

RELIGION'S HEAT DEATH PROBLEM

Unitarian-Universalist Church of Roanoke

Non-Theist group

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I. PRELUDE

In my moments of despair about the human race, my thoughts often drift to the possibility of conscious and intelligent life **elsewhere** in the universe. If we can't pull it off, maybe they can. The universe, after all, appears to be life-promoting. The processes from which life emerges appear to be ingrained in the physical and chemical properties of matter. If we make the eminently reasonable assumption that there is life elsewhere, what does that say about widely-held religious beliefs of Earthlings? Will life last forever? If it doesn't last forever, why does it come about in the first place?

II. RELIGION BEYOND THEISM

There are a number of **non-theistic** ways of thinking religiously about the universe. For example, one way is to contemplate that occurrences of life and consciousness, and even important parts of human culture like ethics, are not an accident, but are hidden in seeds of the universe's makeup. Let me explain what motivates *me* to this view.

From bees to birds and all higher organisms, we readily recognize instincts throughout Nature for self-sacrifice devoted to protecting offspring. We also recognize the intense interest in human society to imaginatively, freely, and morally develop this protective instinct beyond family, beyond tribe, beyond nation, and on to the entire human race, and even to all living things as in Albert Schweitzer's philosophy of Reverence for Life. I believe such noble aspirations of humanity are a reflection of our advanced *natures*, and are quintessentially religious.

To explain my more expansive sense of religion, consider PANTHEISM, which popularly identifies God with the physical universe, but effectively eliminates any traditional concept of a God apart from and above the physical world. Einstein's pantheistic God, he said, is the god of the 17th Century philosopher Spinoza, which is identical to the strictly deterministic and intellectually intricate physical laws that govern the world.

Is Nature itself fundamentally intelligent, and even imaginative? I agree with physicist extraordinaire Paul Davies **who concludes that the universe is indeed disposed to promote life and consciousness.** I suspect there are many physicists like me who would agree with him: There appears to be a sort of intelligence inherent in Nature. It is manifested in processes that are sometimes destructive, sometimes creative. In this way, Nature appears to *thrash* through possibilities for higher development much like we see in biological evolution—two steps forward, one step back. Seen mathematically, Nature presents us with puzzles that are very complex, intricate, and indeed intellectually beautiful. Studying and learning about Nature has aroused in me the experience of encountering an intelligence! This is an astounding thing! I never sought this experience—it came to me.

Perhaps this super-human cosmic "mind" is sentient, but probably not; perhaps personal, but (as Einstein believed) almost certainly not; perhaps especially caring for human beings but almost certainly not, ...etc., etc. But when the universe's behavior is analyzed from a scientific, particularly a mathematical, perspective, there is a strong impression that there is an intellectual character in it that summons us to wonder and to indulge in the intellectual pleasure from its contemplation if you have that kind of orientation.

Is there any *purpose* in Nature's working? Purpose and deliberation are central to the human experience, and it would be surprising if there were absolutely nothing of a teleological (Aristotelian) character like "purpose" or at least **PROGRESS** in natural phenomena, despite most biologists' antipathy to this idea. The *de facto* progress in organization and consciousness is a most baffling and wondrous thing. **The question can be put this way: Are humans the most successful attempt on Earth of Nature's effort to know itself, to be self-conscious?** (This idea comes from the late great physicist John A. Wheeler.)

A more recent strain of non-theistic religion is known as "Religious Naturalism," wonderfully described in biologist Ursula Goodenough's beautiful book *The Sacred Depths of Nature* (1998), and the more recent books by another biologist, Stuart Kauffman, in his technical book *The Origins of Order* (1993) and less-technical books *At Home in the Universe*, *Investigations*, (2000), and *Reinventing the Sacred* (2008). For Kauffman, the "sacred" is the inherent creativeness of natural processes. (*Reinventing*, p. 283.) For Goodenough, the "Epic of Evolution" is sacred in itself.

