Vital Reenchantments: Biophilia, Gaia, Cosmos, and the Affectively Ecological

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“We are made of star stuff,” Sagan reminds us again and again in Cosmos, and this revelation becomes the one that paves the way for countless others. Much more than constituting a reason to affiliate with the cosmos, like Lovelock’s Gaia, it is a proclamation that we affiliate, whether we like it or not. That we share a great deal with the stars forms the seed around which the cosmic perspective, the subject of Cosmos and this chapter, crystallizes. As described by Sagan, the cosmic perspective involves an embrace of the “subtle machinery of awe”\(^1\) with which the universe confronts us; it is an orientation towards wonder. Although Cosmos shares a great deal with Gaia and Biophilia in celebrating the infinity and excess of life on earth, it is also fundamentally about the potential for reenchantment in an age in which we are just beginning to realize the vastness of that which we have not yet experienced in the universe.

Framing Cosmos both temporally and conceptually are the Voyager spacecraft, which also begin and end this chapter. Though they were initially conceived of as mere probes, Sagan was responsible in the late 1970s for outfitting each of the spacecraft with a Golden Record—a greeting to the stars and pos-

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sible extraterrestrial intelligences—and also a fragmentary and highly affective portrait of the human species. This, I argue in 5.1, crucially informs the way Sagan portrays the relationship between the human and the universe in *Cosmos*. Section 5.2 moves on to the series and book itself, describing both their unprecedented success as works of popular science and also explaining why it makes sense to treat them as ecological. The following sections move on to the so-called cosmic perspective in *Cosmos*. Section 5.3 looks at what Richard Dawkins has derided as Sagan’s “cosmic sentimentality”: the notion that our connection with the stars is not merely material and energetic, but also affective. Section 5.4, entitled “Precious worlds/Precarious Life,” in turn, focuses on another leitmotiv in *Cosmos*: the idea that life, let alone intelligent life, is so rare and so fleeting that the very realization of this fact must produce an ethic of care. Stepping back slightly from the series, section 5.5 takes a broader look at the scholarship on and criticism of *Cosmos* in the ’80s, addressing what has become the elephant in the room: the series’ religious undertones. The final section returns to Voyager, now cruising through interstellar space with a collection of affects that will outlast the planet earth and potentially the human species.

5.1

*The Golden Record: Terrestrial Murmurs in the Cosmic Ocean*

In 1977, a mere three years before *Cosmos* would air, the two Voyager spacecraft were launched by NASA. At the time of their launch, the planets, aligned just so, would enable the vehicles to travel remarkably fast via gravity-assisted trajectories that flung them through the solar system, flying by Jupiter, Saturn,

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3 Ibid.
and, in the case of Voyager 2, Uranus and Neptune.\textsuperscript{4} Though they ceased relaying images to the earth in 1990,\textsuperscript{5} they have managed to capture some of the most iconic images of the outer planets and are still traveling. In 2013, scientists confirmed that Voyager 1 had entered interstellar space in 2012, thirty-five years after its launch.\textsuperscript{6}

But it is no empty vessel outfitted only with a few rudimentary instruments that has left the solar system. Carl Sagan campaigned, successfully, to furnish each craft with an identical golden record (really gold-plated copper) and record player, serving as a kind of deep time and deep space capsule. A committee, organized and chaired by Sagan, was made responsible for what was to appear on the record. In the end, it would carry:

118 photographs of our planet, ourselves, and our civilization; almost 90 minutes of the world’s greatest music; an evolutionary audio essay on “The Sounds of the Earth”; and greetings in almost sixty human languages (and one whale language), including salutations from the President of the United States and the Secretary General of the United Nations.\textsuperscript{7}

The effort, documented by the committee members themselves in \textit{Murmurs of the Earth: The Voyager Interstellar Record} (1978), was a monumental one. Although Sagan held out hope that the Record would serve “as a message to possible extraterrestrial civilizations that might encounter the spacecraft in some distant space and time,” he was not naïve about the endeavor. Given the likelihood that the Record would be swept up by intelligent


\textsuperscript{6} Greicius, “NASA Spacecraft Embarks on Historic Journey.”

\textsuperscript{7} Sagan et al., “Preface,” 222.
life cruising through space, Sagan admitted that, ultimately, the Record was for us on earth.8

And what does the Golden Record, hurtling away from home at roughly two billion kilometers per year,9 do for us? As far as the human is concerned, Sagan’s writing implies that it served two purposes. It allowed the committee, first of all, to frame human beings not just as “perceiving and thinking” but as “feeling creatures.”10 The Record emphasized the affective dimensions of the human: a multiple-exposure shot showing how a gymnast moves on the beam,11 the “harbor-filling bray of an ocean liner’s foghorn,”12 a Navajo night chant in which “one can almost see the dance by listening to the recording.”13 Ann Druyan’s audio essay, “The Sounds of the Earth,” attempted even to place these human affects on a deep time scale: Beginning with a series of tones arranged in time like the orbit of the planets in the solar system, it then progressed to sounds of volcanoes erupting, earthquakes, and thunder — the elemental earth. This gives way to a series of animal sounds, out of which emerges the biological and then the technological human.14 Machines quite literally occupy the same plane as animals on the Record, and the human appears alongside the geological. At the end, there is a recording of “Life Signs,” a minute-long compression of Druyan’s own brain waves produced by an hour of thinking, followed by the sound of a pulsar.15 Druyan offered the following explanation for this particular part of the sequence: “My recorded life signs sound a little like recorded radio static from the depths of space. The electrical signatures of a human being and a star seem, in such recordings, not so different, and symbolize our relatedness

8 Ibid. 11.
9 Greicius, “NASA Spacecraft.”
15 Ibid., 157.
and indebtedness to the cosmos.”16 With this gesture, the feeling of a human is related to the radiation emanating from a star; this is the celestial human. The Golden Record emphasizes, in this way, that we are feeling creatures in a cosmos that not only gave birth to that feeling but that also potentially has other elements that feel (although certainly not as we do).

The second purpose of the Golden Record is to emphasize the contingency of contemporary Western culture and, in so doing, affirm the openness of the present to other ways of living:

Our modern technical civilization is one ten-thousandth as old as mankind. What we know well has lasted no longer than the blink of an eyelash in the enterprise of cosmic time. Our epoch is not the first or the best. Events are occurring at a breathless pace and no one knows what tomorrow will bring — whether our present civilization will survive the perils that face us and be transformed, or whether in the next century or two we will destroy our technological society. But in either case it will not end the human species.

There will be other people and other civilizations, and they will be different from us.17

The Golden Record makes no claims to portray the apotheosis of evolution on earth. Even now, not even half a century later, it seems very much a product of its time. But this is also precisely what it aspired to be, a reminder of “life’s ever-branching and beautiful ramifications” destined, perhaps, for a place with “murmurs…very unlike our own,” but also a record of all the terrestrial voices “silenced forever by carelessness or merely by time.”18 The Golden Record acknowledges the certainty that the conditions it presents will change (and they already have). Simultaneously, however, it casts a new light on the present. Contemplating it, we inevitably position ourselves as the intelligent

16 Ibid., 160.
extraterrestrials who have snapped it up, experiencing a small part of earthly existence during a narrow window of time, and we can wonder anew at it.  

