

Questions from O'Neal Middle School

Why did you decide to become an astrobiologist?

My path to astrobiology was not straight nor direct. I first became interested in astronomy when I was five years old and my parents took me to the Hayden Planetarium in the American Museum of Natural History in Manhattan. At first, in college, I studied biochemistry. Then I switched to physics and mathematics. I had to work while I was attending college, and that led me through a series of jobs related to engineering and science. Eventually, I got graduate degrees in astronomy and education; and, I began teaching astronomy. Way back in 1976 I got interested in the search for life on Mars by the Viking Lander. That led to my involvement in astrobiology.

Have you ever been in space?

No, I have never been in outer space, which I believe is defined as being 100 kilometers above the Earth's surface.

Do you think aliens are real? Why or why not?

This is not a straightforward question. If you ask me if I believe, not based on any evidence, that there are intelligent extraterrestrial beings in space, I would say yes. The main reason being that space is so vast, that it is difficult for me to believe that among hundreds of billions of galaxies, each with hundreds of billions of stars, that we are the only intelligent life that exists. However, many people, when they ask about "aliens", are really asking if I believe we have already been visited by extraterrestrials and that they are walking among us here on Earth. To that, I would no. The reason is that we simply have no evidence to support such a statement.

How often do you think black holes occur?

We have evidence supporting the view that a supernova takes place about once every 50 years in our galaxy. That would mean that a neutron star or black hole is formed on the average, once every 50 years in our galaxy.

Do you think it is possible for life to exist on different planets?

In a way, we know that life can exist on other planets. You may ask, how do we know this to be true? We know this must be true because we are able to subject Earth microbes to conditions that mimic the conditions we know exist on other planets or moons in our own Solar System. Thus, it is possible for life to exist on other planets or moons. The question is whether or not there really is life elsewhere in our Solar System.

What is the longest a human can stay in space? (Marcus)

I am not sure what you mean by this question. The longest any astronaut has been in space is almost 438 days; that is of course longer than a year. But that is in a space station in orbit around the Earth, and in a nearly zero-g environment. If astronauts were in spacecraft which accelerate at 9.8 meters per second per second, they would feel as if they were in a gravitational field similar to that of Earth. There is no limit on how long they could last under such conditions.

Have you ever come across life inside space other than human life?

There is no evidence as yet of any life in our Solar System except for life which has come from Earth. While some have suggested that certain

fossils of micro-organisms may have been discovered in rocks from space; I am afraid these reports have not been corroborated by other scientists.

Can you grow crops in space?

There are various ways to interpret your question. We have already been successful in growing plants in the space station; and, before that space labs, American, Russian and Chinese. However, I thought you might mean growing plants on another surface. If that is the case, it has never been done, but it is considered possible under the right conditions and enclosures.

When do you think we'll be able to live on another planet?

This question also has different interpretations. We have already had humans live on the surface of the Moon. That has been done on 6 different occasions. Nonetheless, it certainly is possible to have humans reside on the surface of other celestial objects given the right enclosures and safety precautions.

Have you seen life on another planet?

As of this date, no one, neither me nor anyone else, has seen life on any of the planets in our Solar System.

If you discover life first in space would you keep it secret or tell NASA?

There is actually an international treaty in effect which demands that if any scientist or engineer in any of the countries that have signed the

treaty, must report any such discovery, or possibility of discovery to the international, which consists of the International Astronomical Union and the United Nations. We would not just tell NASA.

What signs of aliens have you found?

I am sorry, but I, nor anyone else for that matter, have yet to discover any signs of extraterrestrial life in this Solar System nor any other star system in the galaxy.

How far can a black hole move?

Everything in this universe is moving. Right now, sitting in your seats you are moving at a half kilometer per second, relative to the center of the Earth. In fact, relative to the center of the Sun, you are moving at about 30 kilometers per second. And if you consider your speed relative to the center of the Milky Way Galaxy, you are moving at about 200 kilometers per second, every single second. So, yes, a stellar mass black hole moves, and it moves just as much as any star in our galaxy.

Have you ever studied an asteroid?

In a way, I have studied an asteroid. Every meteorite was once a part of an asteroid. I was given an opportunity to study a stony chondrite meteorite many years ago. Although not as interesting as a carbonaceous meteorite, which contains carbon-based molecules, it is still a fascinating study, allowing scientists to understand the chemical composition of the material that first formed our planets in the Solar System.

What is the most challenging part of being an astrobiologist? What is the easiest part?

The most challenging part of being an astrobiologist, or any scientist, is the amount of time that one has to spend dedicated to one's field of study. While very time consuming, you won't get rich being a scientist. The easiest part of being a scientist is the drive to discover something new and that is what is most enjoyable about science.