On Finding Grandeur in Nature

A Personal Essay
In the Tradition of Religious Naturalism

by Thomas K. Shotwell

Through the rural community of Charles City in northern Iowa, where I lived from 1966 through 1970, a small river wound its way among parks, shops, and bars. The hulk of an old hydroelectric generator stood as a lonely sentinel, casting its shadow over the eight-foot-high dam built long ago to tap the river's energy. The lazy blue-green river trickled an inch or two deep over the fifty-yard-wide dam, except when the floods came. And natives saw their little river with its quaint electric generator as symbolic of the mix of semi-modernity and quiet agrarian culture they pursued. They had an ongoing love affair with the river and had, from the beginning, constructed buildings dangerously close to the flood line.

The Melody Lounge had taken over one of these precariously perched old buildings, and the owners installed a large plate glass window in such a manner as to provide a scenic view of the river, the dam, and the hydroelectric plant. Thoughtful (and a few not-so-thoughtful) people could be found just about every evening sipping beer, watching go-go dancers, and musing about the soft summers and harsh winters so characteristic of the upper Midwestern states. Once or twice each month I made it my duty to dwell upon the poetry at the Melody Lounge.

The long summer days offered plenty of after-work daylight for sports, and four of us who worked in drug metabolism research had grown to enjoy our vigorous, if somewhat amateurish, games of doubles tennis in the evenings. After long hours of laboratory tedium, we released a lot of our tensions through an almost frenetic series of tennis matches. Sometimes clownish, sometimes with startling precision, we attacked the balls and each other with gusto and good humor. One summer evening after several particularly vigorous games, dripping with sweat and our limbs weak from exertion, we agreed to have a beer or two at the Melody.

An unusually heavy rain had fallen steadily for two days, and the straw gold of a setting sun sifted through straggler clouds to illuminate the river. The quiet stream had been transformed by the rains into a tumultuous little

Niagara, where murky water leaped angrily over the dam and exploded its surprising store of energy on stones placed by men whose lives had ended years before. I mused about the transitory nature of this life and, just for fun, silently enumerated the kinds of atoms and molecules I knew made up a flooded river.

The hydrogen and oxygen of water were supplemented by myriads of other substances swept from soils and rocks upstream, and as I sat in the quiet lounge, I recapitulated what I knew about the origin of the elements in the hearts of glowing stars and exploding suns of the Milky Way. Atoms don't just exist; they are the products of eons of evolution in the galaxy, products of chaos and pressure and time and space and whatever it is we humans call natural law.

Very intentionally, I sat quietly sipping my beer and ruminating over what I knew about the sources of order, the nature of duration, of genetic explanation, of subatomic particles, of strong and weak forces, gravity, atoms, planets, and meandering streams. It was fun to stack it all up in my mind, building a structure from the presumed Big Bang, the origin or things, to the emergence of suns, quasars, black holes, elements, planets, and flowing streams. I let it build from the bottom up, edited it, worried over the numerous assumptions in it, filled in the gaps where I had jumped over something, edited it all over again, looked, with the mind's eye, back at it all and examined it again and again. As I probed the chemistry and physics of this magnificent little capillary of Earth, I sat frozen in rapture over its great complexity and its stunning evolutionary history as if I had never seen a river before.

What we have discovered about the cosmos is far more important than is generally recognized. Scientists, unlike physicians, spend their lives in intricate research on and meticulous analysis of one or two very specific phenomena. Physicians must study their patient quickly, make their decision on the basis of available knowledge, treat the patient, and then live with the consequences—and do this several times every day. Scientists may work a lifetime on a single tiny subject and never resolve it. Typically we work more like airline pilots—living lives of boring data generation and laborious data analysis involving great monotony interspersed now and then, if we are lucky, with a few moments of great excitement. We count and classify and test and retest. Every answer we generate seems to bring a cargo of new and often inscrutable questions, each of which can consume a lifetime.

As we have specialized and narrowed our fields of inquiry, we become too close to our subjects and, to a considerable extent, fail to recognize the as

yet incomplete but grand edifice we have constructed piece by piece. Up close, it has been said, a magnificent violin concerto is the sound made by the scraping of the tails of horses on the guts of cats. The universe we inhabit is like that. The scraping of the tails of horses on the guts of cats can be a stunning experience from a distance!

I turned to Bernard Colvin, a colleague who sat beside me, and softly suggested that he take notice of the river because it was a particularly beautiful sight. Colvin was a biochemist struggling with the entry of some of our new drug's metabolites into the Krebs cycle, and he had been, for what seemed like months on end, collecting and analyzing bile, urine, and feces from the dosed turkeys we had stanchioned in the laboratory. He was a man of extraordinary scientific talent and had obtained his doctorate doing similar metabolic work; but he was also a pragmatist in the best tradition of John Dewey. When he looked at the muddy river as I had suggested, he exclaimed, "Yeah, and if it gets any higher it will come right through that window!" Finished with his look and finished with me, he turned to call for another beer.

Annoyed that I had communicated so poorly and resigned to enjoy the view alone, I leaned back to relax and soak up more of the spectacle that lay before me. Before long, my reverie was broken by a booming male voice over a speaker announcing, "It's dance time!"

Our little group of four to six, depending on the kind of problems we faced, had for several months been engaged in uncovering the pathways for metabolism of 3,5-dinitrosalicylic acid, 5-nitrofurfurilidene hydrazide, a compound remarkable for its usefulness in preventing an invariably lethal disease transmitted from turkey to turkey through their unsavory habit of eating earthworms. Studies on thousands of turkeys had revealed not only that a few pinches of the drug in a ton of turkey feed were quite enough to prevent the disease and even to cure sick birds, but also that, for reasons we could not explain, treated birds grew five to ten percent faster while eating about eight percent less feed than perfectly healthy, untreated birds.

