Re: Addressing Scientific Reductionism

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- *From*: dkomo <dkomo871@xxxxxxxxxxx>
- *Date*: Wed, 29 Mar 2006 01:06:31 −0500 (EST)

Perplexed in Peoria wrote:

> "Wirt Atmar" <atmar@xxxxxxxxxxxxxxxxx> wrote in message
> news:e09bu0$2gpu$1@xxxxxxxxxxxxxxxxxxxxxx
>
> > Robert Kolker wrote:
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> > > dkomo wrote:
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> > > > Moreover, in a book I've just recently
> > > > slogged through, _The
> > > > Plausibility of Life_, such modular
> > > > organization has been strongly
> > > > selected by evolution because it greatly
> > > > facilitates the process of
> > > > viable phenotypic variation. Organisms are
> > > > modular because they can
> > > > evolve more easily if they are. A small
> > > > amount of genetic change can
> > > > result in big changes in organism
> > > > characteristics. No need for
> > > > Darwinian gradualism.
> > >
> > > Now that is quite fascinating. That could very well account
> > > for
> > > punctuated equilbrium. It is interesting to note there is much
> > > more to
> > > (possible) evolutionary mechanisms than the sculptoring and
> > > culling done
> > > by natural selection.
> > >
> > > I am beginning to understand why thinkers like Dennett

> consider the
> theory of evolution the greatest thing since sliced whitebread.

> If you think about it for a minute, you will quickly come to the conclusion that such a systems design is inevitable. The notion that "one gene encodes one trait" was completely dispensed with by 1945 (although the idea remains implicit in mathematical genetics). Rather, by the 1930's, it was becoming obvious that any complex character in the phenotype was the result of the expression of a significant portion of the genome.
>
> If that's so, the question then becomes: "how do you evolve such a structure?" If the interaction matrix between gene products and their affected traits is such that everything affects everything, evolution becomes impossible. The entire design becomes a house of cards. You can't change any bit of code without affecting the entire organism.
>
> The evolution of modular design ("organ−ization") is the only way out, and it's advantages have been discovered independently by human engineers and nature, albeit several billion years displaced in time.
>
> Pleiotropy is the inevitable consequence of highly interactive systems.

One of the reasons I resist the ideology that life is inherently modular is that it sometimes closes minds in advance of the evidence. If we already 'know' that life is modular, then we will not find the exceptions to the rule. Lipmann, for example, provided a nice modular model for the production and use of cellular energy. But it actually made it more difficult for Mitchell to convince people that the situation is more complicated than that.

There is also the population genetics argument. Wirt writes:

> If the interaction matrix between gene products and their affected traits is such that everything affects everything, evolution becomes impossible. The entire design becomes a house of cards. You can't change any bit of code without affecting the entire organism.

Ok, but that is not an argument using natural selection at the organism level for maximum advantage here and now. It is an argument appealing to retaining the potential for future improvements.

If a species cannot easily evolve it cannot respond to environmental

changes and it will go extinct. Evolvability has itself been selected "here and now". It is as key a trait of an organism as any trait. It means an organism can more easily produce offspring with new characters that can take advantage of changed environments. The rapidly evolving beaks of the Galapagos finches are an example.

NS can take this

> kind of criterion into account only if selection takes place at a higher level − the species level, for example. And, population genetics tells us that selection at that level must be fairly weak.

The evolution of evolvability and modularity does not depend on species selection.

> Hmmm. I wonder if what is 'wrong' with the pop gen argument is the assumption that mutation is random and undirected?

In _Plausibility of Life_ the authors say variation "does not take place in all directions" as in classical Darwinism. It occurs easily along certain directions and not at all along others. For example, it is rather easy to vary the limb structure of animals. It is next to impossible to change a conserved core process like the splicing of introns in eukaryotic cells.

The authors never discuss population genetics. They still accept that mutation is random and undirected. It is the phenotypic result of that mutation that is channeled. Variation is a *constrained* random walk. The drunk cannot stager in any direction he pleases away from the lamp post. He always staggers along particular alleyways.

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