In the discussion to follow, I will talk about the “Heat Death” implications of the 2nd Law of Thermodynamics not just for theistic religions, but also for pantheism and religious naturalism. Before starting, let me tell you a short story about an encounter with the 2nd Law.

II. A PERSONAL STORY ABOUT THE 2ND LAW OF THERMODYNAMICS

If you know just a little biology, you know that even the simplest bacterium is extremely complex. Proof of Intelligent Design? Well, by God NO!—oops, I mean By Darwin, NO! But this claim was made by a fundamentalist minister I debated a while back at Salem High School.

Says the minister: “The 2nd Law of Thermodynamics shows that everything gets more disorderly with time. But life is exquisitely orderly—IT VIOLATES THE LAWS OF PHYSICS, SO WE NEED GOD TO PRODUCE LIFE!!”

Reality: 2nd law applies only to isolated systems; Earth isn’t isolated: it constantly gets energy from sun, because the sun is hotter than Earth. Indeed, if you look carefully, you see that temperature differences are important for life and even industry—nuclear and coal-fired power plants must drain heat to something cooler to work properly.

III. A REALLY SHORT DESCRIPTION OF THERMODYNAMICS

1st LAW OF THERMODYNAMICS: “*Heat,*” in the vernacular, is one of many forms of energy (technically, “thermal energy”).

2nd LAW OF THERMODYNAMICS: There are many forms of it (**all of which apply only to isolated systems!**), that are seemingly different but really equivalent. One of the joys of studying thermodynamics is to see how all the seemingly different forms are equivalent. (You have to use mathematical and modular arguments to do it.) Everybody knows the simplest form of the 2nd Law:

(1) *Heat flows from hot to cold, never the reverse.* You know when you put an ice cube in water, the ice cube melts and cools the water; heat never flows from ice cube to water and heats the water up.

Other forms:

(2) *Disorder always increases.* That’s a kind of picky one because disorder must be carefully defined mathematically.

(3) *A perpetual motion machine is impossible. When enough time passes, **everything in the machine and the isolated system eventually reach the same temperature.*** This is the

classic heat death talked about in the 19th Century before the expansion of the universe was discovered.

A most important CONSEQUENCE of the 2nd Law for our purposes: *If you wait long enough (much longer than the current age of the universe), different energy forms in an isolated system eventually degrade into the “lowest” form, heat, and over enough time everything has the same temperature.*

IV. THE HEAT (COLD) DEATH OF EARTH, SOLAR SYSTEM, AND UNIVERSE

When all energy forms in an isolated system eventually come to the same temperature, there is nothing to drive any machine or organism. This is the “heat death.” In the solar system and universe at large, not only does everything eventually reach the same temperature, but because the universe expands, the common temperature drops towards absolute zero, the lowest possible temperature. A more appropriate term, therefore, is the “cold death” which I will use frequently.

There are three aspects to the issue:

- (1) The finite time for life to thrive in our solar system. (Some think this is about 5 billion years—the remaining lifetime of our sun—but when the sun’s evolution is considered, Earth life has “only” about 300 million to a billion years);
- (2) The likelihood of life elsewhere and what that means for religion; and
- (3) The likelihood of life throughout the universe being totally extinguished in hundreds of billions of years and the possibility that life can nonetheless continue, possibly forever.

V. IMPLICATIONS OF SOLAR/UNIVERSAL HEAT (COLD) DEATH FOR VARIOUS RELIGIOUS SYSTEMS

Let us look at the implications of solar or universal Heat (Cold) death for various religions systems, starting with **Apocalyptic Christian Fundamentalists**.

(1) Apocalyptic Christian fundamentalists

(a) Solar Cold

The material aspects of existence tend to be denigrated—the focus is on the purely spiritual afterlife. Bye-bye *homo sapiens*. But so what? The soul survives! Paradise awaits! It’s all in “The Plan.” The sooner the better! (Very un-Biblical!)

(b) Universal Cold

Ditto.

