

Re: No Grace Period for Metabolism Either

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From: Erwin Moller (*since_humans_read_this_I_am_spammed_too_much_at_spamyourself.com*)

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Date: Thu, 21 Oct 2004 15:27:15 +0000 (UTC)

Hi Tom,

TomHendricks474 wrote:

>>> *Let's turn things around. Take out the sun – tell me
>>> how that would lead to life. I couldn't.
>>> We have taken the heat cycle for granted. I think life
>>> is a reaction to a heat cycle and life is just that which best adapts
>>> to
>>> the heat cycle (and later other adaptations when that prime survival
>>> need is solved)
>
>>I don't expect any life without the sun (or other source of energy).
>>Again: I don't think anybody is disputing that.
>
> But none see its importance – life is not that which
> emerged independent of its environment , instead it was that which in
> response to the sun heat cycle (remnants of which we see in every cyclical
> element of life) was able to survive.*

Of course.

You make it sound like we disagree, but we don't.

Life emerges NOT independent of its environment!

Whatever happened in the very beginning, I am quite sure that if you put that pool of prebiotic life on the surface of Venus, it would not be very successful and most probably fall apart in a short time.

The heatcycle/suncycle is of course very important in how life evolved on this planet.

I am just not convinced that that specific heatcycle was REQUIRED to ignite life.

As far as I am concerned, another form of energy might pull off the same trick.

We just don't know (yet).

> *Life didn't evolve to get to us*

Indeed. Nobody is claiming that. :-)

Life evolved without a purpose.

The only 'purpose' is making copies of itself.

Or more exactly: "Those (individual/complexes-of-molecules) who make copies of themselves tend to exist after some time passed."

> *It evolved to survive the heat cycle.*

Probably.

And it evolved to survive in less energy-rich environment.

And it evolved to survive changing electrolyte concentrations.

And it evolved to survive temperature changes.

etc.

I think you (we) have to take a step back and just state:

—> Life evolved to best fit its environment <—

('Best fit' in the sense of 'making-the-most-copies')

If that includes the heat cycle: fine.

But it includes a lot more. It includes everything that influences the success of the replication.

> *(One can see the sun cycle in every living thing*

> *Note how all life shuts down in low energy, and speeds up in high – its*

> *clear as 'day and night' that only in a very few instances can any living*

> *thing do anything outside of the sun cycle)*

Well yes.

The sun plays a dominant role in our life nowadays. It is fueling our planet's surface with energy.

Really, no discussion there about the importance of the sun.

>

>>> *I think we will and soon. But not if you are looking*

>>> *for a fluke replicator out of thin air. IF you accept*

>>> *that life is that which best survives a heat cycle at the time of the*

>>> *origin – then recreating the exact conditions of that heat cycle,*

>>> *atmosphere, earth spin, tides, etc. will recreate the origin.. We are so*

>>> *close I can almost taste it IMO.*

>

>> *Well... what gives you that certainty?*

>> *What if the chances for 'spontaneous creation' of self-replicating molecules*

>> *is extremely small, even under the 'right' conditions?*

>> *What if you need to run an experiment on a planetary scale for 500,000,000 years?*

> *Because a. I don't think there was a spontaneous creation,*

No?

Maybe we have a conceptual difference on looking at the matter.
(I am not native speaking english, so I might also miss some points.)

But this is how I look at 'spontaneous creation'.

It is just a word to describe something happened, nothing more.
In this case the chemical reaction, which might be very rare, or maybe not-so-rare. But in the end it is just in the numbers (which we both cannot produce).

My point: Let's not discuss the phrase 'spontaneous creation'. It just describes something happened, maybe rare, maybe less rare.
The point is that the circumstance made it possible to happen.

and b. I don't

> *think anything is 'self' replicating. Its a completely different paradigm*
> *and looks at every action of life in completely different terms – terms*
> *that now make sense.*

Sorry, not sure I can follow your line of thought.

If you mean: no such thing as 'self replication' without the right environment setting.

Then I agree. :-)

But maybe I misunderstood.

