The road trip of life: Navigational insights for a biologist

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(BIOL 510) Biology and Sustainability: Linkages to buddhist and indigenous philosophical perspectives

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The study of life: a complex conundrum

What is a biologist? Some might deem it to be an individual with a profound knowledge of plants and animals, the scientist with an outdoor office, or the professor who raves about fruit flies and flatworms. Although there are an abundance of biological foci, the most basic definition of a biologist is an individual who studies life. Students who have just completed a biology undergraduate program, thus considered to be "biologists," could practically recite concepts such as the processes of mitosis and meiosis and the theory of evolution by natural selection. However, when it comes to a discipline as complex as the study of life, core principles can prove to be more of a mosaic than a single, clear picture.

In *Buddhist Biology*, David Barash reminds readers that there is more to fundamental principles of biology regarding genes, the environment and the processes of death and decay. This resource reminds any individual who has completed a biology undergraduate program and is striving to be a *successful* biologist, to re-examine these core principles, expand their perspectives and most importantly, look a little bit deeper. In this essay, I will argue that even completely disregarding all of the buddhist components, Barash's descriptions of, and different perspectives on, core biological principles make his *Buddhist Biology* book an invaluable learning resource for anyone claiming to be a biologist. The specific concepts will include the role of genes, organism-environment relationships and our human view towards death and decomposition, with applications in regards to sustainability.

Are we just survival vehicles for our genes?

Before the mid-1800's it was clear that a mother and her son shared the same blue eyes through some type of inheritance. However the mechanism of this inheritance, *what* was being transferred, remained a question to scientists. With his experiments on inheritance patterns in pea

plants, Gregor Mendel discovered one of the most significant pieces of the puzzle of life: the gene. Referring to them as "factors," he identified what are now recognized as the basis of life, the entities containing the specific nucleotide sequences that are transferred across generations (Ellis et al. 2011). The concept of genes and genetic inheritance is one of the fundamental principles of biology, but with this revelation comes a stark reality - if the only permanent aspect of humans is our genes, are we merely their transporters? Do we really have as much control as we think in our lives?

The idea of control has been a perplexing concept for many, and biology has demonstrated that many human behaviours and tendencies can be traced directly back to genes. For instance, an aunt helping her nephew can be explained by the theory of kin selection, a strategy that favours the reproductive success of an organism's genetic relatives. But when it comes to making this decision to help, Barash reminds us that it is not the aunt herself who is choosing, merely "a gift from altruism genes within the giver to altruism genes within the recipient" (2014, p.56). If our genes are somewhat in control, what happens when it comes to people who are more genetically pre-disposed to certain behaviours, where do we draw the line when placing the blame? Are we really just "temporary combinations of physical stuff" (Barash 2014, p.68) and slaves to our genes, or is there more to the story? Trained biologists are aware that both genes, the environment and their interactions have an influence on a person's actions, but to what extent?

Genetic influence: a different biological perspective

Inasmuch as Barash highlights the influence of genes, he also reminds readers of the role of the environment in human behaviours. Many biologists understand this "shared power," but the ratio of genetic and environmental influence remains much of a mystery. Barash provides the

important clarification that “genes whisper, not bark,” and that humans can and do say “no” to their genes (2014, p.167). He uses the relevant yet under-appreciated example of toilet training, a behaviour exhibited by (hopefully all) humans which goes against our biological and genetic instincts. Our primate ancestors evolved in trees and did not need to worry about where their excretory contents ended up. In fact, it takes more time and energy to wait for a specific place to defecate, which is not beneficial to our genes in any capacity. Other examples such as donating to charity and choosing to not have children provide further evidence of humans blatantly ignoring the suggestions of their genes. So, when it comes to placing the blame, we can understand that the bank robber’s genes were merely making suggestions, not issuing orders.

This idea becomes important when we examine the issue of sustainability, and the fact that humans are trapped in ancient, primate bodies with innate survival instincts and behaviours. Although our genes might be urging us to practice unsustainable, self-serving behaviours, Barash reminds readers that we have the capacity to act against these instincts. Our genes might therefore be the designers of the vehicle, coding for the make and model of the machinery. But in the end, the front seat driver, the one who chooses the route, is our consciousness, with our good old friend the environment holding the map in the passenger seat.

Self-versus environment, or self is environment?

One of the most notable by-products that resulted from the development of the human consciousness was the sense of self. This notion of identity greatly benefits the process of evolution by natural selection, in that the idea of the self implies a separate and important being that should be taken care of first and foremost. After all, it would surely benefit our genes, the designers of our make and model, for us to see ourselves as the newest Lamborghini as opposed to another identical Camry...all that handiwork couldn’t possibly be for nothing.

