ENVIRONMENTALLY SPEAKING

Peter Schwartzman

Just when we thought humans were intelligent...

In only the past century, life as we know it has changed dramatically, altered largely by technological achievements. Automobiles allow us to move at legal speeds upwards of seventy miles per hour. Airplanes transport us nearly ten times that speed at heights previously not encountered by our species. Computers can do billions of operations in mere seconds. Cell phones allow us to communicate with people on the other side of the planet almost instantaneously. But as advanced and sophisticated as all of these, and other, technologies appear, we would be wrong to consider them exemplars of our species' intelligence. In fact, there is great evidence to the contrary. Arguably, the continued expansion of these types of technological achievements may bring an abrupt end to our species' altogether. For the skeptical among you, consider the risks associated with the proliferation of nuclear, biological, and chemical weapons, all of which are in part related to research in these other areas. Fortunately, whether we think the expansive growth of technology is either bound to save us from many of our modern ills or ready to destroy us, a revolutionary idea—biomimicry—is rearing its head and likely to take the world by storm, perhaps just in the nick of time.

You see, all the above representatives of our "advanced" technological age are inherently very damaging to us and the planet. Current use of automobiles kills tens of thousands of us (in this country alone) via accidents, not to mention the more significant injuries and deaths due to their emissions. Planes are much safer (mile for mile) but they too have emissions that influence human health as well as climate (via greenhouse gases effluence and contrail production). Computers are now thought to be the most toxic items in our households and e-waste (i.e., electronic waste) has become a major contributor to the toxification of our landfills. Cell phones may have been cleared from associations with brain cancer (for now) but they too are full of materials (such as antimony, arsenic, beryllium, cadmium, copper, lead, nickel, and zinc) not fit for an healthy planet; actually, these substances are persistent toxins, which means that once they are released into the environment, they don't break down very readily, if at all. Clearly, given all of the problems and costs engendered by these feats of technological prowess, we should be demanding, "Is there a better way?" Fortunately, Janine Benyus and other scientists are responding with a resounding, "Yes."

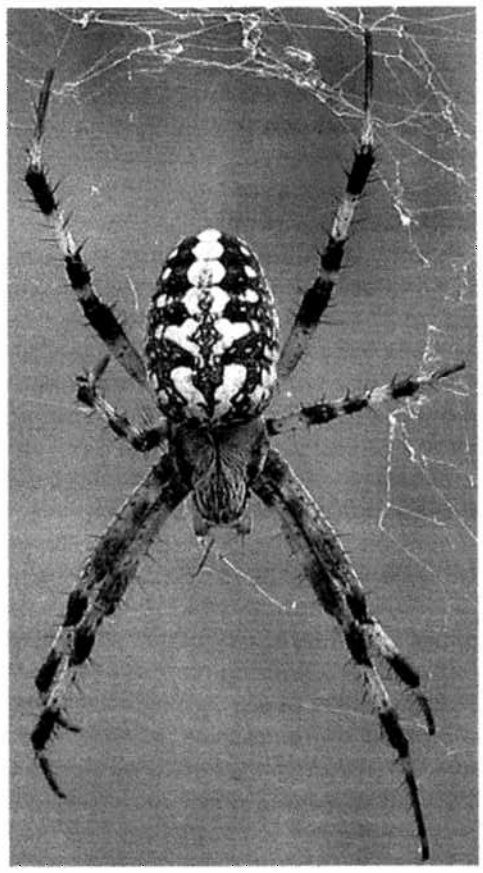
It has been seven years now since Ms. Benyus published her groundbreaking book, *Biomimicry: Innovation Inspired by Nature*, and its significance has yet to materialize in the profound way that it someday will. This book, and the subsequent research that it is inspiring and motivating, rests on two simple premises. First, *species cannot survive if they appropriate all the resources.* Evolutionary history has taught us that species that are too greedy do not survive very long. Second, *all living things are intelligent.* The life forms on the Earth today are the descendants of close to four billion years of evolution and it is through the process of natural selection over this period of time that all life forms have gained their intelligence; "less intelligent" beings simply don't survive, it is nature's way. As simple as these premises may appear, their implications are so radical that they may force us to redesign the way our civilization is structured.

The first premise provokes us to reconsider the way we live in profound ways. Our species, now six billion in number and counting, has greatly transformed the Earth's surface. Over the past one hundred years, we have altered ecosystems and landscapes so dramatically that many are collapsing, or are on the verge of doing so. Consider that rainforests (the most biologically productive ecological communities on the planet) are now a mere 6% of the Earth's land surface; not too long ago, they covered more than twice this expanse. Also, consider that according to a landmark study published in the prestigious journal *Science*, which had such import that it was authored by nineteen scientists, coastal marine ecosystems all over the world are collapsing as well (Jackson et al.). An indication of the extent of such a collapse can be observed in the following statistic. Global per capita fish catch per person has been on a steady decline since the early 1980's despite increased efforts and more advanced use of technologies to increase catch. And if human population growth weren't enough to increase human need for resources, increases in standards of living worldwide have also driven higher resource demands. As amazing as it seems, according to Dr. Raven, the Director of the Missouri Botanical Garden, humans now utilize more than 40% of all of the photosynthetic energy produced and nearly a third of the fresh water available on the planet. Clearly, if this rate of consumption continues, or increases, as it is expected to in the coming years, our species may suffer the same fate of earlier species that hoarded so rapaciously.

