

# ***Creationism Debunked by Science and Reason***

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## **Preface**

This text was initially prepared under the title "An Atheist Critique of Pandeism," an invited chapter for *Pandeism: An Anthology*, (John Hunt Publishing, 2016). The critique applies equally to creationism in general, and is presented here for readers whose interests lie beyond pandeism.

Pandeism posits a creator-deity that became the universe itself upon its creation. As such, it is perhaps the most elemental creationist theology, sidestepping anti-evolution, "intelligent design," and other post-creation arguments favoring religion.

In debunking pandeism by means of recent findings in cosmology and astrophysics, this reader-friendly article for the intellectually curious non-scientist also effectively debunks all forms of theistic creationism.

In doing so, it convincingly exposes the falseness of supernaturalism, regardless of which religion is its partner in delusion.

## **An Atheist Critique of Pandeism**

A complete definition of pandeism may be found elsewhere in this anthology. For the purpose of this critique, I will use this definition from Wikipedia: *The belief that a creator deity became the universe and ceased to exist as a separate and conscious entity.*<sup>1</sup>

As such, pandeism is a presuppositional theory attempting to explain the beginning of existence, the presupposition being that existence had a beginning at all. Here, "existence" is differentiated from "the universe," and the Big Bang is differentiated from "the beginning of existence," as will be discussed below.

My view that pandeism is an erroneous theory rests on three contentions, which I shall elaborate:

1. There is no evidence that a creator deity ever existed.
2. Pandeism is not compatible with science.
3. Pandeism, like ordinary theism, arises in part from the human inability to fathom the dimensions of infinite time and infinite space.

Virtually every human culture in history has invented religions, deities, afterlife myths, and creation myths to explain the mysteries they encountered in their time. Harvard biologist E. O. Wilson estimates that over the past 60,000 years humans have devised roughly 100,000 religions based on roughly 2,500 gods.<sup>2</sup> The great majority of these religions are now extinct, having no

contemporary adherents. The religion of the ancient Greeks, which is now taught in educational institutions as “Greek Mythology,” is the extinct religion perhaps best known to our readers.

Pandeism differs from today’s popular religions in that the deity is no longer believed to exist in a conscious or active form. Hence, it is not a personal god with whom the faithful may communicate via prayer and other channels. Pandeism does, however, hold that a conscious deity once existed that imbued the universe with its intelligence and other sentient qualities.

A problem that pandeism shares with other religions is that no empirical evidence has been found by scientific means that any deity has ever existed. The major extant religions rely on purportedly divinely inspired “holy books” as proof of the truth of their beliefs, which is fallacious circular logic. (I recall a cartoon photo of a paper table napkin with the hand-written inscription, “The napkin religion is the one true religion because it says so here on this napkin.”)

A listing of over fifty religions and their sacred texts may be found at the Wikipedia page on religious texts.<sup>3</sup> Of course, not all these religions can be true, since many of their doctrines are mutually incompatible – for example, some are monotheistic whereas others are polytheistic. And, not all their holy books could possibly have been divinely created, since different (and often disagreeing) gods are believed to have inspired them. Clearly, at most, only one of these religions can possibly be entirely true. Further, if all but one are not true, as logic dictates, then it is likely that none are true. After all, how confident can a believer be that one’s religion, being one of many thousands, happens to be the one true religion considering the fact that no religion is supported by any empirical evidence whatsoever? Therefore, all but the most fundamentalist believers recognize the fallibility of so-called sacred texts as evidence of the factuality of their beliefs.

Of course, pandeism has no divinely inspired sacred text, and so its adherents’ faith in the creator deity is based on other premises. Their worldview depends on *a priori* principles of pure (intuitive) reason to derive their belief that a creator deity once existed, and then the deity became the universe itself. The history of philosophy is littered with the carcasses of beliefs derived through pure reason, the most famous of which may be certain elements of Kantianism itself, the philosophy of Immanuel Kant who originated the term “pure reason” in 1781 (six years before “pandeism” would first be mentioned, by one of Kant’s own countrymen). For example, Kant believed in God only to the extent that he reasoned that morality deductively *requires* belief in God.<sup>4</sup> Secular humanists vigorously assert, with overwhelming supporting evidence, that morality and social ethics are untethered to religious belief, and indeed are regularly practiced by nonbelievers; hence, the common humanist refrain “Good without god(s).”

