

Re: No Grace Period for Metabolism Either

Source: <http://sci.tech-archive.net/Archive/sci.bio.evolution/2004-10/0275.html>

From: Erwin Moller (*since_humans_read_this_I_am_spammed_too_much_at_spamyourself.com*)

Date: 10/18/04

Date: Mon, 18 Oct 2004 21:54:57 +0000 (UTC)

TomHendricks474 wrote:

>>Hi Tom,
> And Hi to you.
>
>>> *There is no grace period on metabolism in the origin.*
>>>
>>> *Some scenarios suggest that first came a first
>>> replicator – then followed a grace period where
>>> natural selection allowed this first replicator to
>>> develop a metabolism system to power itself!*
>>>
>>> *I ask what energy source was there to develop the
>>> metabolism system during that grace period? And how
>>> is it that that first replicator was in no way
>>> harmed or destroyed by the environment.*
>>> *It just couldn't happen.*
>>
>>*But it did.*
>
> *Yes it did because there was constant and cyclical energy
> impute from the sun – a heat cycle that was constant enough to adapt to
> but variable enough to produce variants to allow for selection.*

Well... yes of course.

Is anybody disputing that?

> *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.

>
>
>> *Maybe not in the way that those theories you refer to describe, but it*
>> *did. I don't expect we will ever find out, with reasonable certainty, what*
>> *happened during the very origins of life.*
>
> *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 selfreplicating 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 to have a chance of 1% to create a selfreplicating molecule?
I just don't know the numbers.
I think nobody knows.

What we actually need are more observations to get away from our n=1
'experiment'. ;-)

Until then I expect it is really hard to do any statistical feasibly
predictions on the matter. :-/

>>
>> *Your point that any replicating machinery needs energy to run, is of*
>> *course true.*
>> *Replicating complex molecules reduces local entropy, so costs energy to*
>> *achieve.*
>> *You wrote:*
>>> *Some scenarios suggest that first came a first*
>>> *replicator – then followed a grace period where*
>>> *natural selection allowed this first replicator to*
>>> *develop a metabolism system to power itself!*
>>
>> *IMHO:*
>> *I expect that the spot where this first happened had a good environment*
>> *with*
>> *energy in the 'right' form available to the first replicating molecules.*
>
> *Oh please don't expect or accept or take anything for*
> *granted.*

Erm....
Some things are just not really suitable for controlled experiments.
Like the origin of life.
Or the beginning of the universe.
Not everything can be reduced to a labcontrolled experiment.

Shame, but that's just it.

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.*

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 photosynthesis.

I think it is just a safer bet to say that energy in some form is needed. It can be electromagnetic, or chemical or maybe even something else.

- > *2. when the sun began to waned or cool, the prebiotic*
- > *processes that switched to alt forms of energy were the only that survived*
- > *that environment.*

ok.

- > *Thus order is everything.*
- > *1. 'sun selection.*

What do you mean by sunselection?

Do you mean that if our planet was in the outer egions of a red giant, life would have a really hard time?

- > *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?

- > *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.*

Is it?

I don't agree.

I DO agree with you that the circumstances must meet certain criteria, like restaints on the temperature. Complex molecules fall appart 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 (or a set of

selfreplicating molecules)?

How will you estimate a reasonable chance for that to happen with our current understanding?

We don't even know a lot of selfreplicating systems. We know of our own DNA/RNA replicating system, which needs a whole bunch of supporting molecules to deliver that trick.

So how did that start?

I don't believe the all the molecules were just there by a fluke chance, so I really expect a lot of steps inbetween.

- > *The problem I see is that most still subconsciously cherish the 'life is independent and special' fallacy and instead of a creationist moment*
- > *they've barely switched to a first replicator springing out of thin air*
- > *moment. Both are wrong. Dumb that paradigm. Look at the environment as it*
- > *was. Don't try to anticipate life as something to fulfill a future event,*
- > *and it all becomes much clearer IMO.*

I am not doing any of these things, and I don't know of any respectable scientist who does.

You do not know how much life there is in the universe.

You don't know how big the chances were that selfreplication started.

You do not need a creationist-like argument to assume that it 'somehow' started.

In science it is 100% ok to say: I don't know that (yet!).

You wrote: "Don't try to anticipate life as something to fulfill a future event, and it all becomes much clearer IMO."

Agree. But again: Who is doing/claiming that?

>>

>>*eg: a popular energycarrier nowadays in our cells is ATP.*

>>*When it loses a Phosphate (ATP--> ADP) energy is available.*

>>*I expect*

>

> *Don't expect or postulate – prove.*

You want me to prove that energy-rich molecules were available on spot where the first life (selfreplicating molecules) arose ??

The only 'real' proof is timetravel, which I regrettably cannot offer you.

But I can make it plausible, I think.

If you look at the behaviour of atoms, you'll see that they have this tendency to react with each other in such a way that they end up with minimal energy.

This is why water doesn't fall appart in H₂ and O₂ (a lot) at our current surfacetemperature.

In the H₂O form the system released most energy. This is called lowest

energy state and that is where most molecules head to.

You need extra energy to create molecules that are contain atoms not combined in their lowest energystate.

That is why I postulated that it is likely that the first selfreplicating 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 molecules of course.

I only took ATP as an example, I have no reason to expect any certain molecules on that first-life spot.

Maybe a good physisist can make some educated guesses, I cannot.

>

> *that on the spot where the first replicating molecules where*

>>*forming, the environment contained similar energy-rich molecules.*

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

>>

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

>>*molecules.*

>

> *You still are depending on an order that seems wrong to*

> *me.*

Ok, I hope I can explain that a little futher.