I have begun with Voyager and the Golden Record because I want to suggest that it is an important philosophical precursor to the series and the book that appear in 1980. *Cosmos* will return, time and time again, to the affective connection we have to that beyond the earth, to the way feeling cannot possibly be separated from the stars. And despite the neat historico-scientific genealogy that it offers, *Cosmos* also insists that there are other ways of living and that stubbornly maintaining otherwise is not only a recipe for disenchantment but also endangers the only intelligent life we know.

5.2
Bathed in Strange Light:
An Introduction to *Cosmos*

*Cosmos* began as a television series for the American Public Broadcasting System (PBS), with Carl Sagan as the nearly constant awe-struck science-god star. As the most widely watched American public television series during all of the 1980s, it is estimated to have been seen by 600 million people worldwide over the years. It was this show that would catapult an already media-friendly Sagan to fame and earn him the title of the “prince

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19 Lomberg, who led the effort to select the images for the record, even writes, “I found myself increasingly playing the role of extraterrestrial, a mental exercise I had done in fun for many years (while playing Frisbee, for example, I’d ask myself, ‘What would ETI make of this?’). Only now it was in earnest. I would look at the pictures and try to imagine that I’d never seen the subject before” (Lomberg, “Pictures of Earth,” 77).


of popularizers.”22 A few weeks after the debut of the series, he would grace the cover of *Time* magazine. Frederic Golden, who wrote the feature in *Time*, proclaimed: “In the casualness of turtleneck jersey and chino pants, his butcher-boy haircut tousled by the wind, Sagan sends out an exuberant message: science is not only vital for humanity’s future well-being, but it is rousing good fun as well.”23 Although Sagan would be mocked for this exuberance, most famously by Johnny Carson on *The Tonight Show*, *Cosmos* is not thinkable without it. Riding, perhaps, on the series’ success, the book also became a bestseller. Until Stephen Hawking’s *A Brief History of Time* (for which Sagan also wrote the introduction) was published in 1988,24 it was the best-selling science book ever written, staying on the bestseller list for over a hundred weeks.25

Both the book and the series were immensely successful, retaining enough of a cult following today to merit a sequel financed by a major (notably non-public) network.26 Sagan himself writes at the beginning of the book that, although the book and the series are organized in a similar fashion, the book “goes more deeply into many topics than does the television series.”27 And, indeed, the script is lifted overwhelmingly from pages of the book. For this reason, I understand the book and the series as part of the same project and differentiate between them only when they deviate from one another. For practical purposes, this chapter draws on quotations from the book rather than the script, although the occasional reference to Sagan’s behavior in

the series is illuminating. Indeed, given that Sagan spends half of his time in the televised version bathed in strange light, face directed towards the heavens, marveling, one cannot but make reference to these undeniably affectively-charged images. The televised series also includes a “Ship of the Imagination,” shaped like a dandelion seed, which allows Sagan to play galactic tour guide. The ship, for obvious reasons, is left out of the book, which means that much of the language relating to traveling and exploration is as well. In episode 1, for instance, when introducing the Ship, Sagan proclaims, “Our travels allow us to see the Earth anew, as if we came from somewhere else.” The Ship of the Imagination, like Wilson’s motion picture projector of magical versatility, should be a familiar fiction by now: a kind of ultimate scientific tool, which, like any revolutionary tool in science, shows us just how small our Umwelten, our own small sectors of nature, are.

The associations one has with Cosmos, especially for those who may have grown up with the series, may not be immediately ecological. At first glance, Cosmos appears to be a glorified history of astronomy and its antecedents that is simply heavy

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28 These images were, in fact, a source of contention; Sagan thought they were too much, and they have certainly contributed to the impression that the series represents the height of 1980s popular science kitsch. Keay Davidson, Sagan’s biographer, remarks: “Indeed, of all the things that people remember most vividly about the Cosmos series, the most annoying are the long, tedious close-ups of Sagan’s face. ‘Most of the criticism of Cosmos centered on Carl’s shit-eating grin in the spacecraft,’ says Don Goldsmith [an author of popular science and a consultant for the series] — a grin that he gleefully imitates. Stanley Miller [chemist and good friend of Sagan’s] claims that Sagan blamed the shots on [director] Malone, who (Sagan told Miller) kept shooting Sagan in close-up ‘to screw him.’ (Soter [co-producer along with Sagan and Druyan] and Goldsmith doubt this.). In Soter’s view, the spaceship shots were ‘the major flaw of the series. Those were all Adrian [Malone]’s idea…Carl went along with Adrian’s judgment and it turned out to be a bad call,’ Soter said. But Sagan certainly deserves at least some of the blame: after all, he had driven the Cosmos staff half-crazy by trying to run everything” (Carl Sagan, 333).

on the editorial. At heart, however, *Cosmos* is about the relation of the human species with the universe—historically, scientifically, and prospectively. Near the beginning of the work, Sagan justifies the title he has chosen: “*Cosmos* is a Greek word for the order of the universe. It is, in a way, the opposite of *Chaos*. It implies the deep interconnectedness of all things. It conveys awe for the intricate and subtle way which the universe is put together.”30 For Sagan, *cosmos* is the ecological condition—these “exquisite interrelationships”—and this constitutes for him, again and again, a cause for celebration and wonder. This is the “subtle machinery of awe.”31 Sagan’s book is ecological literature understood in the most fundamental sense (few secular authors, at least, attempt to tackle our relation with the universe). He tells us, “Every aspect of Nature reveals a deep mystery and touches our sense of wonder and awe,”32 and by “every aspect,” he means supernovae as much as steam engines.

But the ecological bent of *Cosmos* is just as dependent upon what Sagan will mysteriously refer to as the “cosmic perspective.” Though the term sounds suspiciously like a scientist’s none-too-cloaked universalizing move, a way to make a certain code of ethics and practices obvious by reference to their supposed groundedness in the universe and scientific fact, the cosmic perspective is more subtle and tentative than that. In *Dragons of Eden*, published just a few years before *Cosmos*, Sagan makes his first references to the term:

The current resurgence of interest in the ecology of the planet Earth is also connected with this longing for a cosmic perspective. Many of the leaders of the ecological movement in the United States were originally stimulated to action by photographs of Earth taken from space, pictures revealing

31 Ibid., 2.
32 Ibid., 275.
The cosmic perspective, rather than merely insisting that the image of the earth from afar automatically provides solutions to local problems, points to a more tentative ethic of care fueled by wonder. It is from space, Sagan argues, that life finally appears as something in need of nurturing. And it is by caring for and regarding the living world with awe, in turn, that we can fully inhabit our role in the cosmos as “matter grown to consciousness.”

The following sections examine this cosmic perspective in more detail, first by examining the alleged “sentimentality” involved in Sagan’s view of the relation between the human and the cosmos (5.3), and then by looking more closely at Sagan’s insistence that life’s rarity in the universe demands we develop a different orientation towards it (5.4).

