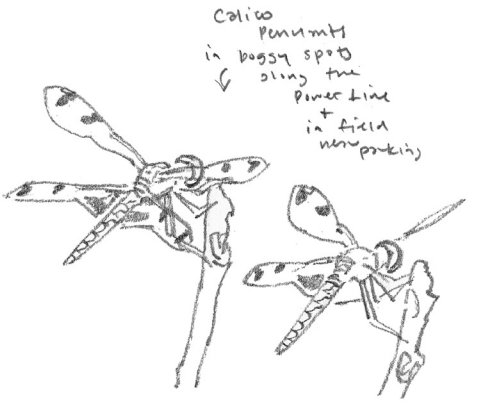
Oxygen

by Susan Edwards Richmond



Eight egrets float on the marsh fringe,
one, two, three at a time, rising,
falling back into brushstrokes.

If I hadn't sat, I wouldn't have seen them,
or just now, the kingfisher, arrested in air,
heavy bill, slightly parted, pointing down

before the dive, the lilies overblown
into alien pods, the cattails turning
inside out their tufts of fur.

I am convinced more than ever
it is oxygen I need,
the unadulterated air.

But where? Last night we hurried in
at dusk to shut up the house
against the sprayers' poison.

Out here, I still feel the crackle
of an airway lapsed, the muscular
gymnastics of long-term Lyme.

But this morning creeps
across the rail in the yellow jacket's
bands, the swallowtail's buoyant
refusal to light. Marsh wind
blows my hair clean
over acres and acres—

it looks like you could walk
from here to those egrets.
But you can't.

They are comfortable in distance.
I want to tell you—
but the words haven't been invented yet.

Until you hear the buzzing
in your own head,
I tell you this instead.

The Natural Mind

In an Urbanized Digitalized World, We Need Nature More Than Ever

by Nini Bloch

According to a 2011 study of 30 years of data assessing empathy among American college students in North America over the last three decades, the ability to respond emotionally to someone else's distress, in other words display empathy, has declined almost 50 percent. This downward trend in empathy tracks a parallel 50 percent drop in nature-based recreation over the past 40 years.

Is this merely a coincidence or are these two statistics related in some deeper way?

Mounting scientific evidence suggests that indeed these statistics are intimately tied to each other, especially when one considers another statistic. Currently, 81 percent of Americans live in cities, and now—for the first time in history—so does half the rest of the world's population. As the US has become more urbanized and digitized, we have turned our backs on nature with disturbing consequences for individual health and society's well-being. Particularly worrying is the escalation of stress-based, chronic conditions and, with declining empathy, a decrease in the desire to help others and an increase in narcissism and self-absorption in young adults.

Neuroscientists are currently making significant strides in understanding how the human brain works and how our screen-driven, fast-paced urban lifestyle is challenging that mass of neurons inside our skulls that evolved to deal with a much different setting—the natural world. The result is that we are actually changing the configuration of our brains. Researchers have discovered that not only are we instinctively attracted to nature but that it has profound, positive effects on our moods, decisions, behavior—and health. Scientists have also learned that—as much as we pride ourselves on our highly evolved neocortex, the thinking part of the brain—it's actually the much older "emotional brain" that runs the show. Neurochemistry drives our feelings and shapes our health.

The veritable storm of insights that have resulted from this research offers both hope and a road map for restructuring our brains, improving our health, and reversing the trend away from nature. Already, individuals and even nations are applying the principles, encouraging activities such as taking a mindful walk in the woods—with proven results—happier less-stressed souls.

It has taken considerable effort to bring to light the scientific underpinnings of what we knew in the first place—watching a sunset is good for us. Countless poems and works of art have celebrated nature's deep effect on our souls, but until relatively recently scientists have largely skirted the subject. Delving into the possible health benefits that immersion in nature might confer on us received the scientific cold shoulder because any reputed results were based largely on self-reported emotions rather than hard data: "I feel better; I don't feel as stressed."

Scientists deemed emotions too immeasurable, "squishy," and complex to investigate. At best, psychology approached emotions sideways, isolating them from the brain's functions. Getting hard data about the brain's reactions to nature required, first, probing what part of the brain was triggered by exposure to nature, and, second, understanding what the brain was doing to the body. Only then could we understand the nature–brain link. The brain itself remained a black box; however, we couldn't peer inside it to see what was actually going on.

Now, with new tools like electroencephalograms (EEGs) and functional magnetic resonance imaging (fMRIs) and more advanced analyses of the suite of chemicals the brain produces, we are beginning to piece together how the 3-pound organ inside our skulls works. Both EEGs and fMRIs pinpoint where in the brain neurons are firing in response to a thought, feeling, or action. These tools are becoming portable, meaning that the scientists can take them into the field and get real-time data about the brain's reactions to life outside the lab.