I will leave to other contributors to this anthology the task of elaborating the *a priori* principles (assumptions) from which belief in pandeism’s creator deity is derived. Those assumptions will be apparent in their arguments for the existence of the deus.

Being familiar with Christian apologetics, I recognize that the language of science is used disingenuously to support the tenets of their faith, as shown in teleological arguments for “Intelligent Design” and other presuppositional attempts to logically prove the factuality of

Christian theology. In my view, pandeism falls victim to (or is the result of) similarly flawed logic. I'm sure my co-contributors will fervidly rejoin with opposing views to this assertion.

To better understand pandeism in preparation for this writing, I posed three questions to Knujon Mapson, the editor of this anthology. (In our prepublication correspondence, Mr. Mapson disclaimed being an "official" representative of pandeism, although he is perhaps its most vocal proponent.) Here is my first question and his answer.

*DD: Question 1: Who/what created the creator? Or, did the creator not exist in time and space prior to creation?*

*KM: Answer (his capitalizations are retained): If a Creator is to be posited, it indeed follows that this Creator must either have itself come into existence through some spontaneous process that did not require a Creator, or was itself intentionally created by an Ur-Creator, or simply exists eternally without origin.*

Our esteemed editor acknowledges that his answer is speculative, as no evidence is available to support any of the three alternatives he offers. Indeed, no empirical evidence is even conceivable that would assist us in selecting one of the three possibilities he provides. Rather, those alternative solutions are derived from the *a priori* assumption that the creator deity existed. Further, to my empirically oriented ("show me the evidence") mind, none of the three alternatives is remotely plausible. Therefore, the question of what preceded the existence of the creator remains unanswered, and is, I believe, unanswerable if a scientifically plausible response is required. That is, the *a priori* principle of existence of a creator deity is unsupported by evidence or by logic, and is therefore a false assumption.

Some readers may be reminded of an anecdote reported by cosmologist Stephen Hawking in his 1988 book *A Brief History of Time*:

A well-known scientist (some say it was Bertrand Russell) once gave a public lecture on astronomy. He described how the earth orbits around the sun and how the sun, in turn, orbits around the center of a vast collection of stars called our galaxy. At the end of the lecture, a little old lady at the back of the room got up and said: "What you have told us is rubbish. The world is really a flat plate supported on the back of a giant tortoise." The scientist gave a superior smile before replying, "What is the tortoise standing on?" "You're very clever, young man, very clever," said the old lady. "But it's turtles all the way down!"<sup>5</sup>

So, it seems that pandeism shares a common conundrum with theistic religions: Where did God come from? If we are to avoid the tortured circular reasoning of Christian apologists, and if we require at least a modicum of plausibility, given the utter absence of any supporting empirical evidence, it is hard to escape the reasoned conclusion that God (or some other creator deity by any name) does not, and did not ever, exist.

Mr. Mapson buttressed his answer by pointing out that time is nonlinear, and that time may have also begun at the moment of creation of matter. Time is indeed a variable dimension of spacetime affected by gravity, as confirmed by empirical tests of Einstein's theory of general relativity.<sup>6</sup> So, its inconstancy may be (wrongly) considered by proponents of pandeism to be supportive of the notion that the creator deity created itself at the moment of creation of matter and energy. Indeed, matter and energy are interchangeable quantities according to the formula  $E=mc^2$  where the speed of light ( $c$ ) is constant. Cosmologists and particle physicists, such as Lawrence Krauss, describe the Big Bang as pure energy, with matter (in the form of subatomic particles) coming into existence within a miniscule fraction of a second thereafter.<sup>7</sup> Further, Krauss states that time itself came into existence at that moment as well, insofar as time is a function of motion of particles in the primordial universe.