### 5.3 Cosmic Sentimentality?

If there is something about the phrase “subtle machinery of awe” that does not sit quite right, it is because it contains a paradox central to Cosmos and the cosmic perspective it embodies and presents. Awe is there for the taking — spinning, exploding, and flying through space — but is also engineered by Sagan himself. Indeed, it would be foolhardy to suggest that Cosmos grants us unmediated access to the affects of the universe. And yet, what I want to suggest here is that the series and the book are not merely cosmic kitsch. They choose, in most instances, sensation over sentiment. Thus the cosmic perspective, although it is a mediated view of the universe, does not sentimentalize it.

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34 “Shores of the Cosmic Ocean.”
Many reactions to *Cosmos*, however, involve scientists in particular taking objection to just that—the supposed surfeit of emotions Sagan invests in space. In the preface to his own book on wonder and science, Richard Dawkins insists that “the debunking of cosmic sentimentality,” by which he means the various ways “we tie our life’s hope to the ultimate fate of the cosmos...must not be confused with a loss of personal hope.” Instead, and in apparent direct opposition to this “cosmic sentimentality,” he appeals to the “feeling of awed wonder that science can give us,” which he claims is “one of the things that the late Carl Sagan did so well.”

As much as I agree with the assessment of Sagan as an ambassador of scientific wonder, my argument here is that the cosmic perspective must not be confused with cosmic sentimentality. *Cosmos* revolves around not the feeling the universe has for us, but the profound connections between the human earth-bound and the cosmos. Life’s hope is indeed bound up with the fate of the cosmos, but so is everything else. This can hardly be termed sentimental in the sense alluded to in Chapter 1.

The cosmic perspective, as explored here, is a mode of seeing the ways in which the everyday is situated in and reliant upon the cosmic—for instance, how one’s bus-ride to work is, through the magic of fossil fuel, powered by the light of a younger sun. From the cosmic perspective, nothing is trivial, and it consists of constantly recasting that which we thought we knew as part of a much larger network of relations. This is what, in Sagan’s words, “stirs us”; our own relations, perceived within an Umwelt that is literally and figuratively expanding, acquire a newness and occasion wonder.

At the beginning of *Cosmos*, Sagan proclaims directly that our own destinies are intimately tied up with the universe. He writes:

> We have grown distant from the *Cosmos*. It has seemed remote and irrelevant to everyday concerns. But science has

found not only that the universe has reeling and ecstatic grandeur, not only that it is accessible to human understanding, but also that we are, in a very real and profound sense, a part of that Cosmos, born from it, our fate deeply connected with it. The most basic human events and the most trivial trace back to the universe and its origins. This book is devoted to the exploration of that cosmic perspective.  

Here Sagan repeats the short version of the disenchantment tale, only to state that science can repair the damage we think has been done (the universe has, after all, only “seemed remote and irrelevant”). Science, rather than serving to further alienate the human from the universe, in a dramatic reversal, is precisely that which will return us to an exalted place among the stars. It is here, in the very beginning, that Sagan ties the trivial and earth-bound to the vastness of the cosmos and begins to lay the groundwork for the cosmic perspective.

Sagan does not attempt, at first, to close the distance between his readers and the cosmos, but appeals directly to their immediate reactions to the attempt to think vastness in space and time: “The Cosmos is all that is or ever was or ever will be. Our feeblest contemplations of the Cosmos stir us — there is a tingling in the spine, a catch in the voice, a faint sensation, as if a distant memory, of falling from a height. We know we are approaching the greatest of mysteries.”  

Sagan tries to evoke an affective relation to the cosmos here, and we experience its unthinkable dimensions as sensation. A mere reminder of the size to which the twentieth, not to mention twenty-first, century human Umwelt has grown, inducing a kind of wonder. Significantly, it is not necessarily the experience of new affects that produces wonder in this case, but the notion that, given the sheer size of the tracts of space and time at stake in the “contemplation of the cosmos,” one cannot possibly say what new affects await. But that they

36 Sagan, Cosmos, xvi.
37 Ibid., 1, emphasis mine.
are there for the taking (or, rather, to take one up) cannot be disputed; the infinity of the cosmos promises this, at least.

Within this cosmic perspective, the earth, far from being reduced to a meaningless speck, acquires a new significance. “The surface of the Earth,” he announces, “is the shore of the cosmic ocean.” In the television series, he stands on a rock outcropping of an actual beach in his trademark turtleneck, hair blowing in a wind one realizes is not entirely terrestrial in origin, as he says this. But what does it really mean for the earth to be “the shore of the cosmic ocean”? Such a statement smacks of the cosmic sentimentality derided by Dawkins, yet it proves not quite as naïve as it seems on first examination. Rather than constituting the solid ground that the rest of the universe, known and unknown, laps against, the earth here is the vantage point from which one receives information from the cosmos (even if we send out “scouts,” the information must be relayed back). Sagan writes:

We inhabit a universe where atoms are made in the centers of stars, where each second a thousand suns are born; where life is sparked by sunlight and lightning in the airs and waters of youthful planets; where the raw material for biological evolution is sometimes made by the explosion of a star halfway across the Milky Way; where a thing as beautiful as a galaxy is formed a hundred billion times—a Cosmos of quasars and quarks, snowflakes and fireflies, where there may be black holes and other universes and extraterrestrial civilizations whose radio messages are at this moment reaching the Earth.40

38 Ibid., 2.
39 Sagan’s novel, Contact, also features a beach, along which the scientist-astronauts, after traveling in an alien spacecraft through several wormholes, finally are able to converse with the extraterrestrial hosts. See Carl Sagan, Contact (New York: Pocket Books, 1985), 344–72.
40 Sagan, Cosmos, 275.
One could speak of other kinds of messages at other wavelengths, as well, but Sagan is, after all, a radio astronomer. Any special significance one might associate with the earth becomes the result of a cosmic awakening, a willingness to contemplate extraterrestrial affects. Wondering at and in the cosmos is, for Sagan, eminently human. And the space age presents unparalleled opportunities for further expanding this sense of wonder:

We embarked on our cosmic voyage with a question first framed in the childhood of our species and in each generation asked anew with undiminished wonder: What are the stars? Exploration is in our nature. We began as wanderers, and we are wanderers still. We have lingered long enough on the shores of the cosmic ocean. We are ready at last to set sail for the stars.41

This is a call to explore and experience radically new Umwelten (and they are Umwelten; the possibility of encountering alien life is upheld on countless occasions) — the ones only glimpsed and imagined in the so-called “childhood of our species.” It constitutes, on the one hand, an enthusiastic declaration of support for NASA and other organizations involved in space exploration, but it is also a call to the reader. Sagan pleads constantly for an awareness that we are on a planet orbiting a sun, in one of the arms of the Milky Way, spinning through the universe.

For most of his readers, this is doubtless not a radical thought, but he reminds us that it constitutes a departure from both classical and Christian traditions: “The Platonists and their Christian successors held the peculiar notion that the Earth was tainted and somehow nasty, while the heavens were perfect and divine. The fundamental idea that the Earth is a planet, that we are citizens of the Universe, was rejected and forgotten.”42 Sagan argues for a possibly unfamiliar kind of ecological embeddedness. He rejects the idea of heaven and earth, surface and sky, in

41 Ibid., 155.
42 Ibid.
favor of a dizzyingly post-Copernican view of the universe and our place in it. The analogy to earthly ecological concerns becomes more apparent when one considers the Ship of the Imagination, shaped like a dandelion seed, ostensibly launched by the dandelion shown in the intro and credits at the end. As a dandelion seed is to the earth, we are to the cosmos. The resurrection of the idea that we are in and of the heavens, “that we are citizens of the universe,” moreover, forms an uncanny echo of Clebsch’s claim, referred to in Chapter 1, for a uniquely American brand of spirituality (section 5.5 will return to this). It is also a powerful response to contemporary narratives of disenchantment.

