

The Unkempt Time of Light

by Barry E. Childs-Helton

Prologue

Good evening, friends and compatriots of the Indianapolis Literary Club, and of the early twenty-first century. What I'll read to you tonight, just after the 51st anniversary of Sputnik, is a five-part speculative venture that has grown from the intimations of a wider future that were once an integral part of my time and my education. I offer not so much a research piece as a set of snapshots from a worldview that embraces astronomical distances and geological time scales — where beneath the order we have trained ourselves to see, the cosmos is endlessly unkempt — a riot of energy in infinite process — which nevertheless we are now poised to enter as travelers in earnest. So I'd like to share with you some of this unkempt time, and some of my own reaching toward light. I begin with two quotes — one from a Russian schoolteacher, and one from an English novelist.

“Earth is the cradle of mankind, but one cannot stay in the cradle forever.”

— Konstantin Tsiolkovsky, ca. 1911

“But poor mankind is so small — little animals. Is there to be no rest?”

—H.G. Wells, *Things to Come*

1. The Egg Tooth

All I'd wanted was a spontaneous swim, buoyed by salt water under a high sun just off Miami Beach in the summer of 1971. But my twenty-two-year-old mind, fresh out of college and intrigued with testing itself, had other ideas. So, adrift on my back in the mild surf, I witnessed a silent internal collision. Two “unrelated” notions, previously content to float among the jetsam of my education — the chemical similarity between human blood and sea water, and the fact I was looking *out* from the planet as much as *up* — suddenly fused at some daydream co-ordinates off the everyday map.

I thought of the stars hidden beyond the brilliant blue sky, and the thin wall of human skin that isolated my blood from its ancient origin — but now linked it as well; the fluids on either side of the barrier differed by only a few specialized chemicals. My eyes and mind seemed as much borrowed from the planet as my blood. As a small point of awareness floating on

Earth's liquid surface, I seemed to look out, with the eyes of the planet itself, on infinite surroundings veiled by the familiar sky — as if Earth had evolved humankind as its primary means of looking outward and wondering, and I was doing exactly what I was meant (or evolved) to do. The idea brought with it a moment of elation, and a sense that life and awareness were incredibly extravagant gifts. I seemed deeply and consciously connected with my homeworld, acknowledging myself as a part — an infinitesimal expression — of the planet's greater mystery and wonder. It was actually a moment of reconnection. Yet, in the intervening years, I have never known what to do with that memory.

A skeptical part of me — framed to reflect the traditional Western divorce from nature, and hardened by distrust of any agency that would condemn all its creations to death — looks askance at such moments. Often they seem poetic, but ineffectual, distillations of an ancient human longing to belong here and to have enough life. At less forgiving times, they seem the mere “special effects” of immature human intellect at play among infinite possibilities — you can look at a chicken as an egg's way of making more eggs, or the brain as DNA's way of knowing itself, but what can you do with such ideas?

Perhaps their best use is indeed immature, and appropriately so: as an egg tooth to crack the shell of conventional illusions in which human beings habitually dwell. If we fail to use that egg tooth, we smother in the shell of our received “wisdom” without even knowing it, and become yet another failed evolutionary experiment. But we have no control over the huge processes of the cosmos that may yet send us to join the dinosaurs. So we prefer to narrow our vision, see certain basic assumptions as real, and behave just as if past, present, and future were real and separate, the continents didn't move, one element never decayed into another, and we actually controlled things when we named them. Such notions interlock to form the conceptual veneer we impose on the surrounding mysteries — and consider our normal reality. Yet, paradoxically, our culture's most accurate and careful assessments of its surroundings can crack this shell of the mundane.

2. The Emperor's New Spacesuit

On a cloudless Ohio night in late fall 1969, I stood in line behind my astronomy classmates in the Wittenberg University Planetarium, all of us bundled in parkas against the invading nip of outdoor air. The college's

telescope, an elegant, naval-cannon-size artifact of polished brass, pointed up toward Saturn through the open dome and the frigid clarity of the dark sky. I took my turn at the eyepiece, and there it floated — the one ringed planet known to me at the time — its rings reaching diagonally across my field of vision, its image the color of the mid-afternoon sun. I had seen photos, of course, since the International Geophysical Year of 1957-58 — but I had never seen Saturn this way before. It was a quietly shocking privilege to look at another planet and see it whole as a world, not just a bright light in the sky. Yet it had looked like that, and had turned offhandedly there in the sky, waiting to be beheld, since before my remote ancestors crawled out of the sea. I could understand how such a sight might ignite an astronomer's mind like a new star.

