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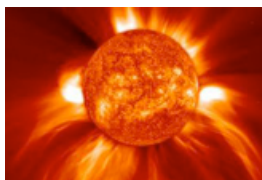
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Stars May be Cosmic Road Signs to Intelligent Aliens

By [Clara Moskowitz](#)
Astrobiology Magazine
posted: 05 November 2009
08:03 am ET

When scientists search the heavens for habitable worlds beyond Earth, they don't necessarily know what to look for. A new study has found that the most probable place to find intelligent life in the galaxy is around stars with roughly the mass of the sun, and surface temperatures between 5,300 and 6,000 Kelvin (9,100 and 10,300 degrees Fahrenheit) - in fact, stars very similar to our own sun.

Learning that sun-like stars are [good candidates for life](#) may not sound surprising, but it isn't always what scientists have thought.

"The principle of mediocrity says that, barring any evidence to the contrary, our observations should be typical among those of all intelligent observers," said researcher Daniel Whitmire, a physicist at the University of Louisiana at Lafayette. "But the typical star is not like the sun - the typical star is a low mass star. We don't find ourselves around a typical star and we show the reason why in this paper. Our results confirm the principle of mediocrity as applied to the sun."

Sun-like stars are [actually a minority](#) in the galaxy - 93 percent of stars in the Milky Way are less massive, less luminous and cooler than the sun. Though the typical star in the galaxy weighs between one-tenth and half the mass of the sun, life is more likely to be found around the more unusual variety of stars like our own, the researchers found.

To make their calculation, Whitmire and colleague John Matese combined models of how planets form with data on the distribution of stars in the galaxy as a function of mass. The planet models show when worlds are most likely to form in the [habitable zone](#) - a Goldilocks region around a star in which a planet would be just right for life - not too close that its surface would be boiling, and not too far that it would be frigid either. Planets in the habitable zone are the best candidates for having liquid water, which is thought to be a prerequisite of life.

In general, the planet-formation theories predict that more massive stars are the most likely to have planets in the habitable zone. So the larger a parent star is, the more likely its planets will have environments [conducive to life](#).

But this advantage of larger stars is counteracted by the fact that more massive stars are less abundant - there are fewer big stars out there. In addition, the more massive a star is, the shorter its lifetime. That makes it hard to find very massive stars that have lived long enough for complex life to develop.

The researchers weighed these factors against each other to calculate

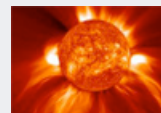
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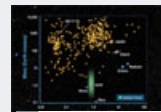
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Stars like our sun may be the most likely to harbor intelligent life in the galaxy. Credit: NASA/SOHO



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Artist's visualization of one kind of habitable planet that might exist in the galaxy - a "water world" with a creature living in its vast, planet-covering ocean. Credit: Nahks Tr'Enhl



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Distributions of mass and orbit size for the extrasolar planets so far discovered. The habitable zone is marked in green. Credit: NASA

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John_with_a_B wrote: posted 05 November 2009, 9:39 am ET

Interesting article, but I get the feeling it is saying basically that stars that have life on their planets must be stars like our sun, because our sun has life on one of its planets. I have a few problems with it though.

Firstly, how do we know that life on any planet must take the same amount of time to evolve in every situation? I don't see why there may not be a wide range in the time needed. Perhaps there are planets with very more conducive conditions for life around other stars. Maybe it is quite variable and depends more on random mass extinctions.

It must be a given that a star that supports life bearing planets must be more than a generation old. A star with planets forming out of pure hydrogen would not have enough heavy elements to provide the carbon and other elements necessary for life as we know it, or likely any other kind. There would have to be an abundance of heavier elements to form rocky or metallic bodies at all. I don't rule out the possibility of life on/in gas giants in the habitable zone of a star, but it certainly would be of a form we are not familiar with. Any star and planetary system must have a certain minimum degree of metallicity, but I'm sure we don't know what that is. Stars like the sun that are somewhat metallic have to have been formed from the remains of supernovae from the generations of stars before.

However, a very massive star that becomes a supernova could have a lifetime of much less than a hundred million years. Several generations of stars could have been formed in the first half billion years or so since the very early universe began. The Sun is massive enough to exist for a lifetime of 10 billion years or so. It is only middle aged now. Some red dwarf stars are thought to be very much older, one thought to be close to 13 billion years. Red dwarfs could have lifetimes of hundred of billions of years. Our Sun is commonly described as a yellow dwarf.

I fail to see how this study can rule out life supporting planets around 70 - 90% of all the stars in the galaxy. I can certainly see why stars like Blue Giants could not likely allow time for life to evolve with their lifetimes measured in tens of millions of years. But red dwarfs should certainly have some sort of habitable zone, even if it is much smaller and closer to the star than the sun's. A planetary system around a red dwarf could be over 10 or 12 billion years old now and have an expected natural lifetime (barring accidents) of tens, if not hundreds, of millions of years. Life on a planet in the habitable zone of a red dwarf would have far longer to evolve than life on a planet like Earth that is around a star like the sun.