But Sagan’s claim about cosmic citizenship goes further than the recognition that we inhabit a planet of the universe; it is also a claim about the human. Again and again, he reminds us: “The nitrogen in our DNA, the calcium in our teeth, the iron in our blood, the carbon in our apple pies were made in the interiors of collapsing stars. We are made of starstuff.” Materially and energetically, human destinies are indeed deeply intertwined with the cosmos. Our atoms have been smelted in cosmic ovens, and, as Sagan also tells us on a number of occasions, we are made of atoms, as is everything we have ever known or ever will know. Even the baking of the humble apple pie, he famously tells us, first requires the invention of the universe.

But he goes even farther than this, arguing that neither our subsistence nor our current biological form would have been possible without the awesome power of the sun. “We are, almost all of us, solar-powered,” he claims, highlighting the role of plants as “grudging intermediaries.” He goes on to state that

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43 Ibid., 190. It should be noted that this is in one sense only a more elaborate, and more scientifically informed, illustration of some of the vaguely ecosophical/cosmological declarations of the 1960s. The chorus from Joni Mitchell’s “Woodstock” (from Ladies of the Canyon, Reprise, 1969, LP), for instance, goes: “We are stardust. / We are golden. / And we’ve got to get ourselves back to the garden.” Sagan’s work contains none of the nostalgia, retrogressivism, or Luddism to be found in what one might term “hippy cosmologies” (one would be hard pressed to find “the garden”), but certainly contains some of the same leitmotifs.

44 Sagan, Cosmos, 180, 179.
the mutations so essential to evolution “are produced in part by cosmic rays — high-energy particles ejected almost at the speed of light in supernova explosions,” concluding, “The evolution of life on Earth is driven in part by the spectacular deaths of distant, massive suns.”45 That we exist at all and have continued to flourish can thus be viewed as the result of a strange amalgam of interstellar accidents.

What is significant about this view of the human, as a creature of the stars as much as the earth, is that these connections to the universe manifest at the affective level before they become the object of scientific inquiry. Sagan explains:

We are, in the most profound sense, children of the Cosmos. Think of the Sun’s heat on your upturned face on a cloudless summer’s day; think how dangerous it is to gaze at the Sun directly. From 150 million kilometers away, we recognize its power. What would we feel on its seething self-luminous surface, or immersed in its heart of nuclear fire? The Sun warms us and feeds us and permits us to see. It fecundated the Earth. It is powerful beyond human experience. Birds greet the sunrise with an audible ecstasy. Even some one-celled organisms are known to swim to the light. Our ancestors worshiped the Sun, and they were far from foolish. And yet the Sun is an ordinary, even a mediocre star. If we must worship a power greater than ourselves, does it not make sense to revere the Sun and stars? Hidden within every astronomical investigation, sometimes so deeply buried that the researcher himself is unaware of its presence, lies a kernel of awe.46

This primordial fascination with the cosmos, unleashed by sensation — the heat on one’s “upturned face,” or even the racket birds make at sunrise — is the original cosmic wonder. The recognition of an entity like the sun (or the stars, or the moon) also entails the recognition that something lies beyond one’s

46 Ibid., 189–90.
own “soap bubble.” What that is exactly can only be revealed or approximated with a kind of science, but the first taste of the cosmic unknown is undeniably affective. Only later might the extent of our absolute reliance on that which lies beyond the earth become known. But even after a place is carved out in the cogito for the sun, for instance, it in no way precludes an affective engagement with it. One may know exactly what kinds of rays are striking one’s upturned face and still wonder at the sun. This most fundamental kinship with the universe, the idea that extraterrestrial affects have somehow brought us into being, is the cosmic perspective. Sagan grandly declares: “We have bravely tested the waters and have found the ocean to our liking, resonant with our nature. Something in us recognizes the Cosmos as home. We are made of stellar ash. Our origin and evolution have been tied to distant cosmic events.”

This awakening to the scope of the human Umwelt, both in material terms and in terms of the realm of inquiry, is not only eminently human for Sagan, but also an occasion for unparalleled wonder. He continues, “In the last few millennia we have made the most astonishing and unexpected discoveries about the Cosmos and our place within it, explorations that are exhilarating to consider. They remind us that humans have evolved to wonder, that understanding is a joy, that knowledge is a prerequisite to survival.” The take-home point for Sagan is that “our future depends on how well we know this Cosmos in which we float like a mote of dust in the morning sky.” And lest our cosmic origins and ability to contemplate them lead to any kind of human hubris, Sagan constantly reminds us of our smallness.

49 Ibid., 1.
50 Ibid., 1–2.
Our destinies may have been set in motion by nothing smaller than the Big Bang, but we still only “a mote of dust in the morning sky.”

Despite the fact that our own mote of dust, our own abundant planet, not to mention our own star, so overshadows that which might lie beyond it, Sagan assures us that there is a whole universe with which to become acquainted:

Each star system is an island in space, quarantined from its neighbors by the light-years. I can imagine creatures evolving into glimmerings of knowledge on innumerable worlds, every one of them assuming at first their puny planet and paltry few suns to be all that is. We grow up in isolation. Only slowly do we teach ourselves the Cosmos.51

This is another lesson in interrelation: The notion of any kind of solitude is a preposterous one for Sagan. Partially this is because he nourished the hope, up until the end of his life, that other intelligences might be encountered.52 But not all of his argument hinges upon the existence of alien beings. He insists, as well, that the contemplation, not to mention exploration, of the extraterrestrial brings us closer to it, or at least extends our own imaginary Umwelt to such bounds that solitude simply no longer computes.

Learning the cosmos, moreover, which Sagan claims we are slowly doing as a species, is as much a matter of contemplation as of action. In a particularly evocative passage, Sagan compares the 3.6-million-year-old footprint of an early hominid found by Mary Leakey in Tanzania to a footprint left by astronauts in the Sea of Tranquility on the moon: “We have come far in 3.6 million years,” he asserts, “and in 4.6 billion and in 15 billion,”

51 Ibid., 4.
52 The SETI (Search For Extraterrestrial Intelligence) Institute, in fact, has a Carl Sagan Center for the Study of Life in the Universe. See “Carl Sagan Center,” SETI Institute Online, http://www.seti.org/carlsagancenter.
the approximate ages of the earth and the universe respectively. Further, he writes,

For we are the local embodiment of a Cosmos grown to self-awareness. We have begun to contemplate our origins: star-stuff pondering the stars; organized assemblages of ten billion billion billion atoms considering the evolution of atoms; tracing the long journey by which, here at last, consciousness arose. Our loyalties are to the species and the planet. We speak for Earth. Our obligation to survive is owed not just to ourselves but also to that Cosmos, ancient and vast, from which we spring.\(^{53}\)

The core of Sagan’s cosmic perspective consists much more of a belief in the wondering human than in any distinct vision of the cosmos. Sagan asks for nothing less than the ceaseless expansion of the human *Umwelt*, whether with telescopes, microscopes, or moon-shoes. Thus, although the stars may be marvelous, of primary importance is the ability to contemplate and wonder at them, and, prior even to this, the people that are able to contemplate and wonder. This star-fed wonder, as we will see in the next section, far from producing an indifference to the terrestrial, seeks to honor and protect the earth as cosmic exception.