On the way back to my apartment, I looked at the moon and reminded myself again that human beings had now set foot on it twice. The moon was now a real place to humanity, because our species had affirmed that reality — in the immemorial fashion of infants — by going up and touching it. We had even left things there; scientific instruments, hand tools, spent descent rockets, and Hasselblad cameras now lay in the lunar dust. And we planned to return, as if to a neighbor's house in vague embarrassment at our hasty departure. Surely the cosmos must soon be transformed to an array of resources and destinations. Even the counterculture, normally anti-technological, was daring some hubris: "We are as gods," The *Whole Earth Catalog* proclaimed, "and might as well get good at it." All, it seemed, because of one complex application of a two-hundred-year-old principle: Newton's Third Law of Motion, the mantra of rocketry.

The world that spawned Newtonian physics reserved the idea of moon voyaging for fantastic satires. To the eighteenth century, the cosmos was not a place so much as an elaborate machine whose parts danced an immemorial minuet. Even in these post-Copernican times, it was still largely a setting for the one place that mattered: Earth. The elegant celestial mechanics still seemed to lack an immediate, concrete link to Earthly affairs. But then, there could be no compelling reason to suppose any kind of material communication between the celestial and terrestrial spheres; the reality of traveling out there — becoming such a link — was still too far away in the future to command credence. Prior to the French Revolution, there was supposed to be no such thing as a meteorite.

The vast meteor crater in the American Southwest had yet to be discovered by Europeans. Even if it had been, the New World was an abundant source

of fantastic traveler's tales, and was far enough away from European civilization that such reports could be comfortably dismissed. Though French farmers reported finding big rocks in the middle of their fields that had not been there the previous day, the French Academy stoutly maintained an imperially rational view: Stones simply could not fall out of the sky; anyone who said they could was uneducated and superstitious. Only after the French Revolution, when the farmers gained some political clout, would their observations be considered worthy of investigation. Thus the securely separate heavens of the day were like the emperor's new clothes: an authority-driven concept that was politically convenient to believe in, empowered to flout first-hand observation, and almost entirely imaginary.

Yet it is traditional for human beings to edit out most of what exists when we construct our view of reality, and to assume that the only real things are those that just happen to fall within the narrow range of phenomena we can perceive. Consider the world our senses tell us is real: that we walk on a huge, crenellated plate that sits still under an inverted bowl of sky. Such a world is barely more sophisticated than the one the dinosaurs must have perceived: an arena ideally suited to life in the food chain; obligingly the landscape holds still so you can detect the motion of your prey. As a denizen of such a world, your concerns are unambiguous, immediate, and constant: get your lunch every day, reproduce as soon and as often as you can, and die. So you run the show called "When Dinosaurs Ruled the Earth" for about 165 million years, fling an asteroid or comet to close it down with a mass extinction, and clear the stage for the next show. Land mammals? Very well, land mammals it is.

Then one difficult species ruins the simplicity of the evolutionary cycle by developing a neocortex. Suddenly life in the food chain isn't good enough for us. We start to detect and think about phenomena beyond the arena. But this new picture of the world takes us far afield from what we're used to as primates — down from the trees, in from the plains, out of the caves — into dwellings, cities, and rational schema we have built ourselves. And as we apply what we have found out, our species becomes an unruly force in the planetary environment.

Gradually some of us make unsettling discoveries that give the cosmos an alien face. The continents, the planet, its star, and its galaxy are revealed as racked with internal violence, moving constantly through systems that themselves whirl through vaster motions. The "fixed stars" recede to incredible remoteness, their seeming stillness an effect of the millennia

starlight must travel to reach us — an event, like the life of a species, that barely registers in geologic time. The imagined solidity of the “building block” atom dissolves to an insubstantial knot of probable energy, disturbingly mutable and made up mostly of empty space. Finally the world our senses report — with all its solidity and consistency — emerges as an illusion orchestrated by our central nervous system for the convenience of biped predators, our distant ancestors.

