

Re: Is there any reason for the evolution to be one way

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"Shaktyai" <Fabrice.Allais@xxxxxxxxxx> wrote in message [news:eu710b\\$1rlj\\$1@xxxxxxxxxxxxxxxxxxxxxxxxxxxx](mailto:news:eu710b$1rlj$1@xxxxxxxxxxxxxxxxxxxxxxxxxxxx)

Random walk with $p=q=0.5$ have a zero mean deviation: ie no evolution.
That goes for a model where a mutation of a gene is modeled in a 1D space. One step on the right or one step for each mutation from state A to B, from B to C, etc...
Such a model can not reproduce the experimental facts: evolution = there is a non zero mean deviation = there is a drift in the random walk.

Yes, such a model can reproduce the experimental facts. Evolution happens without a mutation bias, due to selection. Evolution can also happen with neither a mutation nor a selection bias, in which case it is called drift. Less well known and less important than either of these is evolution due to a mutation bias. If you want to know about this, I have suggested that you Google on mutation pressure G+C
But you need to know that this has nothing to do with why most evolution takes place.

I have in mind the 1D model (and I may be wrong there !), so the only solution is to assume that in general: $p(A \rightarrow B)$ is different from $p(B \rightarrow A)$.
To justify this I was thinking about the thermodynamics of a mutation. In my point of view, the two probability can be equal if $E(A)=E(B)$.
If the free energy of the initial and final state are different then the system will always spontaneously evolve toward the lower energy state and the two probability should be different. Of course there is always the possibility to bridge the energy gap with either a chemical catalyst, a photoabsorption, or an electronic collisional excitation (electron beam).
I might be all wrong but is there a systematic study of the energy required for a mutation to spontaneously happen ?

There is a lot of talk about Hamiltonian of Darwin's systems.

Re: Is there any reason for the evolution to be one way

Not among biologists, there isn't.

To write down a satisfactory theory, one must have a density probability whose integral is always one. In kinetics, this very fundamental point is induced by the hamiltonian structure that induces Liouville's theorem.

There is nothing corresponding to Liouville's theorem in biology. Biology does not involve any useful conservation laws. The basic units in biology *reproduce*. That doesn't happen in chemistry or physics.

In information theory, the probability space is constant and well defined. But in biology it is far from obvious.

You need to learn something about biology before you try to apply your physicist's intuitions to the subject. You will no doubt learn that biology is far more difficult and almost as sophisticated mathematically. Since you will probably want a mathematically oriented treatment of evolution, I would suggest that you start your education with Sean Rice's book "Evolutionary Theory: Mathematical and Conceptual Foundations". Also, read the chapters on mutation in the Alberts textbook on Molecular Biology.