy cliffs, female sand wasps (*Bembix americana*) dig miniature nest caverns to rear a single larva, provisioning it with captured flies and other insects as it grows. The adults of this solitary wasp also feed on floral nectar and provide pollination service along the way.



Tiny forms, greater functions

As reflected by its common moniker, Lindley's silverpuffs, fluffy silver seed heads are what distinguish this annual native plant species (*Uropappus lindleyi*). A distinctive morphology lends itself to effective seed dispersal to create yellow dandelion-like flowers that provide food and nectar for a variety of insects and small mammals.



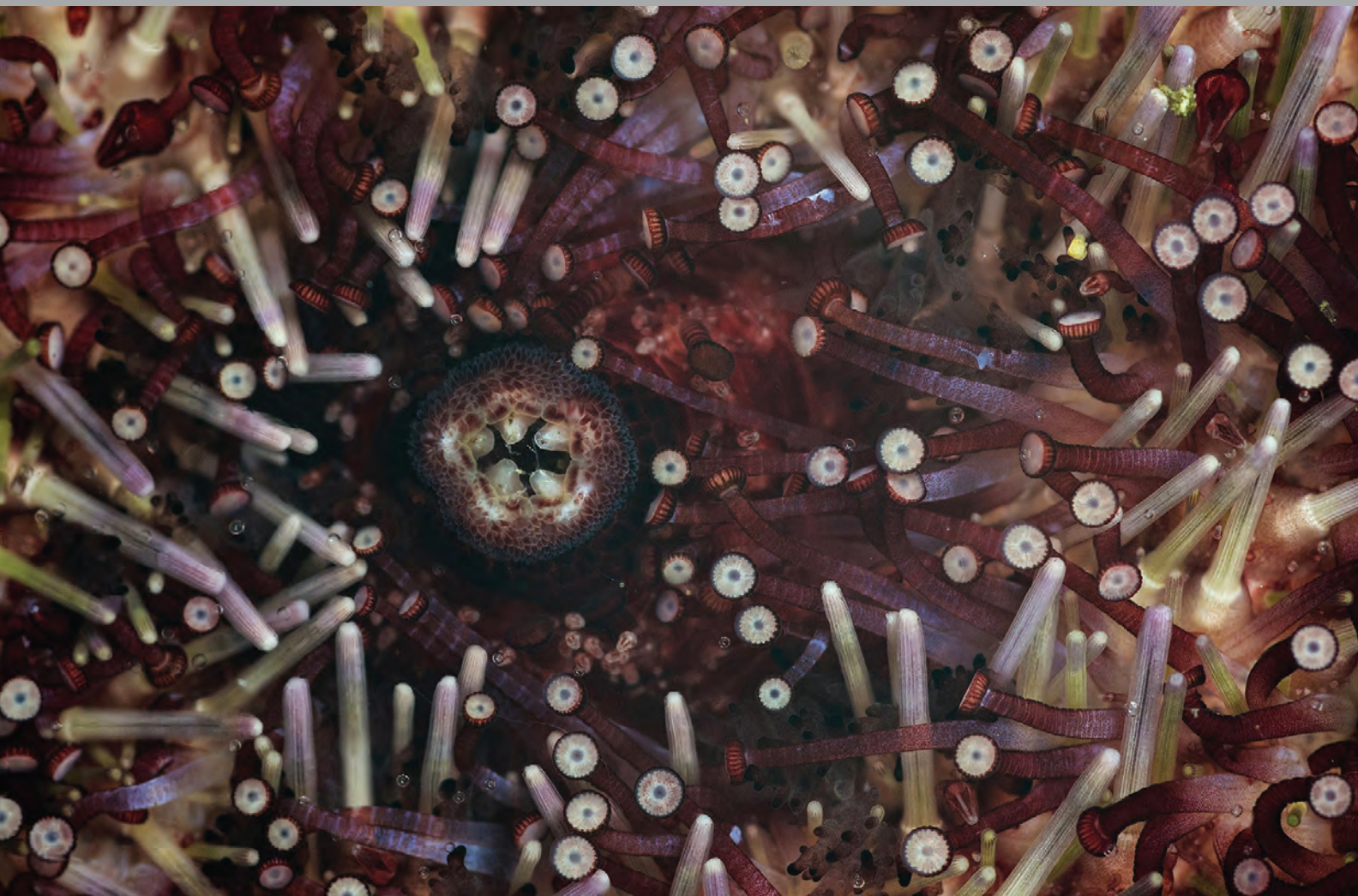
The role of ecosystem stewards

A sometimes elusive but favorite sight in the rocky intertidal zone, the lined shore crab (*Pachygrapsus crassipes*) maintains a reddish-purple carapace or shell. As scavengers, they help clean up the ecosystem, using their large claws to collect and consume plant and animal remains.



The importance of scale

The silver argiopes (*Argiope argentata*) weaves a spectacular orb-shaped web to catch and consume large swaths of small insects. The male serves to continue the species and is sometimes quickly consumed after mating, thereby providing nutrition to the much larger female.



Drivers of change

Despite their modest size, unchecked populations of purple sea urchins (*Strongylocentrotus purpuratus*) have been observed to devastate entire kelp forest ecosystems. They are voracious grazers and use their specialized mouthparts, known as an Aristotle's lantern, shown here, to feast on kelp and other algal species.



Small worlds, big problems

Covered in bright yellow pollen, the peridot sweat bee (*Augochlorella pomoniella*) is a critical player in the reproductive cycle of many plants. Unfortunately, many native bees like these are threatened by non-native species, disease, pesticides, and climate change.



Miniature microcosms teeming with life, secrets, and wonders

Though a conspicuous shade of bright pink, the Hopkins' rose nudibranch (*Okenia rosacea*) is often difficult to spot because of its tiny size (1–2cm). To fend off predators, they steal both the color and chemical defenses of their specialized bryozoan food source (*Eurystomella bilabiata*), also seen here.



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On the cover of this issue

The precipitous rock spires of Meteora World Heritage Site in Greece have a complex geological history. Over the centuries a number of Eastern Orthodox monasteries were built atop them, and today's World Heritage Site recognizes this cultural history as part of the overall geoheritage. | [STATHIS FLOROS](#)