(2) **Liberal (mainstream) Christians** (the vast majority of Christians). I want to focus especially on scholars of Natural Theology, which is the investigation of what Nature can tell us of God's character.

(a) Solar Cold

The end of the Solar System and human life on it suggests, if the creation at large is "good," that there should be extraterrestrial life at least as developed as humans. So let's look at the implications of extraterrestrial life for religion.

1. Detection of Messages from Extraterrestrial Life. As Paul Davies discusses in *Are We Alone?*, the detection of messages from intelligent extraterrestrials, or appearance of them on Earth, pose special problems.

(i) Are the extraterrestrials human just like us with all our grandeur, foibles, faults, and self-destructive behavior? Or are they moral splendors?

(ii) (Again from *Are We Alone?*, pp. 45-48), God is understood to intervene in human affairs. **The most important intervention by far is the incarnation of "The Son of God," which ascribes to God an essential humanness.** (Wisniewski, *God Hides*, p. 103.) **This incarnation is ultimately for the purpose of renewing and perfecting the entire creation (including the material world) in preparation for the Kingdom of God.** (See Albert Schweitzer, *The Kingdom of God in Primitive Christianity*.) If there are intelligent extraterrestrials, has intervention by incarnation been done for them too? If so, how does this square with the Bible?

(iii) Are they super-human (as they would need to be to get even a message to us), appearing like gods to us puny humans? (This phenomenon has been observed by anthropologists to occur for primitive people upon first encountering modern people.)

(iv) If the extraterrestrials are superhuman as they likely would be, *would they have an extremely advanced science and religion/philosophy that would dominate us and put our religious faith to shame? Or, by some incredible stretch, would they have the same beliefs?*

(v) Miraculous phenomena (Again from Davies). Are many of the so-called *miraculous phenomena* reported in the Bible and other sacred texts just encounters with extremely advanced god-like natural beings?

(vi) Extraterrestrial Souls? Suppose intelligent human-like aliens make machines which are as intelligent, conscious, and emotional as human beings. (They would easily pass a Turing Test—I dissent from this view, because the machines would likely be digitally or discretely operated, not analog machines). Suppose also that the machines follow their creator's example and create new machines more advanced than they are. It is these machines which would most likely survive a trip through space and make an appearance before us. *Do these very advanced machines have souls?*

(b) Universal Cold (hundreds of billions of years, much longer than the age of the current universe.)

(1) Why Life? Literal belief in the creation's goodness implies that life in the world, whether Earthly or extraterrestrial, should continue, but all that we know of astrophysics argues against it. Why, then, should we have life? Theistic religions try to make sense of the world, but if life vanishes, there is no sense to it.

(2) Resurrection After Death. The belief that Jesus' body rose from the dead and "ascended" into heaven is extremely significant for Christians as proof that life triumphs over death. So where is Jesus' body? (Wisnefsky, *Ibid.*, p. 106). If in "heaven," then heaven is not just spiritual. What are the theological implications of this? Does the body of Jesus live? Or go into deep freeze with the rest of the universe?

(3) **Religious Naturalism**(a) **Solar Cold**

1. **Kauffman**. Stuart Kauffman ignores the solar heat death completely, but focuses on the immediate threats we pose to ourselves, and hopes that his reinvention of the sacred can be adopted more widely for our ultimate benefit.
2. **Goodenough**. Ursula Goodenough resigns herself to an end of it all. She says towards the end of her book that life is “a sacred circle that requires no further justification, no Creator, ...no purpose other than that the continuation continue until the sun collapses or the final meteor collides.” (p. 171) Towards the beginning of the book, Goodenough talks poignantly of the “**nihilism** that lurks in the infinite and the infinitesimal,” and despairs of answering the “big questions.” *She instead finds solace in resignation before the conflicting tendencies of Nature and focuses on the experience of the mystery and awe of the natural world as it is, which believe to be an essentially religious experience.*

(b) **Universal Cold**:

1. **Kauffman**. As mentioned, Kauffman ignores the heat death *per se*. Instead, towards the end of *Investigations*, he speculates, as a quick aside, that energy in the vacuum of space might be tapped. He’s an inveterate optimist and totally avoids the issue in *Reinventing the Sacred*.
2. **Goodenough**. As mentioned, Goodenough despairs of answering the big questions, including the Universal Cold.