Our first reaction to such a revisioning of the world is a kind of birth-trauma. It hurts us to seem so small, crude, powerless, fleeting, and far from the rest of creation. Yet this is the very point at which we have begun to use our mind’s egg tooth. If we are to take our eventual place as fully adult inhabitants of this cosmos we have “discovered,” our species seems required to think, feel, comprehend, and act on a far larger scale than ever before. It is as if we must become more than we thought we could ever be, or else retreat into mindlessness and oblivion. Our fondest illusion — that we dwell unchanging in the midst of a changing world — is the one evolutionary course forever closed to us.

Even so, once any age has decided upon its normal reality, the complacency of the everyday becomes a kind of shared trance state that shuts down our capacities for awe and wonder, and keeps us comfortably numb to the subtler realms of reality. As a mark of our worldly competence, we all tacitly agree to pretend we “know” what is real, and that it’s nothing remarkable. To do or say otherwise is like observing and acknowledging that the emperor is naked.

From the viewpoint of evolutionary practicality, if we allow our model of the universe to become a mere exchange of accepted platitudes, then the emperor is naked indeed. In a universe that seems to be mostly chaotic vacuum, our finery of easy assumptions will do us about as much good as a make-believe spacesuit. We are vulnerable to the unknown we sail through, more so than we shall ever want to admit. Though we wield mathematics powerfully, an infinite reality is not the least constrained to do only those things we finite creatures think realistic. The cosmos that is our only home is also easily capricious enough to annihilate any star, any species, at any time. And it has all the time in the world.

In the face of such discoveries, conventional faith in organized religions offers diminishing comfort, even while our attempts at objective investigation reveal increasingly an implacable universe. It may be that our

only practical protection against a wild cosmos is slender indeed, and mostly potential at that: the piecemeal armor of what we observe, and after disciplined analysis convince ourselves must be true. We have the power to test, anneal, and remake this small shield every time we apprehend — and try to imitate — some new mystery of nature. But the process is often uncomfortable, requiring us to let go of literalism, of our demand that things just be rather than become.

3. The Chemist's Snowshoes

We are hard put to tolerate living day to day with the knowledge that each of us — and our species itself — is continuously in transition. We realize the restless unfolding of our human condition only in the brief moments of insight we can withstand. For most of our mortal time on the home planet, the concerns of “normal” life hold sway over us because we need them to. We repeat them endlessly, comfortingly, to ourselves and to each other; every repetition reinforces the delusion that our social creations have a reality “independent” of us.

Thus we act as if the value of a symbolic piece of silk-and-paper we call a “dollar bill” were absolutely real, ignoring the shared faith in social cohesion that makes money possible. We bestow the label “Monday” on the x-billion-billionth rotation of the Earth, unmindful that the planet moves without regard for our concepts of time — which exist mainly to coordinate human thought and activity. “Monday” (for example) is actually little more than a collective cue to go to the office, but we must protect ourselves from that idea if we are to keep going to the office. So we arrange to repeat the labeling fifty-two times a year — and after enough years, “Mondays” seem pretty substantial. Our habits become so attuned to the label that we repeat the labeling as an automatic mantra, sometimes only to ourselves, every seven days:

“What day is today?”

“Monday.”

“Oh, man, I’ve got to go to the office today.”

“What I tell you three times is true.” So Lewis Carroll’s Bellman declared — though only once — in “The Hunting of the Snark.” Yet we *can* fail in this protective reflex of repetition — and any moment of enlightenment is just such a “failure.” If we catch a glimpse of the arbitrariness that fills our

assumptions the way empty space fills an atom, the solidity we affirm for our reality takes on a gossamer fragility. We then risk falling through the tissue of our old ideas, like a rotten safety net, into a world of dynamism even more chaotic than human culture would appear to us if we could apprehend it objectively.

Still, we retain a need to navigate the details of our lives undistracted and relatively unboggled — so we harness the force of habit to uphold our conventional sense of what is normal and real. Then we surround our frail perceived reality with one further protection: a boundary of intellectual taboo we have trained ourselves not to violate. Gradually, in the no-man's-land beyond the boundary of our accepted reality, the possibilities we have rejected become invisible to us. We have chosen, for example, to see the unruliness of the cosmos as a kind of monster, and then we have made it go away in the perennial fashion of children: by closing our eyes to it.