5.4 **Precious Worlds/ Precarious Life**

The commitment to the earth and the human would not come as readily if Sagan did not also contend that life, not to mention intelligent life, constituted a relative rarity. But in space (given the sheer amount of emptiness one is likely to encounter) and time (given our own short life spans and the relatively short time the species has been in existence), just as with Wilson and Lovelock, Sagan repeatedly insists on the sheer luck involved in

an intelligent life form existing here and now. Sagan concludes, multiple times, that our existence is both extremely fortunate and extremely precarious, marveling constantly throughout Cosmos at the richness of this precarious life and that of which it is capable. This constitutes the seeds of an ethics to accompany his cosmic perspective. Sagan writes of our impermanence:

Compared to a star, we are like mayflies, fleeting ephemeral creatures who live out their whole lives in the course of a single day. From the point of view of a mayfly, human beings are solid, boring, almost entirely immovable, offering hardly a hint that they ever do anything. From the point of a view of a star, a human being is a tiny flash, one of billions of brief lives flickering tenuously on the surface of a strangely cold, anomalously solid, exotically remote sphere of silicate and iron.\textsuperscript{54}

In deep cosmic time, even more so than in deep ecological time, the duration of the human is hardly worth remarking upon. Like Wilson, Sagan insists on the importance of scale in our understanding of the species. But in contrast to Wilson’s profound anthropocentrism, where the human acquires a significance disproportionate to its time in existence as a life form, Sagan’s message is more humbling, and more in line with Lovelock’s: “We are like butterflies who flutter for a day and think it is forever.”\textsuperscript{55}

In space, as well, our existence is a relative anomaly. As obvious as it may be to the reader, Sagan points to countless permutations of the fact that that which extends beyond the earth exceeds, in size and quantity, anything to be found on it. He goes back to the beach for one comparison:

A handful of sand contains about 10,000 grains, more than the number of stars we can see with the naked eye on a clear night. But the number of stars we can see is only the tiniest fraction of the number of stars that are. What we see at night

\textsuperscript{54} Ibid., 177–78.
\textsuperscript{55} Ibid., 20.
is the merest smattering of the nearest stars. Meanwhile the Cosmos is rich beyond measure: the total number of stars in the universe is greater than all the grains of sand on all the beaches of the planet Earth.\textsuperscript{56}

As nearly infinitely numerous as these points of light might be, itself an overwhelming and wondrous fact, most of the cosmos is in fact empty. Simply locating a planet, however hostile and lifeless, is a challenging exercise. Sagan states this already at the beginning of Cosmos with one of his first dizzying statistics: “If we were randomly inserted into the Cosmos, the chance that we would find ourselves on or near a planet would be less than one in a billion trillion trillion (10^{33}, a one followed by 33 zeroes). In everyday life such odds are compelling. Worlds are precious.”\textsuperscript{57} The universe is simultaneously “rich beyond measure” and desert-like in Cosmos — rich because scientists are just beginning to conceive of the number and variety of entities that populate it, and desert-like because those entities are so few and far between. Though Sagan holds out hope that earth does not harbor the only life, he insists that it is exceptional in the vast reaches of space and time:

There are some hundred billion (10^{11}) galaxies, each with, on the average, a hundred billion stars. In all the galaxies, there are perhaps as many planets as stars, 10^{11} \times 10^{11} = 10^{22}, ten billion trillion. In the face of such overpowering numbers, what is the likelihood that only one ordinary star, the Sun, is accompanied by an inhabited planet? Why should we, tucked away in some forgotten corner of the Cosmos, be so fortunate? To me, it seems far more likely that the universe is brimming over with life. But we humans do not yet know. We are just beginning our explorations. From eight billion light-years away we are hard pressed to find even the cluster in which our Milky Way Galaxy is imbedded, much less the

\textsuperscript{56} Ibid., 161.
\textsuperscript{57} Ibid., 2.
Sun or the Earth. The only planet we are sure is inhabited is a tiny speck of rock and metal, shining feebly by reflected sunlight, and at this distance utterly lost.58

Sagan contends that we exist here and now against exceptional odds. If there is extraterrestrial life, he informs us, it will be far away, farther than we can easily imagine, and easily long dead or yet to come into existence. Life forms, like worlds, are precious for this astronomer with an astrobiological bent — precious because they are precarious, because they could so easily be overlooked in space and time.

This is a slightly different spin on Butler’s precariousness, based not necessarily on “an understanding of how easily life is annulled,”59 but how difficult it is to encounter in the first place. Butler has alluded to the idea that this precariousness might also “link human and nonhuman life in ethically significant ways,”60 claiming, “If humans actually share a condition of precariousness, not only just with one another, but also with animals, and with the environment, then this constitutive feature of who we are’ undoes the very conceit of anthropocentrism.” She goes on to propose “‘precarious life’ as a non-anthropocentric framework for considering what makes life valuable.”61

This shared precariousness-in-the-universe also links life “in ethically significant ways” for Sagan, although he is far from espousing any kind of elaborate anti-anthropocentrism.62 With all other creatures of the earth, Sagan claims, we share the indifference of the universe, neither “benign nor hostile”: “That

58 Ibid., 3.
61 Butler, “Antigone’s Claim.”
62 It can more accurately be called a kind of casual or instrumental anti-anthropocentrism. Sagan states: “If we are to survive, our loyalties must be broadened further, to include the whole human community, the entire planet Earth” (Cosmos, 283).
we live in a universe which permits life is remarkable,” Sagan proclaims, “That we live in one which destroys galaxies and stars and worlds is also remarkable.”63 One might draw parallels here to Gaia’s indifference, which also, paradoxically, becomes the basis of an ethic of care. The indifference of the cosmos, however, can be seen as even more profound, as it is not framed in any way as geared towards the preservation of life.

What this precariousness-in-the-universe entails, in the end, is a plea for non-violence with regard to the earth as much as with regard to fellow humans. Sagan states, “The Earth is a tiny and fragile world. It needs to be cherished.”64 As far as the human is concerned, even given the possibility that alien life may be encountered, Sagan states the following:

The Cosmos may be densely populated with intelligent beings. But the Darwinian lesson is clear: There will be no humans elsewhere. Only here. Only on this small planet. We are a rare as well as an endangered species. Every one of us is, in the cosmic perspective, precious. If a human disagrees with you, let him live. In a hundred billion galaxies, you will not find another.65

Sagan asks us to wonder at the precariousness of life, to contemplate the extinguishing of Umwelten and the affects that characterize them.66 That we exist at all, any of us, he reminds us, is also something at which to wonder. And his argument for pacifism, although it may sound hopelessly naïve, is statistically sound. Death, in the end, entails a loss of complexity and reduction in the range of affective registers for which the most breathtaking nebulae can likely not compensate.