>
> *Once you know that life is a reaction to a specific sun/heat cycle – you*
> *recreate it as best you can – and it*
> *should recreate life. (Miller's experiments where nothing but a heat cycle*
> *– in which the lightning was the cyclical energy source instead of the*
> *sun)*
> *It is like a basic chemistry experiment – you start with same materials,*
> *subject them to the same changes, and get the same product.*

But life is a lot more than the reaction to the sun/heat cycle.

This is just one ingredient, possibly a very important one.

So, yes, I think you are right to pursue the effect of a sun/heat cycle when trying to recreate life. But you won't succeed if you do your experiments on H₂O only.

You probably won't succeed either if you run your experiments at an average temperature of 5000 Kelvin.

My point: It is the a whole complex of circumstances you need, probably including a sun/het cycle. No point in overemphasizing one of them.

But in your view: many are underestimating its effect. :-)

>
> *The difference now is that IF I am correct we know why life is here – its*
> *not a fluke event , its the planet wide reaction to a heat cycle in a*
> *specific environment and temp range.*

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- > *Up until now the best we knew was that life*
- > *was descent with modification. I asked, descent of what?*
- > *And IF I am correct, its the descent of something that is an energy*
- > *moderator (a reaction to the heat cycle*
- > *Energy moderation with modification of that energy moderating system –*
- > *through descent) Now we can make fast progress IMO.*

Could all be very true.

But please enlighten me a bit:

What exactly is that energy–moderator you speak of?

Why call it energy–moderator?

What is it exactly that it is moderating?

Is it storing energy?

It heat changing it's structure?

Are certain photons changing it's internal energy levels? (Like photosynthesis)

I asks these questions because I do not see how this leads to selfreplicating systems.

It still doesn't answer the question where life came from.

- >
- > *(snipped)*
- >> *That aside, lets look at your argument:*
- >>
- >>> *Let's make it not a fluke but a sure thing –*
- >>> *Let's say*
- >>> *1. the sun powered all prebiotic processes.*
- >
- > *Wrong assumption here.*

Which assumption?

You react to your own statement. :P

(Check it)

- > *You are still thinking*
- > *of life as that which independently uses energy and*
- > *has turned to the sun for that. No.*
- > *Every aspect of prebiotic life is that which is pushed by energy –*
- > *Chemicals have no desire for metabolism.*
- > *If they did salt, water, and rocks would replicate.*
- > *Life is not the voice – its the echo, the sun is the voice.*

Tom, don't put words into my mouth.

I didn't say that, and I even don't think that.

I know chemicals don't have a desire.

Actually I think describing early life should be done without any sense of purpose.

Everything happens.

That's all.

And we we say that 'life turned to the sun for its energy' we actually should say that 'complexes of molecules that started using the sun as their (in)direct source of energy tend to survive better.'

There is nothing more to it.

(Unless of course you want to throw in a God.)

>

>>

>>*Sorry, bad assumption. We already know of lifeforms living on*

>>*Sulfer-energycycle deep down the sea where the sun is not delivering*

>>*energy. The sulfer is delevering energy, no photosyntesis.*

>

> *But can you prove that that was not an evolved alt*

> *to sun based energy?*

No, but it shows that no sun is needed anymore.

And futhermore: Can you prove that life can only develop under a sun?

You cannot.

We both cannot prove these statements, not in a slightly mathematically plausible way.

>

>>*I think it is just a safer bet to say that energy in some form is needed.*

>

> *Why?*

Why?

Simply because of thermodynamics.

Creating molecules out of atoms that are not in their lowest energystate (like H₂O, CO₂, etc) costs energy.

It reduces the entropy at that spot and increases the entropy of its environment.

That is why I cannot imagine life without an energysuply.

> *No chemicals need energy or metabolism. It's just the opposte – the sun*

> *FORCED energy on an inert planet – and*

> *it FORCED every step of the way from chemicals who, if they had any desire*

> *whatever – was probably to be left alone! Do you think bases want to*

> *replicate? I'm being outrageous to prove a point and to clear the way for*

> *a new way of looking at the origin.*

I am not claiming chemicals need anything. What do chemicals care?

For that matter: What do you and I care since we are a bunch of chemicals anyway?