If we accept that idea that reality itself is constantly changing, no less than our perceptions of it, then we are drawn to evolve beyond our lifelong habits of mind — and so invite the easy censure of self-styled “realists” who see reality as static. The cost of avoiding this ridicule seems small: all we need do is close our minds to unconventional possibilities. That prospect calls to mind an apocryphal academic tale that my college chemistry professor told us when he mentioned that the atom is mostly empty space: Apparently a 1930s a chemist took this idea to heart, and then took to wearing snowshoes so he would not fall through the atoms of the floor . The poor man must have refused — unconsciously but steadfastly — to think about the equally empty atoms that made up the snowshoes.

Yet it is precisely such moments that afford a priceless opportunity. When we sense an inscrutable abyss opening beneath our feet, perhaps we can begin to marvel that we have not fallen summarily into it — that some reliable dance of the mysterious sustains us, even in the midst of our little portion of mortal time, and even in the light of new ideas. Here awe and wonder can re-enter our world, bringing comforts of their own — awe at the abundance of reality, respect for its scale and power, wonder that we may understand some of it after our fashion, appreciation of how much there is yet to know and question, and yes, gratitude for the opulent gift of being alive and aware, in whatever terms we may express it.

Although such an influx of wonder can provide merciful sustenance for our familiar religious stances, the human spirit is itself in transition. We may be

witnessing, whether with reluctance or anticipation, the engendering of a new species of faith — disabused of old hatreds, unencumbered with any global agenda, able to celebrate both knowledge and mystery. Such a faith, if we are indeed to be its celebrants, would be appropriate to a species that is (as the modern theologian Dietrich Bonhoeffer once hoped) coming of age, ready to accept the pain and joy of growth into humane wisdom. If humanity is come of age, then surely we are ready to break out of the illusory shell of sky within which we have spent our embryonic centuries — into a cosmos overflowing with stars and awash in light.

4. The Koans of Einstein

For better or worse, we have already used our scientific egg tooth to knock out a small chip of our culture's orderly shell; through that small gap shines the dangerous light of infinity — the restless, unkempt light that travels forever and refracts through the thought-experiments of Einstein. These paradoxes of relativistic time tend to stymie everyday logic — for example, the twins who age at different rates when one flies off at the speed of light and returns to find the Earthbound twin much older — or the simple act of turning on a flashlight in a ship traveling at nine-tenths lightspeed (if the beam starts out at lightspeed in a ship already moving almost that fast, will it then be traveling *faster* than light, even though it can't?). The world these paradoxes describe just seems *wrong* the commonsense habits of mind that our ancestors honed on the ancient veldt. But these strange notions also beckon to our curiosity from just beyond the reach of our technological capabilities. Once we have lived with these mysteries for a sufficient time, our logic will evolve to model what we observe, as it has always done.

In the meantime, the paradoxes of relativity offer us an exercise in intellectual, even spiritual, discipline. We are challenged to tolerate a breach in the limits of logic — specifically, of the two-part logic that splits everything into “either” and “or.” Even Einstein himself, faced with a cultural milieu much happier with absolutes than with any stripe of relativism, declared that God does not play at dice with the cosmos. It was a statement of faith. Observation seems to suggest that the cosmos does have its moments of dangerous caprice — as when Comet Shoemaker-Levy 9 broke apart and struck the planet Jupiter in July 1994. Twenty-five years after the first human steps on the moon, we were in a position to observe that event with accuracy, wonder, and unease, aware that a similar comet strike on Earth may well have caused the mass extinction of the dinosaurs. It was a blunt demonstration that everything in reality is moving all the time — and

if it seems to be still, then its frame of reference is moving.

Even so, we retain a prejudice against any alternative to static order; dynamism seems to mean disruption — a loss of control — the anathema of technological culture. But the attempt to impose the predictability of the machine on the processes of nature has had at least one ironic result: the revelation of pervasive turbulence.

When the mainframe computers of the 1960s failed to establish precision in weather forecasting, the study of atmospheric processes led us further into a consideration of fluid dynamics — as modeled in the turbulence of air and water (the basic building blocks of weather). One result was the emergence of “chaos theory,” an ever-changing, mathematically difficult middle ground between order and disorder where predictability disappears. Even now, early in the twenty-first century, we tend to keep this new worldview in abeyance; it sorts ill with our neat dichotomy of order-versus-disorder. We remain reluctant to accept the fruits of our own observations, to admit that a certain degree of cosmic capriciousness cannot be ruled out. Indeed, it seems we must assume unpredictability to be as persistent a quality of the universe as the order and entropy we are used to.