We imagined the growth came about because of some hidden antibacterial activity, or perhaps some impact on hormonal control of the growth process. Oliver Peterson, our vice president of research, had challenged us to find out what was happening so that we could convert that new knowledge into useful products. Reports went out every week on the status of our findings. Antibacterial activity proved to be too trivial to account for any growth, and the metabolic charts on the lab walls grew inch by inch as we added still another confirmed energy transfer pathway. It was slow, methodical, and tedious work, but it was happening. We imagined only time could stop us.

Not being myself a formally trained biochemist, I was surprised at the near perfect match between human metabolism and that of the turkey. We almost daily compared where we were to where others had been while studying human metabolism. Another colleague, Joe Morrison, had taken me aside and given me a short course on energy transfer systems. After all, it seemed that if we were to discover how turkeys grew faster while eating less feed, we would have to trace it through the energy transfer mechanisms of the turkey.

Behind me, the music and the dancer swept away my thoughts of water, minerals, and the evolution of matter and planets. I sat awhile intently peering out the window in hopes it would all come back. The violent muddy river churned on, oblivious of my frustration, and lashed away at the obstacles in its own path. As I finally pushed back from the window, the angle of my vantage point changed a bit, and the dancer behind me became fully reflected in the window, superimposed, as it were, on the river view I had found so fascinating.

Mental closeness to a roaring river and all it signifies had been a thrilling and rhapsodic experience, but now that experience heightened by several orders of magnitude. Just as the reflection from the glass had superimposed the dancer on the river, my mind superimposed the myriad bits of knowledge I had collected about the evolution of life, about the biochemistry of energy transfer systems, and about vertebrate evolution, onto the grand view of the inorganic world I had just assembled. Involuntarily, I interwove my knowledge of the living world with what I knew of the nonliving world.

This was no dream; it was the assemblage of what science has revealed. There was nothing metaphoric or metaphysical about it. In seconds the view was complete. I sat stunned and unable to breathe before that grand edifice, tears pouring down my face.

Six years of teaching general biology, botany, and zoology, and three years of working with laboratory researchers, had given me a commanding view of life, an intellectual confidence about the nature of things such that I knew I would never again experience life in the simple ways customary of most Westerners. Wolfgang Pauli had introduced me to the world of life, and Julian Huxley and J.B.S. Haldane were among those who had ushered me along the way, but I never bargained for this. Together, the river and I had, for a moment, given birth to a colossal vision of physics, astronomy, inorganic and organic chemistry, biochemistry, biology, philosophy, and mind—a great panoramic view of astonishing grandeur. The scantily clad dancer became a technicolor display of the biochemical intricacies that my colleagues and I had labored over so hard. She became an apparition of the

history of sidereal time. As Richard Dawkins[1] might put it today: "Oh what wonders the blind watchmaker hath wrought!" As I watched those vertebrate muscles smoothly bound and rebound, and as a magnificent nervous system directed the shifting of body in rhythmic perfection with the music, I realized I was seeing an almost surreal depiction of all the information many, many years of study had given me. I was standing on the shoulders of ten thousand giants!

My breath returned, but the pounding of my heart and my inability to control what was happening in my mind frightened me such that I turned away from the window. Moments later I looked back, and again the grandeur of the view evoked an excitement that was unbearable. I turned away again, and again. Each time, the neurological storms in my brain subsided, and each time I looked back the storms were renewed, although not to the same heights as before.

I told my friends good night, and started home. Before that evening turkeys and humans were nothing to get excited about. After that evening, we were both made of stardust!

Thirty-five years later, the memories remain vivid and hauntingly beautiful. Now, somehow, Loren Eiseley's sad story about human loneliness[2] no longer has any bite. His is another true but unimportant tale that fades into trivia in the presence of the overwhelming beauty of a gargantuan, purposeless, meaningless universe driven to complexity by chaos. In this view it doesn't matter whether or not there is a god hiding in the celestial bushes. Within this new world we are free, profoundly and utterly free, in the midst of unfathomable beauty.

With apologies to Michael Polanyi and Karl Popper, I insist it is not a detraction from science to assemble its various findings in the mind's eye so as to visualize the overall nature of the cosmos—just as it is not a detraction from cartography to assemble many little maps into a big one. The scientific view described herein begins with the origin of energy, matter, space, and time and sees the present universe as the outcome of billions of years of interactions between energy, matter, and space. Then it moves to the view that, absurd or not, what exists is complex and beautiful beyond contemplation.

So, just what happens when one comes to the realization that one's existence occurs in the midst of unbearable grandeur? For me, it removed any need for a full and closed account of the nature and origin of everything.

Traditional wisdom holds that loss of confidence in the world's teleological myths results in intellectual and moral anarchy with its associated social chaos—in short, the end of civilization. If this were correct, then of course those who share the scientists' fourteen-billion-year non-teleological view would do well to tell no one about it. But can it be ethical to tell no one about something of great beauty?

If for others, too, the burning existential need for inherent meaningfulness in the universe might disappear under the tranquilizing and exhilarating power of beauty, then perhaps the calm search for understanding and the unfathomable beauty of what we do understand may be quite sufficient as civilizing influences.

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Note: This essay was adapted in 2004 from the original, "On Finding Grandeur in Nature," which was published in the December 1992 issue of *Zygon, Journal of Science and Religion*.

References

[1] Dawkins, Richard. 1987. *The Blind Watchmaker*. W.W. Norton & Company, New York.

[2] Eiseley, Loren. 1960. "The Long Loneliness—Man and the Porpoise: Two Solitary Destinies." *The American Scholar* 30 (1): pp. 57-64.