The fact that a few chemicals don't care, doesn't mean that no 'higher processes' are taking place, invisible for that chemical in question. Just like the fact that 1 neuron in your brain doesn't contain a lot of 'you', it creates you when connected up to the rest in the right way.

The 'higher processes' I talk of, that are 'invisible' for that chemical itself, are for example the fact that it takes place in catalyzing some other process, maybe replication.

The mere fact that the chemicals don't care/know doesn't mean that it isn't happening!

We are trying to describe a process, we try to unravel what could have happened at the very beginning of life on earth.

>
> (*snipped*)
>
>>> *Thus order is everything.*
>>> *1. 'sun selection.*
>>
>> *What do you mean by sunselection?*
>> *Do you mean that if our planet was in the outer regions of a red giant,*
>> *life would have a really hard time?*
>
> *Two different things here. As to the 2nd one about a red giant – as you*
> *probably know there are all kinds of restrictions on the HZ or habitable*
> *zone*
> *of a planet for it to have a possibility for life – and a red giant may*
> *not be workable.*
> *But I meant 'sun selection' as something new. It is that which survives*
> *the sun cycle. It could be zircon, or it could be that prebiotic material*
> *that is not burned up.*

Allright.

You are right of course.

If something didn't survive the suncycle, it wouldn't be very successful.

I have one big 'BUT'.

Again you throw in the Sun as number 1.

Why not throw in a decent temperature range as number 1?

Why not throw in a reasonable radiation bombardment (no heavy gamma rays eg.) as number 1?

Why not throw in a few needed chemicals as number 1?

(Carbon or Silicon come into mind)

My point (sorry for repeating): You need a whole situation that makes sense for starting evolution, and that is not just the sun.

Really, I have no problem with looking at the sun as an important piece of the puzzle, I hope I made that clear, but I have the impression you focus on the sun too much.

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There are much more ingredients, and even if we don't know them exactly, we can set a lot of reasonable, based on educated guesses, boundaries.

I know you agree on that because you threw up the Habitable Zone yourself.

- >
- >>> *2. chemical selection when sun cooled*
- >> *This means that on the surface of the planet some molecules can only exist*
- >> *when the temperature doesn't exceed certain values, right?*
- >> *Or do I miss your point?*
- >
- > *Well I didn't say that correctly. Sun didn't*
- > *cool, the planet did.*
- > *When our new planet began to cool, temperatures dropped.*
- > *Any life that could utilize energy other than the sun's forced energy,*
- > *would have an advantage. If they could use chemical energy/ stored energy,*
- > *that would*
- > *be a big advantage over that which used sun energy alone. But remember*
- > *all these chemicals are forced to use sun energy or they become inert or*
- > *shut down (another advantage to evolving to chemical energy – then you are*
- > *seldom shut down)*

Don't worry, I never forget that.

- >>
- >>> *3. natural selection when chemical selection produced the first*
- >>> *replicator. Now nothing is a fluke or a dream or a perchance.*
- >>> *It's clear and obvious.*
- >
- >> *I don't agree.*
- >>
- >> *I DO agree with you that the circumstances must meet certain criteria,*
- >> *like*
- >>
- >> *restraints on the temperature. Complex molecules fall apart at high*
- >> *temperature.*
- >> *That far I agree.*
- >> *The problem is with the chemical beginning of life.*
- >> *The bottomline is that nor you, nor me, nor anybody can tell how things*
- >> *evolved in the very beginning.*
- >> *What are the chances of creating a self–replication molecule*
- >
- > *We are in two completely different worlds.*
- >
- > *The first replicator is nothing but a reaction to*
- > *a heat cycle (it may well be nucleotides denaturing*
- > *in high heat or cells dumping waste) . You act as if it must be there*
- > *because*
- > *we need it to get to us.*

Do I?

Sorry to hear give you that impression. There must be something wrong with my expression in the english language because what you describe is really far from the way I look at it. (I am from the Netherlands, Europe.)

Really, where do I give you the impression that first selfreplicators **MUST** be there because they are needed to get to us?

Yes, they **MUST** have been there because were are here now, so somehow it must have happened, **BUT** I am not saying (and haven't said it before) that they sprang into existence for that purpose.

That is clear nonsense.