Consider, for example, the stars in the celestial realm we are accustomed to think so serene, and whose apparent fixity has guided mariners for centuries. As our instruments tease more information from the faint light that reaches us from far away, we learn that the stars, too, are mortal, in motion, and somewhere in the process of living and dying violently. Astronomers in Earthbound observatories see a distant supernova only when the light from its explosion reaches us — perhaps a thousand years after it happened — suddenly transforming yesterday’s familiar image of that star into the ghost of a liar. Any distant star may have exploded today, and we would not know for centuries.

Anything we see in the wider universe may so betray our senses, given sufficient distance and time. Though we develop sophisticated tools for observing, and depend on the adepts of science to fine-tune our picture of the world, our adaptation to living in this greater realm will require more from us than honest and accurate observation (which is hard enough). We will need to forge a new, inward discipline to carry with us on our outward travels in future centuries. This new outlook will probably partake of the mystical, perhaps offering it as much respect as we already offer the rational; perhaps we would come to see as much with the eyes of the disciple as with

those of the explorer or warrior. Our outlook would encompass respect for the sheer scale of the cosmos, an alert tolerance — even love and wonder — for its dynamic complexity, and a humble equanimity in the face of its limitless capacity for surprise (which so often wears our own collective face).

If Einstein has correctly identified lightspeed as the universal speed limit, then all future human interactions with the wider universe will be, as they always have been, affected directly by the properties of electromagnetic radiation. Once our shared human reality is expanded to a scale at which light takes a noticeable time to travel, we find it rife with paradoxes we cannot ignore. For example, the sun against which I shade my eyes is merely the image of where the sun was eight minutes ago — it took the light that long to get here. So I can't actually "see" the sun, only where it was — but looking at it can still blind me. What matters here is not the object I call "the sun," but the properties and effects of its energy.

Consider a typical practical problem from the future Space Age that I grew up expecting to see: A solar astronomer in an observatory orbiting above Earth detects a solar flare — a giant arc of charged plasma — as it leaves the sun, and must warn a group of astronauts working on the surface of the moon. They must find shelter in time to avoid the flare's lethal dose of radiation. Starting from the sun, 93 million miles away, the flare travels at a million miles an hour and its radiation travels at lightspeed — but by the time the observer detects the flare, it has already been traveling for the eight minutes it took the light from its detection to reach the observer. Say the observer is lucky enough to be on the same side of Earth as the moon, and calculates the safety margin on a super-fast, space-hardened computer that isn't disrupted by cosmic rays. The radio beam that carries the warning still takes a couple of seconds to travel a quarter-million miles to reach the lunar astronauts. If you're the observer, taking all these factors and more into account, how do you calculate the safety margin and send it in time to do some good?

It's probably just as well that I passed the height limit for astronauts in the seventh grade; I was terrible at story problems. But that one I would have tackled gladly if it had been offered. And frankly, I would have preferred to put that solar observatory in orbit around the moon instead of around Earth. Better observing conditions, better safety margin for the lunar astronauts. Earth would weather the flare, as always; it has the Van Allen Belt.

Although finding actual solutions of that sort may seem dauntingly complex in light of our familiar Earthly concerns, it must already be a standard survival skill in the space program. In effect, we have already entered a period in the evolution of our species that constantly demonstrates the linkage between the vast and the minute, between the universe and us. The greater the foothold we gain in the wider universe, the more we will begin to think habitually in such terms. Our successful adaptation to the requirements for survival in this new environment will depend on our understanding of this linkage.

Our explorations will offer us not only new information, but also new choices regarding how we are to orchestrate meaning. Consider, for example, the eventual possibility that large numbers of human beings — perhaps colonists traveling to the stars at near lightspeed — may experience firsthand the original vision of Einstein: riding a beam of light. It's likely they would try to communicate this experience to the rest of humanity — and that we would scarcely know what to make of the information. Would we consider it a collective aberration, a social-science experiment, or an opportunity for mystical illumination? The kind of culture that could not only tolerate, but thrive on such experience is challenging to imagine.

We might start with a modest extrapolation: Space Zen as taught in a lunar monastery of some distant future. A spacesuited master tells her student, “The sound of one hand clapping is like the sound a bell makes in a perfect vacuum.” It is a basic lesson in quieting the din of logic so as to appreciate the eloquent silence of mystery. Only after years of study will the student be ready to try the great mysteries — the thought-experiments of the ancient master Ein-Stein — that prepare the devout for the visionary experience of relativistic enlightenment: seeing the universe as it would look to a sentient beam of light.

