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INTRODUCTION

This is the third volume in a series of books about the wonders of nature that artist Glenn Wolff and I conceived the first time we met. Glenn and I had been a year apart in high school in Traverse City, Michigan, and although I remember him—he was the star of the art departments at Central High and at Northwestern Michigan College—we moved in different circles and didn't know each other. I lost track of him when he moved to Minnesota to study at the Minneapolis College of Art and Design, but grew aware of him again after he established himself in Manhattan as a freelance illustrator for *The New York Times, The Village Voice, Audubon, Sports Afield*, and other publications. My own early essays were starting to appear in some of those publications, and it wasn't unusual to see our work in the same issues.

Even after Glenn and his family returned to northern Michigan, we managed to avoid meeting. Finally one day our mutual friend, the artist Bernie Knox, pulled me to the telephone in her house. She placed the receiver in my hand and said, "Say hello to Glenn Wolff." I greeted him and suggested we meet for lunch at Stacey's Restaurant in downtown Traverse City. It was during that lunch that Glenn opened his sketchpad on the table and we began to outline books about natural phenomena of sky, water, and land.

Glenn knew an agent. She liked our idea for a series and pitched it to publishers. Soon we had a contract for the books that would become *It's Raining Frogs and Fishes*, about wonders of the sky, and The Bird in the Waterfall, about wonders of water.

The third book—the one you're now holding in your hands—began taking shape as Glenn and I wrote and illustrated a bimonthly column in Wildlife Conservation Magazine, the publication of The Wildlife Conservation Society and the Bronx Zoo. For nearly a decade we produced the "Natural Enquirer" column for the magazine, immersing ourselves in the fascinating world of wildlife behavior and the equally fascinating history of

animal/human relationships. The staff at the magazine were a delight to work with and, more importantly, put us in touch with some of the world's prominent experts on wildlife, thus helping us to overcome, in part, at least, a rather glaring gap in our qualifications for doing the column. The truth is, we were not qualified at all. Neither Glenn nor I have backgrounds in biology beyond a few classes in high school and college. My education in the subject was worse than inadequate: in high school our class was so unruly that the instructor finally threw up his hands and surrendered. If my memory is correct he gave everyone a blanket C grade and spent the semester reading newspapers at his desk while the students romped through the classroom. I confess I did little romping myself. Instead I did my homework from other classes—not because I was a model student, but because I wanted to get those chores out of the way so that the moment the final bell rang I could rush off and go fishing. An inspiring science teacher could have probably nudged me to pursue a career in biology. My inspiration came instead from English teachers.

So although Glenn and I had little formal education in the natural sciences, we had been exploring the natural world with an almost scientific zeal all our lives. The field notes and sketches we've gathered since we were kids—and our determination to use canoes, backpacks, fishing rods, cameras, and binoculars to help gather them—recall those ages when amateur naturalists made important contributions to the knowledge of the world. Like backyard botanists and ornithologists of the eighteenth and nineteenth centuries, we are "amateurs" in the true sense of the word, with love for the subject our primary motivation. It is a motivation that spurred us to launch explorations to neighborhood woods and ponds when we were boys and continues to launch us on explorations today.

A biologist is trained to observe objectively, ignore personal emotions, and resist drawing conclusions until the evidence is complete. Amateur nature writers and artists go into the world to satisfy their curiosity and collect memories. For us, subjective experience has always been as important as objective observation. Noticing our own and other people's responses to nature is paramount because part of our work is to cultivate a state of sustained

wonder as we seek clues to why we're on this fecund planet and how we should conduct ourselves during our stay. If some of the clues come from the behavior of ants in a colony or trout in a creek, so be it. Our job is to seek knowledge wherever we can.

Many of us remember our early encounters with animals other than humans. A dog, a cat, a wild bird on the windowsill—here was something astonishing, vivid, and alive. We might remember a feeling of strangeness in the presence of this "other" that was somehow both alien and kindred. It might have awakened an awareness that all living things are somehow connected. It might have been among our first intuitions of the fundamental mystery of life.

If we're lucky, those senses of mystery and strangeness never leave us, and in fact, only grow stronger and more nuanced as we explore the world and witness for ourselves the almost unimaginable abundance and diversity of things in the universe. If we lose those senses—and we all do, at least periodically—it's a relief to know that the loss is not irreversible and that they and our natural curiosity can be awakened in a moment.