We know it happened, and we are discussing here **HOW** it happened.

Nobody is claiming that some force-of-nature is forcing the atoms to behave in a way to leads to selfreplication.

But **WHEN** we have selfreplication, we have evolution.

- > *Or that it has to emerge– so we*
- > *have to think up how it could.*
- >
- > *I'm thinking from a completely different paradigm.*
- > *Think about what survives another day – not what*
- > *biology leads to us – there was no goal oriented*
- > *first replicator – agreed?*
- > *Think of replicating as forced changes by the sun's*
- > *heat. Nothing more at the origin.*

Tom, I know all these things. :-)

Really.

The **ONLY** thing that counts in life is who lives another day.

The **ONLY** thing that counts in evolution is who lives to see another day.

- >
- > *You recreate setting a match to tinder and you get fire.*
- > *You recreate sun cycle heat on primal soup, you*
- > *get life. It has to happen – its that chemical reaction*
- > *that continues the process. What isn't life is burned up*
- > *or shut down.*
- > *It's true you can't recreate a fluke or a magic moment*
- > *but this wasn't one – it was a planetary lab in which that that survived*
- > *and had novel ways of reacting to the forced heat had a novel name – life*
- > *It was not a single moment – it was a planetary selection process.*

Yes.

Do we disagree there?

I think you still don't explain anything.

- >
- >>*DNA/RNA replicating system, which needs a whole bunch of supporting*
- >>*molecules to deliver that trick.*
- >
- > *You are doing wish fulfillment – take that completely*
- > *out of the equation. The only thing we should be thinking of is what best*
- > *survives that day under that sun and in that environment. Answering that*
- > *is life.*

According to that definition a rock is life.
It survives to see the other day (most of the time).
You need a better definition.

- >
- > *(On the fluke self replicator)*
- >>*I am not doing any of these things, and I don't know of any respectable*
- >>*scientist who does.*
- >
- > *Yes you are, you replace creationist moment with*
- > *first replicator moment as if the latter was not divine*
- > *but a fluke – it was neither. It was the reaction to what went before and*
- > *the only cyclical heat source that went before, during, and after was the*
- > *sun heat cycle.*

Indeed.

So what?

Does that contradict each other?

In fact I expect, but cannot prove it just as you cannot, that a heatcycle
is a great way of making it more likely that life is created/formed.

I think you easily sidestep a very important question, that could bring us
more together:

HOW LIKELY IS IT SELFREPLICATING MOLECULES COME INTO EXISTENCE?

Try to answer that question and you will find a whole bunch of insights. (No
ment in a patronizing way, but it gave me a better view on the matter.)

Isn't that what we are talking about?

That is why I said earlier to you: Suppose that the chances of 'spontaneous
creation' of selfreplicating molecules is extremely small?

How can we estimate such chances?

Can You?

The problem is that everything on the planet has to be taken into account,
and our science isn't really that far.

So I ask you again:

How can we estimate such chances?

Can You?

What tools would you need to make a good estimate?
What do you need to know?

To name a few:

- 1) You need to know all possible forms of selfreplication. (I take it you don't think what happened on our planet is the only possible way.)
- 2) Of all these forms of selfreplication: What circumstances where possible on our old earth?

I can continue for a long time, and I am sure you can do the same.

My problem with your statement is this:

"It was the reaction to what went before and the only cyclical heat source that went before, during, and after was the sun heat cycle."

As if that explains anything.

It doesn't.

I don't see any explanation for selfreplicating molecules.

>

> *(snipped)*

>

>>*That is why I postulated that it is likely that the first selfreplicating*

>

> *They weren't self replicating at all. That is a term that is false and*

> *shouldn't be used anymore by either of us.*

> *If they were 'self replicating'*

> *they could replicate anywhere by themselves. That is the def. of self in*

> *self replicating.*

>

> *OK take it beyond pluto and self replicate.*

I used that argument myself earlier.

You are playing wordgames.

Taking a bunch of 'selfreplicating molecules' to Pluto pretty surely will end that line of evolution.

It is so obvious that we mean something else by 'Selfreplication' that I even didn't bother to mention it.