63 Ibid., 205.
64 Ibid., 84.
65 Ibid., 283.
66 See also Sagan’s description of the death of the Sun and “the last perfect day on Earth,” followed merely by “an eerie radiance, the ghost of the Sun” (Cosmos, 188–89).
In *Cosmos*, which is remembered, oddly, for its optimism, Sagan provides us with a precursor to the dark ecologies emerging more recently in the twenty-first century, most notably from within the object-oriented ontology movement. 

67 Like the ecologies that will come later, the cosmic perspective “presents an image of the universe that is indifferent to our existence, without design, teleology, or built-in equilibrating mechanisms that will ineluctably save us from catastrophe.” 

68 This indifference, rather than merely allowing us to give up and give in to the indifference of the universe, “is intended to spur us to action.” 

69 As Levi Bryant, himself an avowed dark ecologist states, “black ecology reveals just how precious, rare, and precarious life is, reminding us that we have to fight hard to preserve it.” 

70 Sagan makes precisely the same claims, at least 30 years earlier, but does not explicitly offer them as a counterweight to the more optimistic ecosophies of the time. Still, in its emphasis on the vast emptiness of space and the miracle that there is something rather than nothing, let alone life, Sagan’s ecology is without question a dark one.

When Sagan is not concerned with the precariousness of life in the universe, however, he extolls the richness and potential of the forms of life we know. Although he does not mention Gaia
explicitly, he appears deeply impressed by the manner in which life regulates planetary systems, noting, for instance, that “99% of the Earth’s atmosphere is of biological origin. The sky is made of life.”71 The earth is constituted by the sum activities of its living inhabitants; small affects beget much, much larger ones. The terms he uses to describe macrobiological processes are much more vivid than a reader of more sober scientific literature on the subject may be accustomed to, and are on par, in their vitalist ring, with Lovelock’s own. Sagan writes, “What a marvelous cooperative arrangement—plants and animals each inhaling the other’s exhalations, a kind of planet-wide mutual mouth-to-stoma resuscitation, the entire elegant cycle powered by a star 150 million kilometers away.”72 It is evident from this description of the manner in which the earth’s gasses are maintained that he grants life an immensely powerful role. Although often threatened by the extraterrestrial, life is also in league with it. It is foolish to think that only the human enjoys an affective relation with the cosmos. The real difference between the human and the nonhuman is that the human may be fully cognizant of this relation—hence the unique capacity for wonder.

Despite Sagan’s baby steps towards a kind of anti-anthropocentrism, towards embracing the whole earth community, he devotes a large amount of energy to admiring the human and its potential. Here, he does not point to poetry or the achievements of the humanities but seems to examine the much more fundamental question, the Spinozan question raised in the first chapter, of what a body can do. And in the end, despite the fact of precariousness, the human, for Sagan, is more or less infinitely capable. The nature and ends to which this capability may be put, aside from, perhaps, “a fundamental redesign of economic, political, social and religious institutions,”73 remain largely mysterious, but one might point to three areas of inexhaustible human potential he explores.

71 Sagan, Cosmos, 22.
72 Ibid., 24.
73 Ibid., 272.
The first is the genetic reservoir granted to us by the universe. Sagan observes the following:

[T]he number of useful ways of putting nucleic acids together is stupefyingly large — probably far greater than the total number of electrons and protons in the universe. Accordingly, the number of possible individual human beings is vastly greater than the number that have ever lived: the untapped potential of the human species is immense.\footnote{Ibid., 25.}

Here Sagan presents us with a truly wonder-inducing biological non-essentialism: Who really knows what is possible with biology?\footnote{This quintessentially human non-essentialism is also to be found in early twentieth-century philosophical anthropology, for instance in Plessner’s notion of the eccentricity of the human. See Jos de Mul, “Artificial by Nature: An Introduction to Plessner’s Philosophical Anthropology” in \textit{Plessner’s Philosophical Anthropology: Perspectives and Prospects}, ed. Jos de Mul (Amsterdam: Amsterdam University Press, 2014), 11–40, at 17.} We can never really know the limits of the human, because the permutations of the species are inexhaustible. Certainly, this could constitute a rallying cry for any species, but, as far as we know, only the human is capable of thinking this thought. Because we cannot know the limit of the human, we also have no way of ascertaining the boundaries of the human \textit{Umwelt}, nor of ascertaining which affects are proper to us, if one can even speak of “proper affects” in the first place. As with many references to the infinite, this constitutes a kind of higher order of wonder, not geared toward the realization of any novel affects in particular, but toward the realization of their inexhaustibility.

The second area of human potential lies with the ability to contemplate the infinite and nearly infinite. Sagan notes when discussing the googolplex (ten to the power of one hundred, or effectively infinity): “A piece of paper large enough to have all the zeroes in a googolplex written out explicitly could not be stuffed into the known universe.”\footnote{Sagan, \textit{Cosmos}, 181.} Mathematics, if nothing else, pushes
the boundaries of the imaginary Umwelt; the ability to conceive of the infinite means, at some level, that one is no longer bound by Uexküll’s soap bubble. One should not, of course, confuse an infinitely large imaginary Umwelt with an ability to conceive of the Umwelten of other creatures. Sagan is not exactly firm on this point, often preferring to gesture towards a dizzying expansiveness and our united precariousness in it than the various ways in which the inhabitants of the earth endanger one another.

Finally, Sagan alludes time and time again to the unplumbed depths of human curiosity and insatiable drive to explore. This is something that far exceeds our more familiar capacities as organisms:

[A] fertilized egg takes as long to wander from the fallopian tubes and implant itself in the uterus as Apollo 11 took to journey to the Moon; and as long to develop into a full-term infant as Viking took on its trip to Mars. The normal human lifetime is longer than Voyager will take to venture beyond the orbit of Pluto.77

If space exploration is not “going beyond the organism,” in the sense referred to by Buchanan and Deleuze and Guattari, then nothing is. “This is how far we’ve come,” Sagan seems to say again and again, and he consistently advocates going further. As a NASA romantic, he is an advocate of the ceaseless expansion of the human Umwelt. Every new landing, every stride made beyond the tiny fraction of space known intimately, involves a renewal of wonder and becomes renewed proof of the capacity of the human.

Whether or not Sagan intends it, this involves a much more enterprising view of the human than Wilson and Lovelock put forth. For Lovelock, humans are just another organism on Gaia, albeit with the capacity to marvel at her. Wilson, in turn, advocates a kind of conservationism to nourish the human capacity for wonder at life and the life-like. Sagan alludes only obliquely

77 Ibid., 113 (asterisked note).
to such earthly concerns. *Cosmos* is not so much about the exploration of nonhuman *Umwelten*, but the relentless, both wonderful and terrifying, expansion of our own. Put more reductively, Wilson gives us a species nourished by affective relations with nonhuman life, Lovelock endows the earth with affects in which we cannot help but take part, and Sagan gives us a species nourished by affective relations with the stars (although he, too, held out for the possibility of life there).