Scientists who support the notion of a multiverse, such as astrophysicist Coel Hellier, argue that our universe may be only one among many, or more likely an infinite number, separated by hyper-distance, scattered throughout infinite space (see the semantic discussion of space vs. existence below), entirely out of contact with each other. Admittedly, the concept of a multiverse is speculative, and probably can never be confirmed empirically, although Hellier's philosophical argument is compelling.<sup>8</sup> Moreover, the dimensions of infinite time and space are beyond our limited human powers of imagination. It is instructive to note, however, that Krauss, Hawking, Tyson, Weinberg, Greene, Randall, Hellier, and the great majority of other prominent cosmologists are self-identified atheists who do not find it necessary to posit a creator deity to account for the beginning of our universe.<sup>9</sup> So, it may be a bit presumptuous of laymen (relative to the fields of cosmology and astrophysics) to insist otherwise. Indeed, a survey of members of the National Academy of Sciences found that 93% are atheist or agnostic.<sup>10</sup> How is it that the most accomplished scientists regard the notion of deities to not be useful in their disciplined search for understanding the natural world and its origin?

Here is my second question to Mr. Mapson.

*DD: Question 2: By what physical mechanism(s) did the creator manufacture the material universe? Or, did the creator not exist prior to the creation/Big Bang, at which time particle physics as we now know it began to take form?*

*KM: Answer: We don't know, but the answer will be discoverable by science. But it does seem something had to exist, or else there'd be no reason for there ever to be a change in the status quo of nothing existing.*

As cosmologist Lawrence Kraus discusses in his book *A Universe From Nothing*, the laws of physics, as they operate in our universe, appeared concurrently with the Big Bang, not before it.<sup>11</sup> Those laws are known as the Standard Model, which identifies electromagnetism, the weak and strong nuclear forces, and classification of all known subatomic particles.<sup>12</sup> Indeed, in the conjectured multiverse, other universes may contain "matter," the form and nature of which may be quite different from matter and energy as they appear in our local universe and may operate under different physical processes than those observed in our universe.

Normal (i.e., observable) matter comprises only about 5% of the mass of our universe, the remainder being dark matter and dark energy.<sup>13</sup> These “substances” (perhaps not a suitable term, since little is known about their physical properties) interact with gravity, but not with light. That is, dark matter cannot be visually detected with telescopes, but it does produce observable effects on the motion of stars, galaxies, and other massive objects.

It is plausible, albeit highly speculative, that dark matter and dark energy are associated with a separate universe that originated in a separate Big Bang, that is co-located with ours in space, and that is operating under different laws than the Standard Model that describes normal matter and energy.<sup>14</sup> Or, if science develops instruments capable of empirically observing dark matter and dark energy, which are invisible to our existing technology, the Standard Model may be revised to include additional particles or forces that would define these phenomena as derived from our Big Bang and therefore a part of our universe.

In any case, dark matter and dark energy do not conform to the current Standard Model. So, speculatively, another Big Bang that created a different universe might operate under different physical laws, which would have come into existence at that universe’s moment of creation. The physical nature of dark matter and dark energy constitutes one of the great mysteries that cosmologists and physicists are currently studying.

So, we see that “existence” may not be limited to our local universe, which did indeed begin with the Big Bang. Other universes quite likely exist, as Hellier argues. Consequently, the beginning of existence, which pandeism attempts to explain by positing a creator deity, is an irrelevant concept if one accepts that time, as well as space, are infinite in dimension and may contain an infinite number of universes.

Perhaps “distance” or some other term would be more suitable than “space” in this context, since, as Krauss argues, space itself was created with the Big Bang and will continue to expand eternally. He explains that, since space, even where devoid of matter and radiation, contains quantum mechanical processes and dark energy – it is not “nothing.” So, the hyper-distant regions between universes are not the same empirically observable “empty space” that exists within our universe.