New difinition:

Selfreplication is the ability to make copies of oneself out of the surrounding material under favorable circumstances.

Something along that lines is what I mean by selfreplication.

>

> *It is a reaction to a heat cycle – again there is no*

> *separate independent emerged life form –*

> *it is a REACTION to the sun cycle. It can't self*

- > *replicate*
- > *If it could it could do so not only at absolute zero*
- > *but in the center of the sun.*

indeed.

And in interstellar space too you will find some difficulties.

Of course that is not what ANYBODY means by selfreplication.

Why toss that up?

Is your opinion of fellowscientists/enthousiasts so low that you think they mean by selfreplication such a strange thing?

- >
- > *Again we are giving these chemicals human behavior*
- > *we think we are independent and separate from that which is around us. So*
- > *we project this on chemicals*
- > *reacting to heat.*

Nope, nobody does that.

At least nobody I take seriously.

- >
- >> *molecules were in an energyrich environment. That makes is many/many times*
- >>
- >> *more likely to create the complex molecules capable of selfreplication.*
- >>
- >> *Futhermore: This energy has to be available in a form suitable for those*
- >
- > *Why – to fulfill our destiny? You act as if metabolism*
- > *was a goal not a reaction to what went before.*

No I don't.

I am merely describing what favorable conditions are likely to form the conditions for forming the first selfreplication.

- > *We are 180 degrees a part.*

No we are not.

We are if you insist putting strange things in my mouth/brains.

- >
- >>> *that on the spot where the first replicating molecules where*
- >>>> *forming, the environment contained similar energy–rich molecules.*
- >
- > *If using energy was such a positive step, why didn't*
- > *salt, water or rocks use it too? Metabolism was not a choice, nor did it*
- > *emerge as a fluke event.*

Question: Why rocks don't selfreplicate?

Answer: Because they can't.

If they had some mechanism that was trying to replicate them, they WOULD replicate under the right circumstances.

"Metabolism was not a choice, nor did it emerge as a fluke event."

I think that is wordplay again.

"Metabolism was not a choice" is of course true.

How can you talk about 'choices' when describing chemicals?

"nor did it emerge as a fluke event."

Now you make it sound as if I claimed that the whole citric-acid-cycle was there by accident. By a fluke.

Chances for that happening must be in the range of Douglas Adams 'Infinite Improbability Drive' out of the Hitch Hikers Guide To The Galaxy. Very small indeed.

Metabolism is big word, but it started by small steps.

In my opinion it is much wiser to look at probably/favorable circumstances for something to develop.

Yes, still a lot of 'fluke' needed, but at least we are talking about more reasonable chances.

Please indulge me with my example/thought experiment:

1) In a favorable environment some molecules are rudimentary capable of making copies of themselves, making lots of mistakes.

Let's not discuss where they came from here, I am just trying to get metabolism in.

Most copies result in molecules that are not able to copy themselves anymore. Some do copy more reliably and tend to become the majority because of that.

2) Quite soon the favorable environment changes because of this chemical activity. No ready-to-use building blocks are available anymore.

3) Many/all molecules cease their copying-activity because they miss their building blocks.

4) Now IF some catalyst is around that can make things go running again (by making some missing building blocks out of until-then unusable chemicals) that would make a good survival-combo.

Still we do not need any 'intention' or 'plan' before you shove that into my mouth again. :-)

I just state that certain combos of molecules tend to survive better in a certain environment.

5) Now IF these combos of molecules accidentally develop a way to keep them together (by binding them in the same space by using membranes or something) they made their first step to metabolism.

The problem with the above scenario is that all the needed molecules need to be replicated.

So the need for early 'genes' is needed.

Or better put: IF some sets of molecules are capable of recreating themselves, they have a huge advantage above those that can only copy themselves.

('Set' is the keyword)

Does that above scenario sound very unlikely to you?

>

>>>> *Most probably NOT ATP of course, but just energyrich molecules ready to*

>>>>

>>>> *react and making their energy available to the first replicating*

>>>> *molecules.*

>

> *Cause these inert molecules wanted to get to us?*

No.

Just because of the physical circumstance, chemical reactivity, the sun.

Just because the molecules were around.

No magic, no creationist argument needed.