5.5 Numinous Science: Cosmos and the Sacred

It is difficult, particularly when confronted with shots of Sagan grinning, eyes closed but directed towards the heavens, to resist associating the cosmic perspective with a certain religiosity. The Ship of the Imagination resembles not a cockpit crowded with instruments, but a cathedral, with a console where the pulpit should be. Sagan is positioned as priest or minister, and the entire television audience as congregation.78 Among the cliffs on the California coast, one cannot help but hear *The Cosmos is all that is or ever was or will be* and the subsequent description of the “tingling in the spine, a catch in the voice, a faint sensation, as if a distant memory, of falling from a height” when “approaching the greatest of mysteries”79 as the beginning of a sermon. These scenes, as well as some very incisive contemporary criticism (which I will turn to shortly), beg the question: Does *Cosmos* present us with a vision of an exalted or an immanent science? Does its capacity to reenchant lie merely in aping the structure and rhetoric of religion, or does it indeed offer a kind of secular reenchantment?

78 The 2014 remake of the series featured a redesigned Ship of the Imagination, in which one looks down, rather than up, into the universe with guide Neil deGrasse Tyson, as if into a well.

Sagan was himself not at all clear about when wonder slips into worship. In *Pale Blue Dot*, for instance, written near the end of his life, his criticism of religion is not that it posits the existence of a transcendental realm, but that the transcendental it posits is too small:

In some respects, science has far surpassed religion in delivering awe. How is it that hardly any major religion has looked at science and concluded, “This is better than we thought! The Universe is much bigger than our prophets said, grander, more subtle, more elegant. God must be even greater than we dreamed”? Instead they say, “No, no, no! My god is a little god, and I want him to stay that way.” A religion, old or new, that stressed the magnificence of the Universe as revealed by modern science might be able to draw forth reserves of reverence and awe hardly tapped by the conventional faiths. Sooner or later, such a religion will emerge.80

It is tempting to conceptualize the cosmic perspective as precisely “such a religion,” but here I will argue against it. Although scholars and critics from the 1980s were eager to frame *Cosmos* as “an attempt to ground science in a higher order, to place science within the realm of the sacred, and consequently remove it from the banalities of profane existence,”81 this ignores the extent to which Sagan uses science to rob profane existence of its banality, to place the earth in the heavens.

This does not mean, however, that there are no holy or sacred dimensions to the cosmic perspective. By insisting that everything is of the heavens, Sagan, in fact, banishes profane existence altogether. It is helpful here to consult Rudolf Otto’s formulation of the holy or the sacred (*das Heilige*) to understand the way in which a scientific perspective is even compatible with the sa-

vital reenchantments

cred. For Otto, the sacred does not merely designate that which is morally good, but also includes a “clear overplus of meaning,” which he identifies as the “numinous”: that which “cannot, strictly speaking, be taught, it can only be evoked, awakened in the mind.” He continues, “the nature of the numinous can only be suggested by means of the special way in which it is reflected in the mind in terms of feeling. Its nature is such that it grips or stirs the human mind with this and that determinate affective state.”

The numinous as Otto understands it is akin to the virtual, or the infinity of becomings that are possible. There cannot, then, be any one relation to the numinous or a way of knowing it objectively; it is perceivable in one’s own relation to it. And one’s relation to it, as Otto frames it, is very similar to wonder: “creature-feeling” describes one aspect, in which the creature is “overwhelmed by its own nothingness.”

“Mysterium Tremendum” describes another, which “may at times come sweeping like a gentle tide […] the hushed, trembling, and speechless humility in the presence of — whom or what? In the presence of that which is a Mystery inexpressible above all creatures.”

If one tallies up the number of references to the effectively infinite and the unlikelihood or smallness of life on earth, not to mention invocations of mystery in Cosmos, there is a lot of creature-feeling and mysterium tremendum. One cannot deny that Cosmos speaks not merely to the finite and knowable, but just as, if not more, to the numinous. From this perspective, the cosmos is indeed sacred.

But does the prominence of the numinous in Cosmos imply that the cosmic perspective is a kind of religion, albeit a scientific one? Perhaps the most sustained criticism of Cosmos’s supposed religious bent has come from communications scholar Thomas Lessl. In a 1985 article entitled “Science and the Sacred

83 Ibid., 5, 7.
84 Ibid., 12.
85 Ibid.
86 Ibid., 13.
Cosmos: The Ideological Rhetoric of Carl Sagan,” he distinguishes between Sagan the scientist, who adheres to the “dominant mechanistic model of nature” and Sagan the cosmologist:

When Sagan the cosmologist speaks, a different set of epistemic principles seems to be in force. Suddenly, through the subtle suggestiveness of metaphor, Sagan breathes life into the formerly dead machine universe, transforming it into a self-determining, purposive cosmos. The fact that this vitalism is given to nature through deliberate metaphor is important. The ambiguity of figurative speech allows Sagan the capacity to transgress the more rigid forms of scientific description. 87

Lessl neglects to explain why the mechanistic model of nature is the only appropriate model for science, as well as what exactly about Sagan’s cosmos is purposive. That Sagan’s cosmos is to a large extent self-determining and populated with living bodies is, however, consistent with my own reading. As evidence of Sagan’s vitalism, Lessl points to his discussion of the lifecycle of a star, which includes an “adolescence,” and the use of oceanic metaphors for the universe. 88 But we are never told by Lessl how this vitalism renders the cosmos purposive or transcendental. I would argue that this light vitalism actually allows the cosmos to seem more accessible to the reader. When Sagan declares that “The Earth is a place. It is by no means the only place,” 89 he announces the cosmos as no more elusive than our terrestrial reality.

Four years later, in 1989, Lessl published another article examining Cosmos as religious testament or artifact—“The Priestly Voice.” 90 Here, Lessl distinguishes between the bardic and priestly voices, explaining, “Whereas we think of the bard

88 Ibid.
89 Sagan, Cosmos, 2.
as one submerged in the culture of his or her audience, the priest mediates a configuration of symbols and a conception of reality that for the most general audience is at once both near and remote.”

He goes on to describe the priesthood as “given an elite status as well as a formative role in creating a particular society’s existential consciousness.” The priestly voices stand apart from everyday experience, while Bardic communication takes ordinary experience as its subject. And while “the bard’s communication is lateral, extending across the well-traveled highways of a cultural milieu,” speaking “to the profane dimension of human experience,” the priestly voice is “largely vertical, descending from above as an epiphanic Word, filled with mystery and empowered with extra-human authority.”

In which voice, then, does Sagan speak?

Unsurprisingly, Lessl makes the case for Sagan as priest: “By virtue of his ability to give audiences the perception — some would call it the illusion — that they can understand science, Sagan is a master of priestly communication.” Spun this way, Sagan speaks on high from the pulpit of the techno-scientific elite. In a 1980 review of the series, David Paul Rebovich also points to Sagan’s exalted status: “The answer to the question ‘Who Speaks for the Earth?’ [posed by Sagan in the series] is the scientist. The scientist is the exalted pursuer of knowledge and the witness for the paramount values and aspirations of mankind and, for that matter, any rational species.” He continues, “Sagan wants to explain how man is ultimately connected to the universe, and it is science that teaches man this special knowledge.” Science here is at least part sacred order, and Sagan is one of the initiates generous enough to impart to us some of its knowledge.