Glenn and I were fortunate as children to have parents, teachers, and friends who encouraged us to explore the world and indulge our interests. In turn, we set out to teach our own children that being explorers is a worthy and honorable aspiration, and that an explorer does not necessarily have to travel to Antarctica or the Amazon. Wild places and an abundance of wildlife are everywhere, even in the busiest cities. There's a virtually endless number of them in our own backyards, beneath the night sky, in every park, woods, meadow, creek, and pond. All anyone needs to discover the wonders of the world is an inquisitive eye and a willingness to look.

We hope this book will in some small way be of help.

1
BELLYING UP TO THE WORLD

We want to reach the heart of the world, but first must know the surface. The problem is, there's no end to the surface.

When my sons were young they led me to amazing new places I had never thought to visit. Aaron, at four, said, "Dad, you're a kid in your brain and I'm a man." He collected seashells, old coins, basketball cards, and feathers, attaching deep and equal value to each, ready at any moment to abandon them all. One afternoon, as we walked in the meadow near our home, he watched fascinated as hundreds of starlings passed overhead in streaming, switching undulations, like a river of birds. Brimming with mission, I explained what they were doing, and why. I was in teacher mode, trying to share the information I was sure he would need to find his way in life. But he wasn't listening. He stretched out in the grass and crawled, following the trails of beetles and meadow voles, already immersed in some private immensity.

I followed him. I ruined the knees on my Dockers but, by God, I got down in the dirt with my son and became lost. And while I was there, happily nosing around among creatures I hadn't paid attention to in years, it occurred to me what an enormous kingdom there is among the grass stems and spider holes. I knew then what the nineteenth-century zoologist and geologist Louis Agassiz meant when he said, "I spent the summer traveling. I got halfway across my back yard."

Myrmecologists take note: My sons in their backyard travels have devised an effective technique for observing the foraging behavior of ants. Begin by placing half a teaspoon of

granulated sugar in your mouth and swish it around to stimulate the production of saliva. Allow the solution to linger a few seconds on your tongue (especially near the tip, where, as three-year-old Nick explained, the taste "bugs" are most receptive), then with careful aim allow a drop of richly sugared saliva to fall to the ground, ideally in the path of a solitary ant. In our yard, the best ants for the purpose are the tiny red ones that have demonstrated their love of sweets by colonizing our kitchen. Their single-file trade route leads around the perimeter of the floor, up a wall, across the counter, and to the back of a cupboard where there's a ruptured bag of jelly beans left over from Easter.

Aaron, while mastering the saliva/sugar technique, noted that it takes a while for the scout who discovers the bounty to rush back to camp with the news and return with a company of workers. He noted also that the workers seem to follow a scent trail laid down by the scout but don't follow it unerringly. There is a certain amount of weaving and crisscrossing involved, reminiscent of the way a river in a delta divides into braided channels, as individual ants lose the trail then pick it up again and are followed by others who digress from the secondary trail, and so on. Eventually the ants create a wide, well traveled highway over the shortest practicable route from nest to food source. Soon a line of workers is busy transporting the dissolved sugar back to camp a bellyful at a time.

Once you start noticing the little worlds around you, there's no end to them. One spring the boys and I became interested in a tiny reservoir of water we found in the crotch of one of our yard maples. It was early April, still cold enough to harbor a few patches of snow on north-facing slopes and too early for the black flies and mosquitoes that in a few weeks would be on the wing and on the hunt. The only insects we had seen until then were the small, pale-colored moths that emerge from leaf litter as soon as the snow is gone, before the insect-eating birds return to spoil the party. The boys and I peered into the cavity in the crotch of the maple and saw a glint of water deep inside. We inserted the nozzle of a squeeze-bulb device designed to draw samples of antifreeze from car radiators and drew out a half-pint of murky, odorous water, emptied it into a jar, and carried it inside the house. We

placed the jar on the windowsill in the kitchen and waited for the sediment to settle. Soon we could see dozens of minute, nearly microscopic larvae wriggling in the water.