Why do you insist in letting me say that molecules have a will of their own?

> *Why metabolism?*

> *Your way, we never ask 'why metabolism', my way it is easy to answer – it*

> *was forced energy from the sun that was later utilized by novel variants.*

I never ask 'why metabolism' ??

Nonsense.

Without metabolism life can only exist when every needed molecule is around, ready to use.

When less ready-to-use molecules are available, the need for metabolism increases.

And before you say I am putting human concepts on molecules, let me rephrase:

"Those sets of molecules that cannot use alternative sources of energy tend to extinct, while those who can keep on copying themselves."

> *Don't you see how different those two ideas are?*

I still don't understand how you translate the sun/heat cycle to metabolism.

You attack my suggestions, which is ok, but I don't see any explanation of your own ideas.

So to answer your question: I don't know how far apart our ideas are. I

know you misread my statements a lot though. :-(

Maybe you had this discussion before with somebody, and that person had those ideas. Don't know.

>

> *False scenario:*

>>> *1. first replicator pops up*

>>

>> *Yup.*

- >
- > *Magic? or fluke? Now remember if you say fluke,*
- > *we are going to have another fluke for cells, another*
- > *for protein , another thrown in for using ATP, another*
- > *for getting them all in one place at one time, another for getting them to*
- > *work*
- > *in sync, – so the odds are still good for you that this happened? You*
- > *can't seriously defend this can you?*
- > *Magic is more logical.*

No, here we disagree on a clear point at last.

I think you miss the whole point of evolution when you say that.

Nobody is claiming a fluke–creation a whole complete system we know nowadays that uses proteins, ATP, etc.

Chances for that happening are very close to 0, and I don't believe in that.

The point is this: Once you have some basic really–imperfect selfreplication, evolution kicks in.

This means that 'inventions' are added IF that makes the system become 'better'. ('Better' as in making more offspring–molecules that are themselves capable of selfreplicating)

It is a step–by–step process.

Remember that all chemical reactions needed for life are 'naturally occurring' and catalists speed up the process. These catalists are the ones that are needed. Nowadays in the form of proteins, but this could very well be something else in earlier days.

- >
- >
- >>> *2. It has a grace period that is*
- >>> *unexplainable in any scientific rational where it is not destroyed in*
- >>> *a*
- >>> *hadean time period.*
- >>
- >>*This Hedean period was not one of the friendliest in Earths history.*
- >>*But why is it impossible to survive this period?*
- >
- > *With a magic wand it's a piece of cake.*
- > *Otherwise there was a 'sun selection' that weeded*
- > *out anything that was burned up.*

So you think you need a magic wand to survive that Hadean timeperiod, but you let your own processes survive it too? You even make them a logical unavoidable consequence of that same heatcycle.

(But I could be missing your theory, see end of the posting.)

So now I am kind of cunfused what your point is.

>

>>*But maybe you should explain more about this 'grace-period'.*

>>*Or point me to some source. I'll be happy to read some (online preferably)*

>

> *It's an original idea with me. But I think it's clear*

> *enough – you can't have energy while you are*

> *evolving to a system that uses the energy you need to do anything. It's a*

> *catch 22.*

>>

> *(snipped – I'm repeating myself from here*

> *on.)*

LOL, I did the same in my posting. :-)

>

> *And forgive my 'bops to the head' sarcasm.*

No problem.

I just bite back if I feel like. :P

What is important is that we like to discuss this. :-)

Although I must say it irritated me sometimes when you assume I have certain ideas that I do not.

> *It's hopefully to suggest novel ways to look*

> *at life that IMO help see it more clearly.*

Ok, let me be constructive:

This is what you need to do for mere mortals like me to understand your point:

1) Describe and make it plausible how a heatcycle system like on our planet gave rise to metabolism and selfreplication.

Because that is what we were discussing, but I still don't see your 'story'/suggestion.

2) Make it clear to me why you resist so strongly against the idea of selfreplication in a favorable environment, leading to evolution, leading to metabolism.

It is important to understand that evolution is nothing magical for me. It is just a logical result of the laws of nature and imperfect selfreplication.

>

> *Tom (th)*

Regards,

Erwin Moller