

Re: Bipedalism in different substrates

Source: <http://sci.tech-archive.net/Archive/sci.anthropology.paleo/2004-07/0287.html>

From: Bob Keeter (rkeeter_at_earthlink.net)

Date: 07/04/04

Date: Sun, 04 Jul 2004 22:11:47 GMT

"Jason Eshleman" <jae@vici.ucdavis.edu> wrote in message
news:cc9tqi\$8be\$1@woodrow.ucdavis.edu...

Snippage. . .

> >
> >*Without some form of "selection" I would say that evolution, as a*
> >*constructive*
> >*process, would cease. At least IMHO, evolution occurs when a species*
> >*adapts to "better fit" the environment. If there is no selection based*
> >*on*
> >*some*
> >*form of "the fittest", there would be no move in any defined direction,*
> >*sort*
> >*of*
> >*a molecular genetics equivalent to Brownian motion.*
>
> *This was a leading question to get someone to bite. I'll get the hook out*
> *of your mouth soon enough. I was fishing for someone to fall for the*
> *evolution = natural selection trap. Evolution, in a biological sense, is*
> *the change in allele frequency in a population. Selection is *one* of the*
> *mechanisms of this change, but a mechanism that serves to slow change*
> *considerably, but in doing so, directs along particular successful*
> *avenues. It does this by reducing variation.*

Well, that may be ONE way of looking at it. Weeding out the unsuccessful variations would definitely fit into your "more scientific" definition as well

as mine. The thing is that the environment pretty much determines the successful vs unsuccessful variations. If I have a totally stable and very "friendly" environment, lots of variations on a successful theme will survive,

if the conditions get ugly only those able to cope will win out.

> (*I hope Larry M. is aware that he really did teach me something many*
> *years ago.*)

Teachers do like to know that they did good at some point or another! ;--)

sci.anthropology.paleo: Re: Bipedalism in different substrates

- > *Without selection, evolution speeds up *considerably.* Variation results*
- > *from mutation and recombination without which evolution would soon cease.*
- > *Selection is a brake, a mechanism to reduce variation, to weed out*
- > *mutations that don't work, to weed out recombinations of alleles that*
- > *don't work. Eventually, without variation increasing from the influx of*
- > *new genetic material, all loci would eventually reach fixation of an*
- > *allele and evolution would stop. In its absence the rate of mutation and*
- > *the rate of evolution are equal as every new mutation results in a change*
- > *in the relative frequencies of alleles. However, the *direction* of*
- > *evolution without selection moves about equally random.*

And I think that here is where I would probably differ with you. You see my idea of evolution is much more akin to what you might want to call the "mean" of a species with "variation" being sort of like a standard deviation in a mathematical sense. Of course my definition is probably not going to get me very far on that final exam! 8-)

Again in my definition if the "mean" doesn't move, the species has not moved even though the frequency of variants across the species may have changed greatly. Throw in that "selection process" and suddenly many of those previously "don't care" variations become fatal (or become prohibitive favorites for that matter) and the species (and the mean) moves. To me, that movement is evolution.

- > *The process of adaptation is significantly slower as it has to wait for*
- > *the variation to occur. Selection does not produce variation, it only*
- > *works on variation that already exists.*

100% with you on that last sentence. The process of adaptation, at least if applied to a species, would IMHO be nothing more than a specific example of selection applied against a single "variation", but. . . . who am I to say.

- > *On the other hand, that Brownian motion might not be without results.*
- > *Regressive tendencies might be enhanced if not "weeded out" by selective*
- > *processes. An easy example might be found in the domestication of the*
- > *corn plant. The artificial selective processes of human farmers have*
- > *turned*
- > *corn into a grain that probably would be extinct in a matter of a very*
- > *few*
- > *years without human intervention.*
- > *IOW the corn "got soft" without the survival inputs of a wild*
- > *environment.*
- > *Some might even say that the reduced cranial capacity of modern HS vs*
- > *early HS might just indicate a reduction in the need for brain power to*
- > *insure survival, but that is another subject I think. . . .*
- >
- > *I am saying that there may not be a selective effect. I am more*
- > *certain*
- > *that the need to get across rivers from time to time isn't a sufficient*

sci.anthropology.paleo: Re: Bipedalism in different substrates

> >> *selector to make a terrestrial creature develop the suite of*
> >> *characteristics I've seen various wet-apers say indicate a "more*
aquatic"
> >> *existence. I am saying that the null hypothesis is not that selection*
is
> >> **always* going to play a factor in all events though.*
> >
> >*Ah, you are not talking about just a species left in a very benign*
> >*environment for a long time and loosing its edge, you are talking about*
something other
> >*than" natural selection" and the survival of the best swimmers or*
whatever! Hmmm
>
> *You do catch my "drift" then.*

Oh, could be. ;-) Matter of fact, I suspect that if we could get past the issues with my "down home" vocabulary we might find violent agreement!

