

## DOES GOD EXIST? THE WITNESS OF SCIENCE

- A. If the Universe had a beginning then what was it like?
1. Bruce has given a logical argument for why the universe had a beginning.
  2. In 1917 Einstein published his paper on general relativity with a set of equations that included a previously unknown constant, the Cosmological constant.
  3. In 1921 Alexander Friedman published a paper that described the situation which might occur if the curvature were either positive or negative.
  4. In 1927 a Catholic priest and professor of physics, George LeMaitre, duplicated Friedman's calculations, but kept only the positive curvature solution; his value is close to Einstein's 0.
  5. The important point is that if the universe is expanding then one can trace it back to some point in which it began to expand
  6. Sir Fred Hoyle of Cambridge coined such an idea with a disparaging name – "Big Bang" – which unfortunately for him has stuck.
  7. In 1929 Edwin Hubble published a paper showing his observational studies of galaxies, in which he showed that changes in the spectral lines of hydrogen and helium (gases found in all stars) were directly proportional to the apparent distance.
  8. Today we have many other experimental verifications that the universe had a beginning. Even Stephen Hawking has noted, "Almost everyone now believes that the universe and time itself had a beginning at the Big Bang."
- B. What are the properties of the universe that make it stable?
1. If the universe began from a single point with all matter compressed into a single, infinitely small point, how can we know or predict what kind of universe will appear out of such chaos?
  2. If the universe is to support intelligent observers at any point in its history, it must have some restrictions on the nature of the space, the matter and the distributions of that matter.
  3. There is a fairly narrow range of forces, relationships, and fields which must be maintained in order to have a universe capable of sustaining observers.
  4. Thus there are a number of laws and constants whose values in the proper invariant reference frame seem to be very finely tuned. If any one of these were to change by a small amount (relative sizes), then life as we know it (and in some cases the universe as we know it) could not exist.
  5. Lord Martin Rees, Cambridge University, has postulated six constants that are critical to the stability of the universe.
    - a. The first two numbers describe the interaction of the laws of physics.
    - b. The next three apply to the size, age, and expansion of the universe.
    - c. The last is just a requirement for three-dimensional space.
  6. Robin Collins of Messiah College lists as many as 26 such constants, all of which have values that appear to be fine-tuned to produce a habitable universe.

- C. What are the properties of the universe that make it habitable?
1. The physical constants described above contribute to the way the mass of the universe is distributed.
  2. The mass consists of normal matter (stars and dust), that generate or propagate radiations, and of the dark energy and dark matter that make up the material parts of our universe.
  3. The Dark energy is embedded into the fabric of space itself.
  4. There are three kinds of galaxies (in order of occurrence):
    - a. Spiral
    - b. Elliptical
    - c. Irregular
  5. Galaxies can contain hundreds of thousands of stars, moving about some center of mass point, which then moves about the center of mass of its cluster.
- D. Is the Milky Way a typical galaxy?
1. Carl Sagan used to say, "We find that we live on an insignificant planet of a humdrum star, lost in a galaxy tucked away in some forgotten corner of a universe in which there are far more galaxies than people."
  2. But today we know that our galaxy is not so common.
  3. Following the Anthropic principle, it seems that even with something as huge as a galaxy, its structure has a tremendous influence on the ability of a planet or sun to produce a habitat for life.
  4. And the star we call the Sun is right in the middle of an ideally habitable Goldilocks zone.
- E. Is the sun a typical star in the galaxy?
1. Stars come in all shapes and sizes, brightness and mass.
  2. Our sun is a yellow dwarf, main sequence star, relatively young, about 4 billion years into its 10 billion year life expectancy.
- F. Is the solar system a typical planetary system in orbit around the Sun?
1. Recall Carl Sagan's statement, "We find that we live on an insignificant planet of a humdrum star lost in a galaxy tucked away in some forgotten corner of a universe in which there are far more galaxies than people."
  2. Today we know a lot more about this little blue marble of a planet.
  3. Over the past two decades, scientists like Guillermo Gonzalez, Peter Ward, and Donald Brownlee have been reporting in the scientific literature just how special our planet and our solar system really are. Their popular books, Rare Earth and Privileged Planet have given to the public a glimpse into why they have come to believe that planets like our earth are not very common in the universe.
  4. We have known for some time that our solar system is rather special as it has so many planets. Most observed solar systems have few planets.
  5. Ward and Brownlee list 18 properties of a Rare Earth planet. Failing to have any one of them would result in a dead rock, like so many others in this solar system and others that we can detect.

6. Gonzalez includes all of the fine tuning arguments given by Ward and Brownlee and adds a new twist, thanks in part to his collaboration with Jay Richards, a philosopher and theologian from Princeton Seminary.

G. What is the likelihood that all of these properties just happened to occur?

1. This question has been addressed by many, most notably by John Clayton, who included only the highest level of properties in terms of the design and fine-tuning of the known structure of the universe
2. His calculations show that there is a greater probability that one can leap from the observation deck of the Empire State Building and walk away from the fall than that the earth ended up where it is in space and time, populated by mankind totally by random chance processes.
3. Robin Collins gives the analogy that it is equivalent to exploding a pile of rubble and, thereby, obtaining a fully formed 15-story building replete with desks, tables, chairs and computers.
4. Paul Davies, cosmologist at Arizona State and author of several books including The Mind of God, God and the New Physics and most recently, The Goldilocks Enigma – Why the Universe is Just Right for Life is quoted, “Through my scientific work, I have come to believe more and more strongly that the physical universe is put together with an ingenuity so astonishing that I cannot accept it as brute fact. I cannot believe that our existence in the universe is a mere quirk of fate, an accident of history, an incidental blip in the great cosmic drama.”

H. Concluding Remarks

1. Fifty years ago the general feeling was that science had answers for everything; it was clear the world as we know it could be explained by a series of elegant mathematics, invented primarily by the mind of man.
2. Fifty years ago, the agnostics and atheists felt that they had religion on the ropes. Today, it is the atheists who resort to *argumentum ad hominem*.