Our brains are both complex, integrated electric switching stations (with trillions of pathways connecting roughly 100 billion neurons to each other) and sophisticated factories that produce cascades of powerful neurochemicals (such as cortisol, which signals stress). Brains are busy places; they have to be to keep the body's basic functions running smoothly yet take in and respond to all manner of stimuli, form memories, learn new things, and revise responses. Brains are never static. They're constantly in flux, adapting and forming new neuron networks as unused ones wither or are damaged (for instance, by a stroke). We call this neuroplasticity, and it's a hallmark of our species. The brain's capacity to alter its chemistry and its very structure can profoundly modify behavior for better or worse.

Much current research has focused on the emotional, or limbic, brain, which lies between the neocortex (the thinking logical part of the brain) and the brain stem (the oldest most primitive part of the brain that controls functions like heart rate, digestion, respiration, and balance). The emotional brain that we inherited from mammals generates many primal emotions (fear, anger, desire) and forms memories. The emotional brain belies our faith in ourselves as rational beings because it tends to shoot first and ask questions later.

In other words, it's often "blurted out" some chemical response to a situation before it confers with the neocortex. To a greater or lesser extent, we are ruled by our emotional brains, which evolved way before humans ever acquired language. Only now are we beginning to understand how the emotional brain shapes our feelings, decisions, behavior, and what we become. Poet and musician Sidney Lanier held that the initial step of every plan and every action is an emotion—a rather apt description of what really goes on in our brains.

To understand how nature affects our health, it helps to consider what our brains evolved to do. The human brain has had two million years to evolve, two centuries to contend with the Industrial Revolution, and perhaps three decades to cope with global urbanization and the Digital Age. In the beginning, early humans wandered in hunter-gatherer bands. They were highly mobile, had no

set shelter, and figured out on the fly how to get fruit, hunt small animals, and avoid getting eaten. This description aligns nicely with molecular biologist John Medina's assertion that our brains evolved to "solve problems related to surviving in an unstable outdoor environment, and to do so in nearly constant motion."

As with many other animals, we're hardwired to scan the environment for dangers (predators, avalanches) and opportunities (food, shelter). The new brain-measuring gadgetry and human subjects' reactions are confirming what we already intuitively know: we instinctively like open vistas. From a survival point of view, we want to be able to see what's coming our way. Lake and ocean shores, riverbanks, bluffs, prairies, mountain ranges, and open forests are all scenes we find particularly attractive—more so than almost any human-built scene.

Water has a special hold on us, and not only because it's essential for our survival. Researchers at Plymouth University in the UK reported that when they asked 40 adults to rate their preferences for either natural or built scenes in 100 photos, participants generally rated the green space photos higher. But any photo that contained water—even in an urban setting—rated highest. A water fountain in a town square draws people like a magnet. In the same vein, just think how the words "ocean view" or "lakefront property" jack up the sales price of real estate.

In their book *Your Brain on Nature: The Science of Nature's Influence on Your Health, Happiness, and Vitality*, Eva Selhub, MD, and Alan Logan, ND, note that our brain seems to operate on a Goldilocks principle. In the UK study, "There was a consistent attraction to water up to a certain point—scenes containing between 33 and 66 percent were, as Goldilocks would say, just right. Too much or too little water detracted from preference scores." That makes sense: a violent stormy sea would be threatening so it wouldn't garner preference points. In like manner, dense, dark forests are scary (imagine the foreboding woodlands of *Grimm's Fairy Tales*). Our brains try to find a balance in nature between boring simplicity and threatening chaos.

Human brains excel at picking out animals in settings and are acutely sensitive to animal movement, far more so than noticing trucks or baby carriages. Even babies, for instance, are attentive to animals more than inert toys. Our ancestors needed to be able to spot and determine quickly if a movement in the bush was a predator, prey, or just a falling mango. We are a species finely attuned to movement, but the frenetic pace of video games that kids play for hours on end and the loud music and strobe lights in bars are a far cry from watching the gentle lap of waves on a shore. One has to wonder what constant exposure to all the incessant flashing visuals and noise do to the brain.

Another human survival strategy is to pay more attention to "bad stuff." As marine biologist Wallace J. Nichols says in his book, *Blue Mind: The Surprising Science That Shows How Being Near, In, On, or Under Water Can Make You Happier, Healthier, More Connected, and Better at What You Do*, "Our brains are wired to be Teflon for the positive and Velcro for the negative to ensure our survival; we notice and react more strongly to negative experiences than to positive ones because otherwise we'd lackadaisically stroll our way to extinction." Our minds rapidly evaluate stimuli for their threat value, label them with emotional content, and, when necessary, issue the alarm that triggers the body's automatic fight-or-flight response. Emotionally and physically, this is an expensive response, so, ideally, it happens rarely; but in modern society it can become a daily experience—with chronic insidious effects.

We all experience daily hassles: traffic congestion, computer malfunctions, quarrels with coworkers, impatient people. Estimates are that North American adults face an average of 50 such irritations and inconveniences per day. We can't make the distinction between happening upon a coiled rattlesnake and encountering a surly repairman. This sets in motion "a cascade of stress physiology," as Selhub and Logan term it, especially causing an influx of the stress hormone cortisol. Cortisol sticks in your system for a couple of hours. Every time you encounter a hassle, your body is bathed in cortisol, and that carries long-term

health risks. Chronic stress leads to inflammation and oxidative stress that damages cells in almost every system in the body, compromises the immune system, and feeds anxiety and depression. All these outcomes shorten life expectancy.