(4): **Pantheistic Intelligence**: (Spinoza/Einstein/Davies)(a) **Solar Cold**

1. **Einstein, *Cosmic Religion***: Human desires are a vanity. Strict determinism governs the behavior of the universe. Time doesn’t even have a preferred direction (all the microscopic laws of physics are time-reversal-invariant, with a very teeny-weeny exception unknown to Einstein). So forget about what happens in the future.
2. **Davies, *The Cosmic Jukebox* and many other books**: Davies just takes this as a given that life will end in the solar system.

(b) Universal Cold

1. Einstein: In the universe at large, Einstein is not concerned—he died in 1955 before the Big Bang was discovered. Nature is of value in itself. Humans are insignificant.

2. Davies: For Davies: no way out, unless physics discovers some new source of energy, e.g., from the vacuum of space that can be tapped.

(5) **Buddhist and Hindu systems**(a) Solar Cold

I have no idea.

(b) Universal Cold

Hindu cosmology is cyclical, as the physical universe might also be. I have no idea how Buddhist thought would address this issue. (A cyclical universe was recently proposed as a possibility by University of Pennsylvania cosmologist Paul Steinhardt, one of the founders of the well-known “Inflationary theory of the Big Bang.” Steinhardt now believes that inflationary theory as currently formulated has serious flaws.)

VI. ANY WAY OUT? COSMOLOGICAL SPECULATIONS GALORE

So, is there any way out of the heat death of the universe? Maybe, maybe not—there are cosmological speculations galore. I just mentioned one, the cyclical universe, though it’s not comforting to think that everything ends in a “Big Crunch.” Who knows what would come out of it? Here are two more hopeful speculations.

(1) Freeman Dyson (in his 1979 *Reviews of Modern Physics* article “Time Without End”) believes like many that consciousness and sentience depends only on structure, not what makes up the structure: “Then,” he says, “life is free to evolve into whatever material embodiment best suits its purposes.” As the universe cools, two things can happen: (1) thought processes speed up—Dyson actually proposes a plausible physical theory for this far-out idea; and (2) to replenish energy as the universe cools, the “organism” goes into longer and longer periods of hibernation while storing up energy from its very low-temperature surroundings to live another day. The organism lives forever (at least psychologically).

(2) Davies, *The Last Three Minutes* (1994) and *The Cosmic Jackpot* (2007): There is no way out, unless physics discovers some new source of energy, e.g., from the vacuum of space, that can be tapped.

VII. CAUTION: COSMOLOGY IS IN ITS INFANCY

The current rage, excessively hyped by *Scientific American* and other such semi-popular publications, consists of far-out ideas about parallel universes, multiverses, and the like. (Speculation is vital to science, but the hype is not!) As just mentioned, one foundation of Big Bang Theory, inflation, is now in deep trouble. Cosmology is a very young science!

For perspective, consider thermodynamics, initially formulated in an elementary but very useful way almost 200 years ago, when only equilibrium situations were well-described. Non-equilibrium thermodynamics, the next development, dates back to about 1931, and this new extension didn't really achieve a developed form until after World War II. Even then, only small deviations from equilibrium were theoretically explained. Starting in the 1970s, thermodynamics was again extended to include systems far from equilibrium, giving rise to the extremely important phenomenon of self-organization, which is a thriving and very hot field of investigation today.

Cosmology is much younger than thermodynamics. It is a very dynamic science, and we can expect many surprises and revisions of existing ideas in the future. In particular, the thermodynamic theory of the universe and implications for its behavior are a still-to-be-completed project. For example, the entropy of gravity remains to be clarified and likewise for global energy conservation in general relativity.

Many mysteries remain and may never be solved by *our species*!