Envisioning “nothing,” not even so-called empty space, challenges our frail human imagination, as does the infinite dimensions of spacetime. Nevertheless, if the multiverse exists, as is probable, then absolute nothingness between universes probably also exists. To the extent that we are capable of imagining this nothingness, we can imagine that the Big Bang created the matter, energy, time, *and* space that constitute our universe.

Existence (“all that exists”), then, encompasses all universes plus whatever lies between them, which is not to be confused with “empty space” as it appears within our particular universe. Further, it may not be physically possible for anything, such as light, to penetrate or travel through that inter-universe medium, ensuring that each universe remains isolated from all others. Science allows such speculation, so long as *supernaturalism* is not introduced. After all, science is the study of *nature*. Pandeism, a theology that presupposes a nonmaterial supernatural creator deity, is a demonstrably unscientific theory of existence.

A review of various multiverse theories.<sup>15</sup> may assist readers in mulling the incomprehensible scale of infinite spacetime and the fathomless nothingness (not even the “something” of empty space) between universes. Note that these are science-based speculations, not theological renderings of the mysteries of existence. Since science does not anticipate ever being capable of direct empirical observation of other universes, multiverse theories will no doubt remain speculations. Future advances in science, however, will surely refine those speculations.

My conclusion, as well as that of all but a very few professional cosmologists.<sup>16</sup> is that the conditions present at the moment of the Big Bang – which have existed throughout infinite time and infinite space, possibly containing an infinite number of universes – were quite capable of creating our home universe 13.72 billion years ago without the midwifery of deus.

As mind-stretching as the concept of infinite spacetime may be, it is nevertheless more plausible, and more consistent with known science, than is a creator deity. Gods are best understood as man-made inventions arising from our pre-science ancestors’ attempts over millennia to explain the otherwise inexplicable mysteries of their earth-bound environment. Otherwise, we face the even more daunting task of explaining, *without resorting to mysticism*, what happened before the beginning of time, and what lies beyond the edge of space. Which of these two universe-views, dear reader, is your conclusion? Empiricism or mysticism? Reason or mythology? I see no third option. I see no hybrid.

Here is my third and final question to Mr. Mapson.

*DD: Question 3: Is/was the creator “supernatural”? Or, are/were the principles of particle physics (the natural world) at work within the “entity” of the creator? Or, is/was the creator a non-material being prior to creation of the universe? If the latter, in what sense did the creator “exist” prior to creation?*

*KM: Answer (capitalizations are his): If it exists, it is bound by some laws – of mathematics and logic, at least – though not necessarily all the laws which govern our Universe. There are aspects of our Universe (the specific speed of light, the ratios of certain particle sizes) which scientists have debated could be different in alternate Universes, so the question really is, what characteristics must persist in any Universe. And there we'll find what governs any Creator.*

Physicists and others working in the natural sciences consider anything that exists, whether or not it is yet discovered, to exist in the *natural* world, which is comprised of physical matter, including subatomic particles so far identified in the Standard Model. That is, nothing exists that has no physical properties. For example, humans do not have a “soul” apart from the biological processes occurring within the physical body. Similarly, “consciousness” is nothing more than the subjective experience of bioelectrical processes within a living brain. When the brain ceases to function, as when the body that houses it dies, consciousness ceases. Consequently, there is no conscious afterlife and no soul that survives physical death. To be sure, the abiogenetic origin of life is a yet-to-be fully understood process, and is a subject of active research, but there is no scientific basis

for thinking that life or consciousness is a *supernatural* phenomenon that functions outside the laws of science.

My third question to Mr. Mapson above asks whether pandeism holds that the creator deity was an entity composed of physical matter. Or, alternatively, do pandeists believe that the creator was *supernatural*, having no physical properties. If the former, then the deity is part of the natural universe and therefore must be comprised of physical properties consistent with the Standard Model, and so is subject to research by the scientific method. If the latter, we must utterly reject the notion of a supernatural deity, since the evolving Standard Model describes and defines all that is natural.

The supposed creator deity is believed by adherents of pandeism to have possessed consciousness and intelligence. Absent physical properties, such attributes are scientifically impossible.

