
AoW # 15

Directions:

1. Mark your confusion.
2. Show evidence of a close reading. Mark up the text with questions and comments.
3. A one page reflection is due on Thursday. It may be typed and saved in the AoW folder of your GoogleDocs collection or it may be hand-written neatly on lined paper.

Anybody Out There?

Source: Michael D. Lemonick/ Time for Kids/ November 30, 2011

Section 1

Thanks largely to the Kepler space telescope, astronomers have discovered more than 2,000 planets orbiting distant stars. That's not half bad considering that until recently we knew of only eight planets in the entire universe, all of them in our own solar system.

Kepler's *ultimate* goal is to find worlds similar to Earth—places where there's a chance that alien life might have taken hold. Once those planets are found, we could then get a closer look at them as new, more powerful telescopes are introduced.

But the search for life will still not be easy, so it will be important to choose the best possible targets. That's the reasoning behind two new rating systems proposed by Washington State University environmental scientist Dirk Schulze-Makuch, along with nine other colleagues.

Similar to Earth

The first rating system is called the Earth Similarity Index, or ESI. That's just what it sounds like: it's a measure of how closely an alien world matches Earth in terms of size and temperature. The temperature is important because liquid water is an *essential* ingredient for life as we know it: nutrients can dissolve easily in water in order to circulate to every part of an organism.

Section 2

The size of the planet seems important too. If a planet is too small, like Mars, it might not have enough gravity to hold on to its atmosphere. Mars itself did have a blanket of air once, but it was probably blasted away by incoming asteroids billions of years ago. If the planet is too big, gravity might have pulled in too much atmosphere, which would create crushing pressure at the surface. A world four or five times as massive as Earth might be able to support life. But anything bigger than that could cause problems.

Life Not As We Know It

This second system is called the Planetary Habitability Index, or PHI. According to Schulze-Makuch, humans have a tendency to be Earth-centric. This ratings system helps us keep an open mind about how life might exist under other conditions.

It includes planets that have a solid surface of some kind, protected by an atmosphere of some kind. Other things necessary under the PHI system are some sort of energy source (sunlight, say, or geological heating); some sort of chemical environment that allows the formation of complex molecules; and the presence of a liquid solvent—but not necessarily water.

Section 3

A Likely Target

When the PHI standards are applied, Saturn's moon Titan comes out ahead of Mars. Titan has a dense nitrogen-methane atmosphere, while Mars has almost no atmosphere at all. Titan also has lakes of liquid hydrocarbons—mostly methane and ethane. And it clearly has plenty of complex chemistry going on, as revealed by the Huygens probe that touched down there in 2005.

But even on a world like Titan, life would be at least vaguely familiar, because it would be based on carbon chemistry. Scientists have also speculated on the possibility of life forms based on silicon, and that's part of the PHI as well. A planet with complex silicon chemistry is "not as high up on the PHI," says Schulze-Makuch, because silicon isn't as chemically *versatile* as carbon. Still, he and his *colleagues* don't want to out rule any possibility too soon.

The search will get easier as technology improves. The best bet would be if the powerful telescopes on astronomers' wish lists actually get built, but finding the money for these projects is difficult, too. Still, these new ways of looking for alien life give us our best chance of learning if somewhere out there we have galactic *kin*.

Reflection Ideas

- What was the journalist's motivation for writing this article? Was he successful in his goal? Explain.
- Should the government spend money searching to find alien life and new planets? Explain.
- What would be the benefits or disadvantages to finding alien life or new planets? Explain.
- What was the most interesting thing you learned? Explain.
- Find a passage from the article and explain why it grabbed your attention.

Anybody Out There?

Vocabulary

- Provide definitions for the following terms using an outside source (Internet or dictionary)
- Create an original sentence for each word

1. ultimate-

2. essential-

3. colleague-

4. kin-

Reading Questions

5. Why do you think scientists like Dirk Schulze-Makuch want to find alien life and new planets?
6. How might finding new planets similar to earth impact your life?
7. How might discovering new planets and encountering new life forms impact our technology?