

Skype Session Questions

From Mrs. Perez's Cambridge Class

Q - If atmospheres scientists are looking at are too thin for us humans, couldn't they just be perfect for Martians or other living organisms unknown to us?

It is not just a matter of being too thin for humans or Earth-based organisms. You need a minimum of atmospheric pressure to allow the existence of liquid water, for example. Without liquid water, used as a medium for transport of material within living cells, you cannot have life as we know it.

Q - What would happen if Mars was closer to the Sun, lightning stroke, and it now holds a thicker atmosphere, would it support life then?

The thickness of Mars' atmosphere is largely related to its size, or gravitational force that it generates. Even if Mars were closer to the Sun, it could never recover the atmosphere that has been lost.

Q - Do you think Callisto could support alien life with a temperature of -200 Degrees Celsius?

No I do not believe that Callisto could support life. Not only because of its temperatures, but also because of its mass, density and escape velocity.

Q - As many evidence has shown, Mars could have signs of life. If so, how could life still survive without water?

Life as we know it cannot exist with water. Also, there is no evidence to this date that there is life on Mars. As we saw in 1976 with the Viking Landers on Mars, there is no evidence of life at any of the sites we have landed upon.

Q - Do you think -200 Degrees Celsius could support the microorganisms that are believed to live on Mars?

No I do not believe that such cold temperatures could be good for life forms of any kind. You should always remember that you need to consider both temperature and pressure when you are looking for environments that could support life.

Q - It is believed that Mars once had a thick atmosphere, how come its atmosphere became thin?

Mars was not able to maintain a dense atmosphere for a long period of time. It is about half of Earth's diameter and thus its gravity is much less than Earth's gravity. Only the heaviest of molecules are able to be held close to the surface. Others escape out into space.

Q - Do you support the theory that billions of years ago there was liquid water on Mars?

There is considerable evidence that there was once liquid water on the surface of Mars. However, over time, the water evaporated and when it rose in its atmosphere the chemical bonds holding the hydrogen and oxygen together were broke and the hydrogen escaped to space.

Q - If life really did exist elsewhere than Earth, how would it live and adapt to the harsh temperatures of other planets and moons?

We have many examples here on Earth where life has adapted to extreme temperatures, both much higher than 100 C and much lower than 0 C. There is no reason to believe that life could not have adapted to such extreme environments elsewhere.

Q - If extraterrestrial life were to exist on Jupiter or one of its moons, which would best support life forms?

If there is life in the Jupiter system it is most likely to be microbial life in the water ocean of Europa, far beneath the frozen surface. Water freezes from the top to the bottom, so where there is frozen water on the surface, there can still be water beneath the frozen surface.

Q - Do you support the theory that Titan, one of Saturn's moon, might have liquid water and is forming new life forms? How can that theory be supported? Is there any evidence?

The evidence for water beneath the surface is based upon the gravity measurements of the Cassini spacecraft. That is not direct evidence. There may be other reasons for the gravity measurements. Nonetheless, even if there is water beneath the surface, it is unlikely that there is life of any kind. There is not enough energy for life forms to use to exist.

Q - Do you support the idea that Titan (Saturn's largest moon) might meet the requirements to support life? If so, how can it support life?

No, I am not one of those scientists who believe Titan is a place where we will find life of any kind. The energy needed for life is very limited on Titan, even though there are plenty of organic molecules available.

Q - It is believed by scientists that Titan could possibly support life, scientists also believe that there are lakes made out of methane, isn't poisonous? How could it possibly support life?

You need to remember that methane freezes from the bottom up, not like water which freezes from the top down. The so-called lakes of methane on Titan are only a few millimeters thick. The rest of the way down is frozen. By the way, there are organisms on Earth for which methane is not poisonous, so that is not the problem.

Q - How could the extremophiles in California's mines possibly survive in Titan's methane lakes if the lakes evaporated fully?

I don't believe that the extremophiles in a California mine could survive in the frozen lakes of methane on Titan. Again, methane freezes from the bottom up, and it is very cold on the surface of Titan, about 94 Kelvin.

Q - Do you support the theory that there used to exist oceans on Venus, billions of years ago?

While there may have been water on the surface of Venus, three or four billion years ago, that water is now lost forever.

Q - If there is life on Venus, like some scientist believe, the life on that planet must be immune to the heat, if not, what type of life could it possibly exist?

I do not believe that there is life on the surface of Venus, it is simply too hot, hot enough to melt typical Earth rocks. While there has been talk about the possible existence of life in the atmosphere of Venus, where the temperatures are lower than on the surface, I do not believe that this is true. While life on Earth can remain in the atmosphere for years at a time, it still needs to evolve in a more friendly location.

Q - If evidence is found of extremophiles, or any form of bacteria, couldn't it have once evolved like it did here on Earth and formed some kind of intelligent life?

A possibility is not the same as a reality. There are many outcomes for the toss of dice. There is but one single outcome. Just because there might be some microbe discovered on another celestial object, that does not mean that complex higher life forms also exist.

Q - How is the discovery of the ice jet on Saturn changing the chances of possible living things somewhere else?

I don't know what ice jets on Saturn you refer to. Are you referring to ice jets on a Moon of Saturn, such as Enceladus? Just because there is liquid water somewhere, does not mean that there must be life too.

Q - If Io gets its volcanic ash from Jupiter's gravity, how did Jupiter get its gravity? How is it so strong?

Jupiter has a large gravitational field because of its very large mass. The ash of the volcanoes of Io does not come from Jupiter, it comes from the mantle of Io, as the ash of Earth volcanoes come from the mantle of the Earth.

Q - There is evidence that proves that there is a black hole at the center of the Milky Way galaxy. Is that possible for all galaxies?

Yes, we do have evidence of black holes at the center of the larger galaxies. Some many time larger than the black hole at the center of our own Milky Way galaxy. There are dwarf galaxies that apparently do not have black holes at their centers.

Q - Scientists collected data that show two stars (IO1 and IO2) make an orbit at an extremely fast speed at the center of our galaxy. Do you believe this is enough evidence to support that there is a black hole at the center of the Milky Way? What other evidence is collected to support that theory?

The orbits of the stars near the center of our galaxy (no official names exist for them as yet) do provide definitive evidence of a massive black hole near the center of the Milky Way Galaxy. However, that is not the only evidence for the black hole center. Other evidence is in different wavelengths of the electromagnetic spectrum. Our theories of matter near the event horizon of a black hole predict certain radiation, and we see that radiation as well.