I shall close this critique with a brief rebuttal of three additional notions advanced by proponents of pandeism to support their creationist worldview.

### **Fortuities and the fine-tuned universe**

Apologists for pandeism, and for creationism more broadly, argue that certain improbable “fortuities” constitute compelling evidence for the existence of a creator deity. Several examples are proffered<sup>17</sup> of “fine tuning” of the laws of physics and other cosmological conditions that, if significantly different from their existing values, would render the universe structurally dysfunctional and make carbon-based life impossible. These conditions include the ratio of the strength of electromagnetism to the strength of gravity and the ratio of dark energy to the density of the universe. Astrophysicist Martin Rees<sup>18</sup> cites these and other technical features of the physical structure of the universe as so improbable that a conscious and intentional creator must have designed it to allow life to appear. (Interestingly, professor Rees has more recently stated, “I’ve got no religious beliefs at all.”<sup>19</sup>)

Although some scientists, such as Rees, support the fine-tuning hypothesis, most do not, arguing instead that the universe is not fine-tuned to us; rather, we are fine-tuned to the universe. That is, humans, and all other life forms, exist only in the conditions in which it is possible for us to exist. If our universe were fatally unaccommodating to life, then life would not exist here. We happen to reside where life is possible; hence we are here to ask these questions. There is no support for a cosmic mandate that life must exist, in our universe or in others.

Cosmologist Victor J. Stenger, author of *The Fallacy of Fine-Tuning: Why the Universe Is Not Designed for Us*,<sup>20</sup> explains how the “strong anthropic principle”<sup>21</sup> distorts perception by causing human observers to assume the universe exists for the special benefit of humans, when in fact the universe is simply the way it is. We humans happen to be compatible with the miniscule niche of spacetime in which we find ourselves, where we were suited to evolve, to currently exist, to observe ourselves, and to reflect upon our own existence. This is quite a simple notion, actually, once we cease insisting that we are on the cosmic center stage.

## Why does the universe exist?

Pandeism attempts to answer this question by positing a conscious creator deity who had a desire or intention to create the universe.

It is human nature to wonder why. “Why did you say that?” “Why did that accident happen to me?” “Why was I born?” But asking “why” is the wrong question in scientific inquiry, except in some social-psychological research. “Why” presupposes an intention, which in turn presupposes a conscious entity that has a purpose for its actions. As Lawrence Krauss explains in *A Universe From Nothing*, the more useful question is how: “How did the universe come into existence.” “How will it end?”<sup>22</sup>

Cosmologists have yet to achieve consensus about how the universe will end. A Big Crunch, in which the universe collapses under force of gravity into a singularity (a zero-dimensional point of infinite density), was the leading contending theory until dark energy was discovered in the 1990’s. Dark energy (an apparently repulsive gravitational force) accounts for the increasing rate of acceleration of expansion of the universe.<sup>23</sup> Eternal expansion is now considered more likely. Time, as a mathematically measurable dimension, might indeed end if the Big Crunch were to be our universe’s fate, since presumably there would no longer be matter-in-motion, although current physics is inadequate to explain what happens at or near a singularity. But, infinite spacetime would remain, possibly containing other universes, under either outcome.<sup>24</sup> Theology in general, and pandeism in particular, contributes nothing to our understanding of this question, nor to its answer.

So, the scientifically appropriate answer to “Why does the universe exist?” is: There is no reason, there is no purpose. No conscious creator deity had an intention that led to creating the universe.

## Supernaturalism

Pandeism claims that the creator deity existed prior to creating the physical properties of the material universe, or at least appeared concurrently with it.

Supernaturalism is the mystical belief that entities exist beyond empirically observable reality, outside the laws of nature, specifically the Standard Model of particle physics.

Prior to the advent of modern science, generally ascribed to the work of Galileo in the early 17<sup>th</sup> century, humans had few observational and analytical tools for determining what is “real.” The ancient Greeks made an attempt at empirical understanding of reality by proposing earth, water, air, and fire as the four elements of the natural world. Microscopes, telescopes, astral spectroscopes, the Large Hadron Collider, and a multitude of other data-gathering tools have since been developed that dramatically increase our ability to “see” nature beyond the human scale.