Whatever shape our future disciplines may take, manifold human adaptability remains one of our greatest resources — for which we continue to find the greatest challenges. As we send envoys and explorers out into the surrounding universe, the common thread of our humanity — however strong we have managed to make it — will become our entire species' link to whatever new realities will test us next. If we are able to say, with St. Augustine, that “nothing human is alien to me,” and have taken the next invaluable step by continuously expanding our definition of what is human, then we will have primed ourselves to reduce the disruptive effect of what is alien. We will have passed our entrance exam to the university of the

infinite.

5. Looking Out for Ourselves

We are now stepping up on the threshold of our accustomed world. Barely aware that it is a moving planet, we dare to launch our tools, our ideas, and even ourselves across the inhuman distances through which we always used to move unawares. With no clear idea why, we begin to break out into a wider cosmos of dynamism roiling in endlessness; our familiar, ancient notions of space and time bend and melt under the strain. It all seems too much — as it would to any newborn creature with half an inkling of the actual world it has entered. Of course we emerge unprepared to move in this new realm; a hatchling has a daunting amount of growing and fledging to do before it will be ready for flight.

This prospect should not intimidate us. Presently we make decisions every day, both large and small, that were completely unavailable to our ancestors — and would seem alien to them: How long to bombard that leftover chili with microwaves? When to make discount travel arrangements to take a flying machine to a place ten thousand miles away, so we may spend a mere week there? Whether to allow a nation to sell its stockpile of flying weapons that can each destroy a city? Humanity has survived in this world by *continuing* to adapt to it. It is not a comfortable survival strategy, but it has worked so far — and it may be only a small inkling of the adapting we have yet to do in the wider universe.

Gradually we extend our reach outward, bearing our small understanding into the vast dark like a protected candle flame. Yet even our first small step to our natural satellite rewards us: we discover, almost too late, a passion for the rare oasis our homeworld is. The people we send out beyond the veil of sky come back changed.

All who follow the first space travelers outward will also change, as will those who stay behind and realize they are traveling as well, and always have been, on a planet rushing through the cosmos not so much like an “arrow of time” as like a feather in a hurricane. That relative stillness and contemplative peace seem possible at all is a kind of grace.

To extend the ephemeral reach of our mortal presence across multiple light years, those who travel far from the homeworld must eventually accelerate to speeds near that of light, and in so doing enter a scheme of things that pushes all the boundaries of the human envelope — our adaptability, our

tolerance for loneliness, our ingenuity, our courage to move on in the face of the overwhelming, and ultimately our capacity to evolve a faith unconfined to familiar categories and symbols. If the collective unconscious is indeed an indwelling human heritage, then we are poised between two realms of transcendent mystery — the inward and outward — and will remain so for as long as we are recognizably human. If our species does have something like an aggregate soul, then the growth of that mysterious treasure will remain stunted for as long as we remain confined to one planet.

So far from eclipsing our need for the sacred, stepping out from our homeworld brings us to the doorstep of a much greater temple, challenges us with the constant and uncompromising vista of infinity, and gives us room to drive toward the sacred. Cleric or mystic, monotheist or animist, acolyte or agnostic, we may yet face the prospect of enough room for the human spirit to unfold, as never before, in the light of a trillion stars. It may be that we will slough our deadlier differences like a skin outgrown, as they are outmatched by the utter alienness of the environments we reach. It may be that our shared humanity will reassure and warm us, that we may be able to see our brotherhood — the great message of all our great religions — clearly and unanimously for the first time. We cannot know whether such an elusive dream is accessible until many more of us are out in the cosmos, and to stay.

The lessons waiting for us on the difficult outward journey are harsh and beautiful as the contrast of moonscape and Earthrise. The most hostile environment imaginable dares us to lift the burden of our appetite for resources away from the torn surface of our homeworld. We are challenged to come make our species' fortune with the materials of a far larger "real world," and encompass its perspectives if we can. If humankind can meet that challenge, individually and collectively, then at last we may have begun to venture out from the chaos of passive evolution itself, and into the unfolding of an illuminated sentience. We may not only survive, only evolve, but grow toward a revelation we may only imagine: the fulfillment of our highest potential. Whether for a species or an individual mortal creature, no greater undertaking is possible.

Thank you for traveling with me.