91 Ibid., 183–84.
92 Ibid., 185.
93 Ibid.
94 Ibid., 189.
96 Ibid., 94.
Yet, Sagan also speaks from the televisions in our living rooms as he wanders the northern California coast; there is something of the bard in him.\textsuperscript{97} I acknowledge that there is a priestly aspect to Sagan, but, particularly in the more affective parts of \textit{Cosmos}, there is more at work. In his capacity as “prince of popularizers,” Sagan does not merely administer science like so many sermons. Science serves, rather, to expand the boundaries of our own world and draw attention to the degree to which we are of the universe. When Sagan tells us that we are made of star stuff, it may have a theological ring, but in practice, he places the human and the stellar on the same plane and establishes a relation between them. With regard to the universe, there is nothing like the obedience, discipline, or piousness traditionally associated with religion.\textsuperscript{98}

At the end of his essay, Lessl begins to move to an understanding of popular science as a hybrid discourse:

To popularize is not merely to make science suitable for the people; it is also to make the people suitable for science. Rather than conceiving of public science as the popularization of technical knowledge, we might better conceive of it as the scientization of popular consciousness. Popular treatments of science do as much to bring people to the scientific domain as they do to bring science to the people.\textsuperscript{99}

This, finally, begins to do Sagan and his immense popularity justice. It is not merely that he as a privileged actor was able to impart (the impression of) privileged information. \textit{Cosmos} does as much to teach us about our place in the universe as it prepares us to occupy this place—not just describing Earthlings, but invoking them. To do this, Sagan must be both priest and

\textsuperscript{97} Lessl even points to Fiske and Hartley’s characterization of television as “the modern bard” ("The Priestley Voice," 184).


bard, bounded by an electronic nutshell and simultaneously a king of infinite space.

Perhaps in the discussion of the sacred and profane, the priest and the scientist, it is wise to return to the concept of the cosmos itself. Sagan describes it as “the deep interconnectedness of all things,”\textsuperscript{100} but Latour also points to its less neutral, Platonic meaning: “the well-formed collective.”\textsuperscript{101} For Latour, the composition or becoming of the cosmos is an unending task in which science plays a crucial role.\textsuperscript{102} Why not, then, view Sagan’s 	extit{Cosmos} as a particularly bold attempt to invoke a people and a collective? The wonder that 	extit{Cosmos} transmits and instigates is no reverence for a higher celestial plane, but the recognition, again and again, of the infinite forms collectivity can take.

5.6

The Ship of the Imagination assists Sagan in composing a cosmos, in positioning the human in a community far bigger than ever thought possible, but so, too, do the very real Voyager spacecraft. For the short time that the spacecraft did operate as probes, they revealed more effectively than anything before and perhaps since just how tiny our sector of nature was and is. One series of photographs, in particular, stands out in this regard, taken in 1990 when Sagan requested that Voyager take “one last glance homeward” just after flying past Saturn.\textsuperscript{103} Sagan would write an entire book towards the end of his life named after the resulting composite photograph — Pale Blue Dot.\textsuperscript{104}

\textsuperscript{100}Sagan, 	extit{Cosmos}, 10.


\textsuperscript{102}Ibid., 102.

\textsuperscript{103}Sagan, 	extit{Pale Blue Dot}, 10.

Pale Blue Dot is the counterpoint to the Blue Marble photograph, with the earth visible only as “lonely pixel,” indistinguishable from “the luminous dots” that are the other planets and distant stars. They are two planetary selfies, taken eighteen years apart. Pale Blue Dot is, however, less self-obsessed — a luminous point taking more of a family portrait. Only an accident of light, the sun reflecting off one of Voyager’s surfaces, marks the earth — it “seems to be sitting in a beam of light, as if there were some special significance to this small world.” Sagan is quick to sternly remind us that “it’s just an accident of geometry and optics.” He continues:

Our posturings, our imagined self-importance, the delusion that we have some privileged position in the Universe, are challenged by this point of pale light. Our planet is a lonely speck in the great enveloping cosmic dark. In our obscurity, in all this vastness, there is no hint that help will come from elsewhere to save us from ourselves.

The Earth is the only world known so far to harbor life. There is nowhere else, at least in the near future, to which our species could migrate. Visit, yes. Settle, not yet. Like it or not, for the moment the Earth is where we make our stand.

It has been said that astronomy is a humbling and character-building experience. There is perhaps no better demonstration of the folly of human conceits than this distant image of our tiny world. To me, it underscores our responsibility to deal more kindly with one another, and to preserve and cherish the pale blue dot, the only home we’ve ever known.

The Pale Blue Dot photograph humbles and reveals definitively that what we know and experience is comparably little. But it also makes a better case, arguably, for the ecological than the

106 Sagan, Pale Blue Dot, 12.
107 Ibid., 12.
108 Ibid., 13.
Blue Marble image. With earth as a “mote of dust suspended on a sunbeam,”\textsuperscript{109} one is not overwhelmed by the greenness and swirling clouds that have come to mean life to us; there is no sublime beauty that provides an aesthetic impulse to protect life. Pale Blue Dot reveals our tinyness, our precariousness in time and space, and makes it clear that “the Earth is where we make our stand.” Sagan writes, “Look again at that dot. That’s here. That’s home. That’s us,”\textsuperscript{110} and it would not be out of place if he added, “That’s it.” It is a powerful antidote to the disenchantment narratives that claim an exaggerated power and place for the human.

The Voyager spacecraft are strange vehicles now. They carry no one, no longer relay back pictures, and by roughly 2025 will no longer relay back anything at all.\textsuperscript{111} Hurtling through space towards nowhere in particular, the spacecraft, carrying the Golden Records which play the sights and sounds of the earth, will outlast not only all of us but also our small planet:

Billions of years from now our sun, then a distended red giant star, will have reduced Earth to a charred cinder. But the Voyager record will still largely be intact, in some other remote region of the Milky Way galaxy, preserving a murmur of an ancient civilization that once flourished — perhaps before moving on to greater deeds and other worlds — on the distant planet Earth.\textsuperscript{112}

The Voyager spacecraft are the affects of the earth set loose. This is their legacy in deep time and deep space — not to conquer and humanize the extraterrestrial, but to bring human sentiment to the vacuum of space.

\textsuperscript{109} Ibid., 12.
\textsuperscript{110} Ibid.
\textsuperscript{112} Sagan, “Preface,” 42.
The Voyager spacecraft are the cosmic perspective in action. They fly on, at once proclaiming the universe’s vastness and indifference and the richness and precariousness of earthly life. Here, I have explained how the probes and the Golden Record themselves embody the cosmic perspective and sentimentality that Sagan will go on to describe more fully in *Cosmos*. The focus on the cosmic within the series does not mean an automatic orientation towards the global, as one might assume, but rather focuses on local, affective connections to the stars. At times, Sagan’s proclamations about the individual relation to the cosmos seem like those of a privileged initiate to followers of a religious order, but what *Cosmos* offers, like *Gaia* and *Biophilia*, is a vision of an immanent science. It asks for a recognition of the human *Umwelt* as precisely that, a subjective world, and attempts to reveal the pleasure of exposing our own “small sector of nature” to the elements. *Cosmos* is an affective ecology for deep time and deep space.