Two obstacles impede popular acceptance of scientism as the most authoritative approach to acquisition of knowledge:

1. Insufficient science education among the global population,



## 2. The psychological propensity of humans to invent religions and other forms of mysticism<sup>25</sup>

I recognize that scientism is controversial, criticized by some as *excessive* dependence on science and the scientific method.<sup>26</sup> To be sure, personally meaningful insights can and do occur through music, art, and other non-scientific endeavors. And the impacts of such endeavors on subjective human experience can be, and are, studied scientifically. But if one's goal is to understand *objective* reality, apart from human subjectivity, science represents the only valid approach to achieving it.

Religious believers who regard faith alone, without empirical evidence, as sufficient for belief in their particular creation story, gods, afterlife myth, spirits and other supernatural beings, conveniently ignore many settled scientific facts and, by logical necessity, refute scientism. I have long been baffled that reason and unquestioned faith can co-inhabit an intelligent, educated mind – perhaps an unrecognized sleight-of-mind bridges the dissonance.<sup>27</sup> Darrel Ray examines in *The God Virus: How Religion Infects Our Lives and Culture* how mystical beliefs propagate within a host culture and impair rational thought by means that are curiously analogous to viral infection in living organisms.<sup>28</sup> As with biological viruses, the “God virus” can infect intelligent, well-educated people as it does those of us who aspire to the 50<sup>th</sup> percentile, although not as markedly.<sup>29</sup>

Pandeism, in positing a creator deity, is a form of supernaturalism, notwithstanding pandeists' belief that the creator became the natural world once the act of creation occurred. It follows that if the now-defunct deity is not describable by the physics that describes the universe we find today, as pandeists appear to acknowledge, the belief is incompatible with science.

My purpose in this article is to encourage science-based critical thinking among adherents of pandeism and of religion in general. I regard science and religion as inherently incompatible because they put forth mutually inconsistent theories of existence. I anticipate that as further scientific discoveries advance our knowledge of the natural world, religion will recede as a harmful presence in human affairs. I readily admit, however, that pandeism is perhaps the least harmful religion yet invented.

### Notes:

<sup>1</sup> In *Wikipedia*, retrieved February 3, 2016, from <https://en.wikipedia.org/wiki/Pandeism>.

<sup>2</sup> Edward O. Wilson. *On Human Nature: With a new Preface, Revised Edition*, 2004.

<sup>3</sup> In *Wikipedia*, retrieved February 3, 2016, from [https://en.wikipedia.org/wiki/Religious\\_text](https://en.wikipedia.org/wiki/Religious_text).

<sup>4</sup> In *Stanford Encyclopedia of Philosophy*, retrieved February 3, 2016, from <http://plato.stanford.edu/entries/kant-religion/>.

<sup>5</sup> *A Brief History of Time*, Stephen Hawking, 1988.

<sup>6</sup> In *Wikipedia*, retrieved February 13, 2016 from [https://en.wikipedia.org/wiki/Tests\\_of\\_general\\_relativity](https://en.wikipedia.org/wiki/Tests_of_general_relativity).

<sup>7</sup> Lawrence M. Krauss. *A Universe from Nothing: Why There Is Something Rather than Nothing*, 2012. See also, Keele University (UK) professor Coel Hellier, personal communication, February 9, 2016.

<sup>8</sup> Coel Hellier. How many Big Bangs? A philosophical argument for a multiverse: *coelsblog*, retrieved February 3, 2016, from <https://coelsblog.wordpress.com/2015/12/30/how-many-big-bangs-a-philosophical-argument-for-a-multiverse/>.

<sup>9</sup> Sean M. Carroll. Why (Almost All) Cosmologists Are Atheists, retrieved February 7, 2016, from <http://preposterousuniverse.com/writings/nd-paper/>.

<sup>10</sup> National Academy of Sciences: *Teaching About Evolution and the Nature of Science* (National Academy Press, Washington DC, 1998).

