

The Extended Universe

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Previously, in the section *Common Deity* (page **Error! Bookmark not defined.**), it was mentioned that all the older religions included a creation story based on the belief in a universe very limited in size. At that time, when these ancient religions were being formed the known earth (universe) was typically thought to be an *island* with heaven above and hell below. The heavens were the source of life-giving water and sunlight, while hell was the source of earthquakes, volcanos, and darkness. Most likely, this view of the universe is much older than recorded history and, being deeply ingrained in our human culture, continued to exist up until only a few hundred years past, when, in human understanding the universe began to *grow* larger.¹

Even as recently as a hundred years past, the recognized size of the universe was limited to what we call the *Milky Way* galaxy and, to the disappointment of many, it was determined that earth was not in a privileged or special place, but off to the side and far from the center of the galaxy. However, even with this new knowledge, the most distant stars were estimated to be only a few thousand light-years distant.²

Today, the extent of the universe has been observed and extended to be *billions of light-years* distant in all directions

¹ Although the approximate size and shape of the earth has been known since antiquity, it was the great ocean journeys of the late 15th and early 16th centuries that finally firmed up this knowledge in common understanding. However, the size of the universe remained grossly understated until the 20th century.

² A light-year is the distance that light will travel through a vacuum in one year. This distance is approximately 6 trillion miles (6×10^{12} or 6,000,000,000,000). This is another example of a number that is used in calculations but is really beyond intuitive understanding. To put this number into some perspective, even if one could travel at *one million miles per hour*, it would take *six million hours or almost seven hundred years* to travel one light year of distance!

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and it is probable that with future improvements in observational technology, the observed size of the universe will become even larger. That is, the current observable *horizon* is about 14 billion light-years from earth, which means that it is estimated that the observed light from the most distant objects observed was emitted nearly 14 billion years in the past. Although, the distance is the same in all directions, it does not mean that we are in the center, it only means that our observing capability limits us to the same distance no matter which way we look and implies that the universe extends beyond this distance in all directions.³

These observations also raise questions about the size and shape of the universe. Similar observation in any direction could simply imply that we are not near an *edge* of the universe (assuming the universe has an *edge*), or it could indicate something about the *shape* (geometry/topology) of the universe. Of course, other possibilities exist – we just do not know enough to make a determination one way or another.

In any case, current knowledge represents a *million-fold* increase in a relatively brief time of about one century. To put this size increase in perspective, the change is like comparing one inch to one million inches (about 16 miles)! It is important to understand and not lose sight of the incredible vastness and physical inaccessibility of the universe beyond our immediate set of planets. For example, after launching the interplanetary probe *Galileo* in October 1989, it did not arrive near Jupiter until December 1995 – six years after launch! And this is a miniscule distance compared to interstellar distances!

³ This is another mistake that the followers of the BB/EI notion make when they associate the cosmic horizon with the age of the universe. That is, they have committed themselves to the position that the universe is about 14 billion years old with the cosmic horizon that is also about 14 billion light years in the past but will change with improved observation instruments are developed and on-line.

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As the observed size of the universe has grown, so has the content of the universe. Our own galaxy, called the Milky Way, shaped like a flattened spiral, contains about *one hundred billion* stars and is about one hundred thousand light years in diameter. Moreover, beyond the Milky Way, observation has revealed billions of other galaxies of assorted shapes and sizes, each containing billions of stars!

It seems that throughout the 20th century, both the age and the size of the universe kept changing, however now it is claimed by astronomers and cosmologists that they have finally got it right and they *know* the exact size and age of the universe. Just as they *know* that it all started with a *big bang* and *inflation*. Of course, 100 years ago, they also *knew*. It is worth repeating this anonymous quote: "*Astronomers and cosmologists are often in error but never in doubt.*"

Nevertheless, there is still a tendency, shared by many, to regard the earth as something special or even unique. Special or not, we know that the other planets in our solar system are incapable of supporting life in the abundance and diversity that we have here on earth. However, if we are open-minded and want to avoid close-minded anthropic thinking, the existence of other life forms throughout the universe is not only possible but is a certainty.

Given the vast amount of substance within the observed universe, it is reasonable to conjecture that abundant life of some form exists not only throughout our galaxy, but also throughout the universe. The problem is that we may never know this directly because of the vast distances that separate us from the rest of the galaxy.

Unfortunately, unless some future discovery overcomes our inability to communicate over these vast distances, conjectures about other life will indefinitely remain just conjectures. Regardless of all the stuff that is written about in science fiction concerning wormholes, warp-drives, and

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other imagined means of interstellar space travel, at this time, none of the techniques used in science fiction should be taken seriously. As of today, the speed of light is the limiting factor and is likely to remain the limit for some time.

As a final word on this topic, it seems strange that given the vast number of galaxies and the billions of stars in each of these galaxies, some still claim that the only intelligent life in the universe is here on earth! This position seems both counter intuitive, naïve, and, in any case, is certainly anthropocentric thinking taken to the extreme, as well as a terrible waste of material.