> >> >*I am saying that the individuals with the highest probability of*
> >> >*crossing safely are those who enter the water early or slightly away*
> >> >*from the main herd, not mid-pack; are good swimmers; are good at*
> >> >*choosing a safe exit route. There may be any number of other factors,*
> >> >*of course.*
> >>
> >> *And of this number of other factors, many of them some of them are not*
> >> *going to be under genetic regulation and others may not be predictable*
in
> >> *a manner that selection can favor any optimization. If the number of*
> >> *random occurances is high enough, selection won't be the dominant*
factor
> >> *in evolution in these instances.*
> >
> >*hmmm. . . . difficult to turn your statement into a probabalistic*
equation I
> >*think.*
>
> *Not difficult to model actually. It's upper division population genetics.*

For a too-old mechanical engineer I suspect that "upper division population genetics" fits right in there with the word "difficult"! 8-))

> *It's too time consuming for me to run through it all here, but John*
> *Gillespie's "Population Genetics: a concise guide" (available through*
> *Amazon I believe and not too pricey does a good job of walking through the*
> *steps if you're interested.*

I think I will just trust you on this one! Need to build a bridge? How about an internal combustion engine? 8-)))

sci.anthropology.paleo: Re: Bipedalism in different substrates

- > *The difficulty comes in trying to predict the outcome. A known selective*
- > *force gives a predictable outcome. It's the recognition that drift, those*
- > *random events blind to the genotype of the organism, though powerful, do*
- > *not move in a predictable direction (or a constant direction). Drift,*
- > *like selection, is a variation destroying process. This force can be more*
- > *powerful than selection in many cases and if so, drift will in many*
- > *instances remove selectively favorable adaptations at random. There is a*
- > *probability that a favorable allele will be eliminated by drift before it*
- > *reaches fixation.*

Ah, so one dominant and reproductively sound mutation and we could have lost the wings that let our ancestors fly that caused us to abandon quadrupedal

locomotion and drove us to bipedalism! 8-) (thats a joke, son, a joke!)

- > *The actual strength of selection is independent of population size.*
- > *Positively selected alleles will move towards fixation with a probability*
- > *equal to the strength of the selective advantage. Ergo, a mutation that*
- > *makes an organism 10% more likely to survive and pass on offspring, has a*
- > *10% chance of reaching fixation in the population. This means that*
- > *there's a 90% chance it will disappear, though advantageous, by random*
- > *cause before it can become fixed.*

Go it! See it wasn't all that difficult.

- > *The strength of drift is dependent on the size of population. In small*
- > *populations, it is even possible to fix deleterious mutations if the*
- > *selection against them is not strong.*

Just luck of the draw, right? Sometimes you do draw into an inside straight, you just would not want to bet the mortgage (or species) on such a thing. I suspect that is one of the reasons that small isolated populations (S. Pacific island birds for example) might wander off the "tried and true" genetic path so frequently and so far.

Snippag. . .

- >
- > *We have to look at a number of factors. Relative advantages in changing,*
- > *unpredictable environments is one (and one that I think is very important*
- > *to our successful generalist adaptations), but even in steadier*
- > *environments, selection isn't the only factor at work. The*
- > *hyper-pan-adaptationist view, the common misunderstanding of evolutionary*
- > *theory that too many people fall for, is insufficient. It's easy to fall*
- > *for it because the basic Darwinian selective principles are easy to grasp.*
- > *The relative strength of random processes are not so easy to get a hold*
- > *on, though they are every bit as important to evolution. That's*
- > *essentially my argument.*

So there is always the luck of the draw in the equation. All of the fancy science and high faluting statistics ends up being a coin flip. Even though when I say it, it sounds strange, it still has the right feel to it. Sort of a pseudo chaos approach, as in there may be a genetic/selective directive to move "over yonder" in terms of adaptations, but the luck of the draw goes in the other direction, even to the extent that the species would become extinct.

Now that I mention it, there are a lot of species that do go extinct when either they "go down a dead end" or dont step quickly enough in the right direction. 8-)

Snippage. . . .

- > *Right. Imagine that there is variation in the swimming ability of zebras.*
- > *But the odds of the best swimmers dying for other reasons are better than*
- > *the odds that their swimming ability saves them from death. This sort of*
- > *thing does happen. That's what drift is.*
- >
- > *This is essentially why I don't think that small differences in the*
- > *swimming speed of a human mean squat when we start talking about aquatic*
- > *predators. The odds that swimming speed saves you from a creature who is*
- > *at worst three times faster than you, at best 2.9 times faster (note: I'm*
- > *making these numbers up, but the point is that the difference relative to*
- > *the speed of an aquatic predator is likely negligible). When we see*
- > *selection for fast escapes from predators in nature, we don't*
- > *generally see creatures who are less than half again as fast as the*
- > *predator.*

8-) see I told you! Violent agreement (and the fact that you end up with a basic $F=MA$ kind of statement makes me happy! ;-)

Regards
bk