The implications of the second premise similarly demand that we immediately change our methods of manufacturing and resource appropriation. When Benyus speaks of the intelligence of life, she attempts to counter the dominant belief that humans are the only, or most, intelligent living things on the planet. The danger in adopting this orthodoxy (which dominates modern society) lies in its ability to fool us into believing that our chemical and mechanical creations are necessarily superior to anything found on the planet. This hubris is preventing us from learning from the many millions of other life forms that inhabit this planet and, in so doing, may be serving as one of the key obstacles to our species' survival. Yet as blind as we are, it turns out that the dismal images thus far described can be rectified if we (metaphorically) get corrective lens and ask a host of new questions. If we remove the scaffolding that is blocking our vision, we will be in a position to see how other plants and animals survive and we will learn how to sensibly assimilate advantageous strategies from them for the long-term benefit of our species. As Janine Benyus ably shows, much has already been learned from visionaries that have adopted a more respectful and humble attitude towards other life forms, one that is not based "on what we can *extract* from nature, but on what we can *learn* from her" (Benyus).

Science is teeming with examples demonstrating the intelligent and versatile adaptations that life forms have developed over time. Investigations have revealed that nature has solved many of our technological problems in more elegant forms. Architecturally, lily pads and bamboo stems produce beams and struts worthy of our emulation. Termites know how to create living quarters that maintain temperatures at optimal levels. Birds, bees and turtles get from place to place quite well without the need for road maps. Arctic fish and frogs have the ability to freeze and thaw without causing internal injuries (Benyus). The list goes on and on.

But what is so special or important about these attributes? In a nut shell, they are far more efficient and far less destructive than our conventional processes and materials. Simply put by Benyus, "living things have



The orb weaver

done everything we want to do, without guzzling fossil fuel, polluting the planet, or mortgaging their future" (Benyus). Too many of our "advanced" technologies lack the intelligence to warrant their continuance much longer. And, fortunately, there is a way out.

The magic of biomimicry (i.e., mimicking nature's way) lies in its potential to provide efficient and ecologically-sound solutions to our problems. For examples of what these look like, let's take a look at how biomimicry might contribute to solving two global problems—food production and petrochemical dependence. Despite what you might hear from certain well-positioned lobbyists, farming need not be toxic, erosional, aquifer-depleting, or so gargantuan in scale that "farmers" live thousands of miles away from the soil (in board rooms). Natural farming, which is based on mimicking nature not industry, grows crops that are ecologically fit for the location (in terms of soil type and climate) in which they are planted and grows multiple crops on the same field (in order to take advantage of synergistic—mutually beneficial—relationships they have). These two simple changes, if incorporated on a grand scale, can produce just as much food as we do today but without all the damaging aspects of modern industrial farming and without the risks associated with certain forms of genetic modification. Natural farming may sound revolutionary, and it is, but it is gaining ground fast in Japan and China, both places where agricultural resources are at a premium and so new ways of looking at problems are in much greater demand. Yet, we need not look across the Pacific to find people demonstrating the value and intelligence of natural farming. Wes Jackson, the founder and current president of The Land Institute in Salina, Kansas, is one of many American's working hard to integrate these methods into many of our neighboring farms. For more information about The Land Institute, go to: http://www.landinstitute.org/ .

Using biomimicry can also allow us to produce materials stronger, more durable and much less damaging to the environment than the ones we use today. For instance, consider that dedicated research on about a dozen different species of orb weaver spiders (like the ones that found a temporary home in the recently planted Knox Campus Prairie this past fall) reveals that a silk they produce is "as elastic as nylon," can "withstand an impact five times more powerful than can Kevlar" (a synthetic material used in making bulletproof vests) (Robbins), and is, pound for pound, five times stronger than steel (Benyus). Industry hasn't come close to produce materials with such versatility. If the spider example isn't shocking enough, how about the mussel, *Mytilus edulis*, which produces an adhesive that will stick to just about anything, even in extremely moist conditions (Benyus)? Think about what we might be able to do with an adhesive with these properties. What is most amazing about what these organisms are doing centers on their ability to create these incredible materials at temperatures and pressures that are "life-friendly." Contrast this with industries the world over who continues to develop and disseminate "new alloys, new ceramics, new plastics made possible by impossibly high temperatures, high pressures, and strong chemical treatments" (Benyus). Sadly, "'Heat, beat, and treat' has become the de facto slogan of our industrial age" (Benyus). It is time we challenged this myopic vision.

In the end, the potential fruits of biomimicry are so unbelievable that we would foolish not to use it as the new paradigm from which to explore our planet. And, fortunately, we don't have to start from scratch. Barbed wire and Velcro both owe their creation to inventors who were inspired by nature's intelligence. So it can be done, if we are dedicated to do so. Unfortunately, time is running out. Not only are our technologies becoming more dangerous (consider how much larger an individual weapons are now, compared to the ones dropped in Japan in 1945; one MX-Peacekeeper Missile boasts a yield up to 200 times that of the atomic bomb dropped in Hiroshima), but our ecosystems are being destroyed at phenomenal rates (which only reduces the intelligences available to us once we do start). So if humans are truly intelligent, we should soon begin seeing them challenging and changing the way they think about and interact with life around them. A bit of humility and respect is all that is asked for. Are you ready for the revolution?

Works Cited

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