<sup>11</sup> See note 7.

<sup>12</sup> In *Wikipedia*, retrieved February 3, 2016 from [https://en.wikipedia.org/wiki/Standard\\_Model](https://en.wikipedia.org/wiki/Standard_Model).

<sup>13</sup> In *Wikipedia*, retrieved February 3, 2016 from [https://en.wikipedia.org/wiki/Dark\\_matter](https://en.wikipedia.org/wiki/Dark_matter).

<sup>14</sup> Ohio State University astrophysics professor Paul M. Sutter, personal communication, February 6, 2016.

<sup>15</sup> In *Wikipedia*, retrieved February 10, 2016 from <https://en.wikipedia.org/wiki/Multiverse>.

<sup>16</sup> See note 10.

<sup>17</sup> Knujon Mapson. Retrieved February 3, 2016 from

<http://everything2.com/title/For+atheists%252C+what+is+the+proof+for+pandeism%253F>. See also, In *Wikipedia*, retrieved February 3, 2016 from [https://en.wikipedia.org/wiki/Fine-tuned\\_Universe](https://en.wikipedia.org/wiki/Fine-tuned_Universe).

<sup>18</sup> Martin Reese in *Wikipedia*. Retrieved February 3, 2016 from [https://en.wikipedia.org/wiki/Martin\\_Rees](https://en.wikipedia.org/wiki/Martin_Rees).

<sup>19</sup> In *The Guardian*. Retrieved February 13, 2016, from

<https://www.theguardian.com/science/2011/apr/06/astrophysicist-royal-martin-rees-interview>.

<sup>20</sup> Victor J. Stenger. *The Fallacy of Fine-Tuning: How the Universe is Not Designed for Humanity* (Prometheus Books, 2011).

<sup>21</sup> In *Wikipedia*, retrieved February 3, 2016 from [https://en.wikipedia.org/wiki/Anthropic\\_principle](https://en.wikipedia.org/wiki/Anthropic_principle).

<sup>22</sup> See note 7.

<sup>23</sup> In *Wikipedia*, retrieved February 11, 2016 from [https://en.wikipedia.org/wiki/Dark\\_energy](https://en.wikipedia.org/wiki/Dark_energy)

<sup>24</sup> Ohio State University astrophysics professor Paul M. Sutter, personal communication, February 11, 2016.

<sup>25</sup> See note 2.

<sup>26</sup> In *Wikipedia*, retrieved February 3, 2016 from <https://en.wikipedia.org/wiki/Scientism>

<sup>27</sup> Dan Dana. *The Reason Revolution: Atheism, Secular Humanism, and the Collapse of Religion* (2014), retrieved February 10, 2016 from <http://www.dandana.us/atheism/>.

<sup>28</sup> Darrel W. Ray. *The God Virus: How Religion Infects Our Lives and Culture*. IPC Press, December 2009. ISBN 978-0-9709505-1-2.

<sup>29</sup> In *Wikipedia*, retrieved March 31, 2016 from [https://en.wikipedia.org/wiki/Religiosity\\_and\\_intelligence](https://en.wikipedia.org/wiki/Religiosity_and_intelligence).

## Author

Dan Dana is a retired educator, mediator, and psychologist who has turned his attention to the advancement of secular humanism. Born in 1945 to a Protestant family in rural Missouri, he attributes his awakening to atheistic humanism as a worldview to his discovery of the philosophy of Bertrand Russell in his youth. Dan's life experiences include serving in the U.S. Army in Vietnam (noncombat) and Panama Canal Zone (1966-1968); teaching at a New England university for 28 years, and guest-lecturing at educational institutions on six continents; and traveling in over 75 countries. The author of several books on mediation and conflict resolution, his most recent publication is *The Reason Revolution: Atheism, Secular Humanism, and the Collapse of Religion*, a free ebook available at Amazon and other online retailers. He holds the PhD in psychology (University of Missouri, 1977) and resides with his wife in Sarasota, Florida (USA).