I guess my objection to the conclusions in the article are based on the assumption that planets are unlikely to form around a star much smaller than the sun. There seem to be planets that form without a star at all! They'd be unlikely candidates for life but do exist. Just because some theory/model doesn't think it is likely that Gliese 581's planets should not exist (and at least one being thought to be in the habitable zone), shows the lack of faith the theory/model itself deserves.

"In general, the planet-formation theories predict that more massive stars are the most likely to have planets in the habitable zone."

The habitable zone is surely not a fixed distance for all stars, but surely depends also on the star's luminosity.

I am sick of the common modern headset that says because some inadequate model fails to predict the nature of the observations made means that then what is observed is at fault, because the model must be right! If that erroneous logic were to prevail, then because we have no model yet that explains how life began it can safely be said that it does not exist! Such utter nonsensical arrogance! Only recently this

site had an article about a model which was announced that explained (allowed for) the formation of binary star systems. It was like now the majority of bastard stars in the universe in multiple systems gained some sort of legitimacy and were blessed by the High Priests and forgiven for existing without benefit of clergy (or theory).




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jerrycobbs wrote: posted 05 November 2009, 9:54 am ET

This makes sense as far as it goes, but given what we are now finding out about our own solar system, we need to be careful not to focus too closely on trying to find other Earths as places for life. Right now it is looking like the most favorable spots for life in our system are the moons of Jupiter and Saturn. With the abundance of "hot Jupiters" and other giant exoplanets out there, I'm thinking when life is found elsewhere it may very well be on a moon which orbits one of these large planets and gets its energy from the planet as well as the star. That opens up the potential habitable zone considerably.

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StarofDavid wrote: posted 05 November 2009, 9:57 am ET

And it took scientists AND money to figure this out. Reminds me of that story in a major magazine a few years back, in front cover headlines stating "Men and women are different". The average 7 yr old could have told you either. Now we know where all that money that Nasa needs has been going.....sheeeesh

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Bill_Wright wrote: posted 05 November 2009, 10:18 am ET



How speculative can one get?
Bill

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triathlonJOE wrote: posted 05 November 2009, 11:10 am ET

Cool. 10 billion good candidates in this galaxy alone. There should be a good deal of space faring species out there. So we are either being ignored or shunned which though a little insulting is not entirely surprising OR, we have not been spotted yet, which may not be a bad thing actually since we can not predict the intentions of another species and prudence says we must assume the worst.

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TimeTheFinalFrontier posted 05 November 2009, 11:32 am ET wrote:

Had the Chicxulub impact happened 50 million years earlier, perhaps intelligent life on this planet would be 50 million years old now. Intelligent life is probably not constrained by the lifespan of the star, just the opportunity for the right conditions.

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DW_Wright wrote: posted 05 November 2009, 11:32 am ET

Wouldnt it also help if you factor in a system like ours with the smaller rocky boddies in the inner part and the larger gas ones on the edge's? Since the gas giants would help to reduce deady collisons on the young planets, help to stablize orbits and clear out the inner solar system of deadly junk on their way to a outer orbit

-i read on here an article awhile back modeling our young solar system with the gas giants further in and they moved out, which did make some good sense-

so even if we cant yet detect smaller rocky bodies in other systems can we measure and adjust for the gas giants that are further out? this might also provide a hint on the size of the "inner" part of that solar system and im sure that with the proper models it would show a more "friendly" enviroment.

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Stockeraties wrote: posted 05 November 2009, 11:36 am ET

Ball-cox. I expect all stars have a goldilox zone so really it depends on if we find planets in those places, of which there will be plenty

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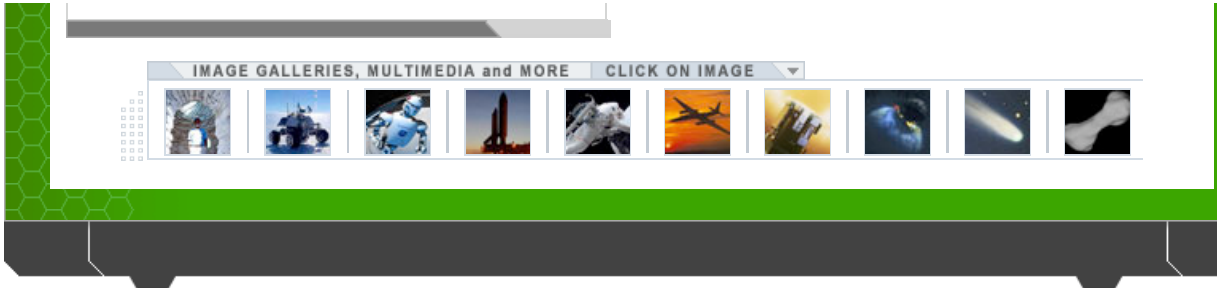
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