For clarity: I am NOT telling you how-it-is, I am trying to understand your point, ok? :-)

> *1. first replicator pops up*

Yup.

> *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?

If our first molecule replicates faster than it is destroyed (by heat/radiation/etc) it will be there.

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) more about that.

Because I don't understand why you need a grace-period to explain the origins of selfreplicaing molecules.

> *3. Then sometime out of this fluke vacuum it evolves metabolism (which*

> *we note it didn't have before that so it was powered on magic dust?)*

> *I'm being sarcastic to prove the fallacy of the grace period – and to
> reset the order of events.*

Ok, sarcasm is ok.

But I still need more info on this grace-period.

Maybe we totally agree. :-)

I just don't know anything about the theories behind it!

>

> *I do believe ATP or phosphate rich compounds were key in the change from
> Sun power to chemical power. I do believe that wherever the phosphate rich
> bonds were, the prebiotic nucleotides and peptides would prosper – thus I
> believe phosphate rich bonds were probably the glue that connected the
> info nucleotides with the protein world .
> But that is another chapter. And a later chapter.*

Ok.

>>

>>*In that way the molecules were trapped to that location.
>>Drifting away too far from the energydelivering molecules would mean that
>>
>>they loose their energysuply and 'die' (stops replicating).
>>
>>That situation (replicating molecules in a natural environment that
>>contains
>>
>>energyrich molecules usable for the first replicating molecules) can be
>>
>>called stable (for some time anyway).
>
> That is way too iffy and improbable. See above.*

No, I am not claiming too much.

I am only claiming that these first selfreplicating molecules needed an
energysource, and when they are denied that source, they will stop
replicating.

Analogy: If I deny you cells ATP, they are in trouble.

>>

>>>>*From here on you can imagine that evolution favored those molecules that
>>
>>were able to create their own environment, by the use of membranes to
>>create an interior with the right mixes of needed molecules.
>
> But here is that anthropomorphism raising its human
> head. Life did not emerge to create its own environment.*

Indeed.

Life did not emerge to do ANYTHING.

It just emerged.

And any change these first molecules had themselves on their environment affected themselves, and so their own succes.

I don't need any 'direction' or 'plan' to explain the fact that the first sets of selfreplicating molecules could modify their own environment.

- > *EVERY aspect of*
- > *selection is adaptation to the environment.*
- > *EVERY aspect of pre–origin was to adapt to the environment.*
- > *How can any change that makes it less*
- > *adaptable to the environment be selected IN that*
- > *environment?*

It cannot.

Or more accurate: The chances for succes are the key–factor. Succes as in: Making the most selfreplicating molecules.

- > *Thus being independent of the environment would never be selected during*
- > *any period of this origin time.*

independent is a word I wouldn't choose.

It is not all black–and–white.

What about a set of molecules that can self replicate that 'adjust' their environment to suit it needs better?

You don't need a plan for it. Just the simple fact that a certain chemical action makes the local environment better suited will be favored.

Do you agree?

I am not talking highly developed membranes with receptors here, but just basic stuff.

- > *(Perhaps later – 4 billion years later – as selfish*
- > *genes – but that too is a much much later story.)*

Selection takes place from the very first moment of self replicating.

The 'invention' of genes is a very logical next step (from my current perspective), but I have no clue how difficult/likely that 'invention' will be.

No doubt it is extremely usefull, but how likely is it to develop in the first place?

I have no clue.

>>

>>*How this happens is of course all speculation, but I think you can safely*

>>

>>*say that the first replicating molecules had a great environment for that*

>>

>>*purpose,*

>

> *I dont' agree and would ask for more proof or studies*

> *or more specific reasons backed up by studies etc.*

You need studies for the the argument that the first replicating molecules had a great environment to come into existance?

That is self evident.

If they had a lesser favorable environment, the chances for them to come in existance were smaller. :-)

I am not claiming anything outrageous here...

Example: The chances for selfreplicating molecules to develop for the first time in the center of the sun is smaller than on Earth.

That is quite obvious of course. Too hot for stable molecules.

But again: The chances for selfreplicating molecules to develop for the first time at 5 degrees Kelvin is rather small too. Why? Not too much chemical activity at such a temperature.

Etc. etc.

I don't think you need a published paper to agree to the statement that the first selfreplicating molecules had a (relative) favorable environment for them to develop.

Of course there are a lot of uncertainties, i know that.

What I call favorable for Earth to develop our 'kind of selfreplication' could be very unfavorable on another planet where something completely different gave rise to selfreplicating molecules.

The question is: What was a favorable environment on Earth to develop our string of live?

Kind Regards,
Erwin Moller

PS: Tom, can you give me a few pointers on this grace-period? Maybe I understand your point(s) better after reading them. As far as my current knowledge goes, I don't see the use of this grace-period to develop metabolism.

>

>

> *and later on developed/evolved to systems with their own energy*

>>

>>*machinery, allowing them to leave the original spot, venturing into other,*

>>

>>*less favorable, environments.*

>>

>>*In that way replication came first, energy-machinery (storing/releasing)*

>>

>>*later.*

>>

>>*Just my 2 cents.*

>>

>>*Regards,*

>>*Erwin Moller*

>>

>>

>>>

>>> *In other words you need a time machine to take*

>>> *the evolved metabolism system back to when it*

>>> *was needed after the first replicator began*

>>> *evolving to the metabolism system that was needed*

>>> *to evolve the first metabolism system, etc! HUH???*

>>>

>>> *Comment?*

>>> *Tom Hendricks, Musea zine ed.*

>>> *<http://musea.digitalchainsaw.com>"*

>>>

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