Within a few days the larvae had grown to an eighth-inch in length and were suspended head down from the surface of the water like slender bats hanging from the roof of a cavern. We noticed they were sensitive to shadows and vibrations: Pass your hand over the jar or tap it with a finger and the larvae would panic and begin frantically flexing their bodies. Nick was enchanted. He was convinced that we had discovered a new species and wondered if we could call a scientific hotline of some sort, register our discovery, and make taxonomic history.

Marston Bates, in The Forest and the Seas, talks about insects that have colonized the pools of water in "rot holes" in trees in South American rainforests and others that live their entire lives in the rainwater trapped among the leaves in bromeliad plants. He also describes a species of North American mosquito that deposits its eggs only in the reservoirs of water inside Venus flycatchers. Life sprouts anywhere it can— everywhere it can.

Ecosystems—communities of interacting plants and animals and the environments they live in—are large or tiny, remote or close-at-hand. Within each community is a food chain of producers and consumers dependent upon one another. If the community is complex, as it almost always is, the food chain is more properly known as a food web. Countless complex dramas take place every moment in the hollows between the nodes of bamboo stalks, within the fruits of fig trees, and in our own backyards.

My half-educated guess was that our tree-hole wrigglers were the larvae of midges, those tiny harmless Diptera you see on spring and summer afternoons hovering in clouds above the ground or water. They often swarm in beams of sunlight, where they catch rides on subtle thermal currents. Entomologists have discovered that each swarm maintains a semi-permanent position near a "swarm marker" such as a tree branch or a patch of ground vegetation. Picking out a spatial locator apparently ensures that males and females congregate close enough to one another to increase their chances of meeting and mating.

While our larvae grew in their jar on the windowsill, we spent a lot of time outside observing the midges that gathered in swarms of thousands in our yard. They suspended in the air as if tethered to invisible cables to the ground, but when we walked among them they exhibited some of the same defensive alertness as the larvae in the jar. They moved out of our way, closing in behind us, careful to avoid contact but always quick to return to their hovering formations.

Meanwhile, our captive larvae fed on microorganisms in the surface film while breathing through miniscule snorkels, and grew to a quarter- inch in length. I was a bit of a hero in Nick's eyes, at least until the first of the larvae changed to pupae and metamorphosed into adult mosquitoes rather than midges. Mosquitoes are Diptera also, and are closely related to midges, but that's like comparing piranha to goldfish. Our neighborhood is infested every summer with small fast-flying mosquitoes the boys call "kamikazes" because they attack so viciously and apparently have no fear of dying. Now we know they hatch from tree holes. It's worth noting that they attack just as viciously indoors as out.

My sons have always been very good at reminding me how tiresome it can be to fill one's head with trivia. They didn't care a lick about the taxonomy of the mosquitoes in our house or of the tiny crustacean we found scrabbling among the pebbles at the beach. They wanted to know what it is, not what it is called. The goal, they reminded me, is to keep our eyes open and become one who notices and appreciates the bountifulness of the world. When they carried home bird's nests and owl pellets, wounded dragonflies and the dried claws of crayfish, it was pure booty. For a kid, observing and collecting are inseparable activities.

Those activities can be practiced year-around, but summer is the high season for low-level observations. Early on a summer day, when you kneel in wet grass and start searching, you become an explorer in exotic lands. A backyard, it turns out, can be as engaging as a rainforest. Within that fragrant jungle of weeds and grasses is an enormously varied biota

of animals. Beetles lumber past in slow and clumsy gait. Leafhoppers poise on a leaf tip, then, at the first hint of danger, fling themselves into the air. Wolf spiders stalk, pause without moving for minutes at a time, then rush forward at terrible speed.

When adults explore the world at kid-level we're reminded that life thrives in such variety and complexity that we'll probably never be done cataloguing it. Also, and perhaps more importantly, we teach our children by example that it's okay to appreciate nature—that it is not just child's stuff.

In our age of instant entertainment and easy indoor diversions, children sometimes need to be encouraged to go outside. With a little nudging they'll explore the backyard in the old-fashioned, down-and- dirty way, with grubby fingers and muddy knees, carrying a fruit jar, a magnifying glass, and a butterfly net fashioned from cheesecloth and a coat hanger. Belly up to the world with a kid and you can form a bond for life. You might end up with a house full of mosquitoes, but surely that's a small price to pay.