In order to eat, our hunter-gatherer ancestors had to explore and search for food. The urge to explore is in our blood, and the brain rewards the quest as much as the discovery. The brain's reward system reinforces risk taking, novel experiences, and physical effort with dopamine, a neurotransmitter that controls the brain's reward and pleasure centers, as well as regulating movement and emotional responses, which is why we keep on searching. Washington State University neuroscientist Jaak Panksepp has named this drive the seeking circuit and has found that seeking is self-rewarding: the process is fun and exciting.

Beachcombing, soccer, shopping, and surfing the Internet are all forms of seeking that we find entertaining. They give us intermittent rewards at irregular intervals and the hope that on that next rack is that perfect little black dress. The seeking circuit doesn't just kick in when we're hungry; it also operates when we're relaxed and happy. Its purest form is play. Learning is a natural outcome of searching.

A necessary corollary to the urge to explore and learn is that humans are stimulation junkies. Our brains demand input. Put a volunteer in a floatation tank that deprives him of all stimuli except touch, and for the first 45 minutes the brain typically sifts through the day's detritus. After that, the test subject gets tense and bored and then disoriented and confused and can even become delusional and hallucinate. Our hunger for stimulation drives many of us to spend up to one-third of every 24 hours on screens. Each interruption may cost us ten minutes to refocus on the original task, but our thirst for information and digital connection keeps us coming back to our screens.

Our fear that we'll "miss something"—in part fueled by social pressure—also feeds our compulsion, for example, to check text messages. The instant

entertainment available on a screen makes us an impatient nation—and reinforces another tendency of the human brain. Nichols points out, "The emotional brain is hardwired to overvalue instant gratification and undervalue future rewards." Picture the child who's tried to save his allowance for a video game but has spent it all on soda and pizza instead. Humans may be innately programmed to live in the present.

When we concentrate on a task like doing taxes that involves conscious thinking and making decisions, our brain is constantly screening out all the other irrelevant "noise" that would distract us from the work at hand so that we can focus. Environmental psychologists Stephen and Rachel Kaplan call this "directed attention." As anyone who's done taxes or some other tedious work can attest, it's mentally exhausting mainly because of the effort required to maintain your attention on Form 1040 while filtering out all the extraneous signals—the cat knocking pens off your desk, for example, or the sound of the garbage truck grabbing your bin—or, hardest of all, inhibiting your mind's tendency to wander during the drudgery.

After doing taxes, your brain needs to rest. What scientists are discovering is that the best antidote to mental exhaustion is for the brain to go into a default mode in a natural setting. It's a state of relaxed alertness that Nichols refers to as "the Blue Mind state of calm centeredness." If you're walking along a familiar beach, you may notice in passing the extra seaweed last night's storm cast up on the shore or a gull dining on a dead fish, but these events will only perk your interest for an instant. Your senses are engaged, you're very much in the present, but you're not actively focusing on anything. The Kaplans labeled this state "involuntary attention." Involuntary attention is easy; it doesn't seem to take much energy or effort.

"Scientists now theorize that the default-mode network allows the brain to consolidate experiences and thus prepare to react to environmental stimuli," says Nichols. This process requires copious "chatter" with the hippocampus,

the brain center involved in creating new memories and learning. When your brain is in default mode, it's most likely to come up with novel solutions to problems and bursts of inspiration—"out of the blue"—because your brain is forming new connections. While the mind is busy consolidating, it allows your exhausted frontal lobes to rest and recharge. Brain centers linked to emotions, pleasure, and empathy take over at these times and measurably calm you, according to Nichols.

Unfortunately, this process doesn't work well in a human-built setting, and our mental, physical, and emotional health is suffering for it. With their noise, crowds, traffic, flashing neon lights, tight spaces, and beckoning stores, cities overwhelm us with distractions, clutter, and more stimuli—and choice—than our brains are naturally designed to cope with. We feel the strain of trying to both filter out the irrelevant signals and concentrate on what we need to. Prolonged periods of trying to fight off distractions to focus on a boring task can affect the brain's inhibition system, making us more prone to inappropriate outbursts. We kid ourselves that we're being doubly efficient by multitasking. There's little down time for the always-on lifestyle, so the brain can't shift into involuntary attention to recuperate, especially if there's no green space around.

Despite the brain's remarkable plasticity, the rush to urbanize and digitize our lives has outstripped its capacity to adapt to the artificial human-built landscape. The brain is an ancient organ coping as best it can to a new world. As a result, rates of stress, anxiety, and depression in the West are on the rise, as are prescriptions to treat them. On the positive side, there's more and more scientific evidence accumulating that immersion in nature is good for us, and programs applying the theory are taking hold. Tapping into the instinctive attraction humans feel toward nature and finding innovative ways to provide access to natural settings, especially in cities, is key to reversing the trend.

The Japanese have put a new spin on the oft-touted "morning constitutional." The Forest Agency of Japan pioneered the effort in 1982 by launching the