What many individuals cease to realize however, is that this sense of self has resulted in a human psychological separation from other species and the environment, even in biology as Barash points out. A trained biologist would define ecology as a branch of biology that examines the relationships between an organism and its environment. This definition implies that the self and the environment are related but separate entities, a vast misconception according to Barash. He therefore deems it the responsibility of biologists to "correct this understandable but troublesome error" (Barash 2014, p.174). However, how can a biologist, especially an ecologist, correct this error having been taught that the organism and the environment are separate? As Barash points out, "it is one thing to be *like* an animal, it is quite another to face the fact of *being* an animal" (2014, p.128). A biologist studying ape behaviour might acknowledge the close relationship between humans and apes, but would likely have a difficult time conceptualizing the fact that humans *are* apes. The perception that we are a more sophisticated, complex and intelligent animal has resulted in the human ego, a mindset that prevents us from viewing other animals as anything but inferior. Thinking of ourselves as merely another animal would surely not benefit our genes, as we would likely treat other living and non-living organisms more equally, and therefore hold them to a higher regard. Such an idea, albeit horrendous to our genes, might be the very mindset that is needed for a more sustainable future.

Organism-environment relationships: a different biological perspective

Barash provides useful insights to the field of ecology with the reminder that the organism and the environment are not separate, but entirely interconnected. The vehicle, front seat driver and the passengers are together the potentially moving car, they would be nothing without each other. Barash highlights this notion with his insight that "just as there would be no organism without its environment, [there would be] no environment without an organism" (2014,

p.92). This interconnectedness is demonstrated from an ecological perspective using the example of a snowy egret, who "independent of its watery habitat filled with food, diseases, predators, competitors, mates, nesting grounds, and so on is worse than meaningless- it is downright deceptive" (Barash 2014, p.71). In consequence, is the current definition of ecology not only misleading, but an outright delusion?

Perhaps, applying some new definitions to the words "ecology" and the "self" might help to advance not only the field of biology, but our sustainability endeavours. Ecology, rather than the study of the *relationship* between an organism and its environment, might be redefined as the study of the organism-environment. One system, one noun, completely interconnected. In terms of the self, Barash introduces the idea that there are both small and larger selves: "it is all too tempting to live within our small selves ("me" and "you") while at the same time destroying the very life of our large selves: not just the human "we" and "us"...but also the rain forests, the oceans, the atmosphere...all those things upon which we depend" (2014, p.148). It may be that from a biological standpoint, we need to focus more on the large self, or eliminate the idea of the small self altogether. Studying specific relationships can result in the delusion that some things are more connected than others - rather than the ultimate truth that humans are just as much a part of the ocean as is the water. With this mindset, a sustainable future is not for the sole benefit of humans, or animals, or the environment, but for the entirety of what we call life.

A smart ape that "decomposes nicely"

Some of Barash's most fascinating insights relate to death and decomposition, which are widely seen as "car breakdowns" from a biological perspective. Most biologists are taught to equate old age, illness and senescence with failure, and are constantly trying to discover ways to mitigate these processes. For instance, Bulterijs and colleagues recently proposed that biological

aging should be classified as a disease, which might accelerate the "curing process" (2015). From the perspective of evolution by natural selection, an innate fear and avoidance of death is extremely beneficial, prolonging survival and reproduction time in humans. Any biologist can understand that generally, if an organism dies earlier in its lifespan it has likely produced less progeny (if any), thus creating a dead end for the residing genes. Further, humans have an innate tendency to react with fear and avoidance to negative experiences, it is simply adaptive. The human fight-or-flight instinct likely evolved for this purpose in early hunter-gatherers, it would surely benefit the residing genes for a human to flee at the sight of a bear rather than to stay put. Death is the ultimate negative experience, it is the demolition of not only the expensive Lamborghini, but its careful constructors, the genes. Thus, from a biological perspective, death should be avoided at all costs...or should it?

Death and decay: a different biological perspective

Charles Baudelaire released *The Flowers of Evil* in 1857, a book of French poetry that is now one of his most famous compositions. At the time, Baudelaire received much scrutiny for the decadence of his poems, most notably in *The Carcass* where he describes the cadaver of his beloved partner: "The sun shone down upon that putrescence,/ as if to roast it to a turn/ And to give back a hundredfold to great Nature/ The elements she had combined" (Baudelaire & Aggeler n.d.). The public was shocked at Baudelaire's grotesque description of a decaying human body, yet from a biological perspective, the poet perfectly captured the beauty of this natural and inevitable process. From a similar viewpoint that even many experienced biologists have not considered, Barash urges readers to embrace the unavoidable realities of death and decomposition, and demonstrates how this is possible using a biological lens. After the death of any organism, including us "smart apes," decomposition follows, a "natural and deeply

biological process" (2014, p.117). Due to our advanced consciousness and sense of self, we often forget that in the end we are nothing but a smarter ape, and our decomposition, like that of fruit flies, flatworms, and mice, is equally as integral to the continuation of life. This process is the ultimate reason that life can continue to regenerate and new humans can be created. After all, we would not be here if it were not for the decomposition of the generations of humans before us. Death, as Barash puts it, is thus a "necessary expression of our connection to everything else, of our being alive in the first place" (2014, p.110). In embracing this, biologists are embracing what it means to be *Homo sapiens,* the reality of our finite and interconnected existence. Perhaps then biology, the science of life, should focus more on embracing, not evading, the sole factor that sustains the constant regeneration of life - death. Instead of a car breakdown, it is a race car finishing its last race. The race is over, and the parts can now be used to build another race car, and another, and another...

Conclusion: Maybe it's time to use a different map?

Before 1676, the existence of organisms such as bacteria and microbes were unbeknownst to even the world's greatest scientists, many believing that the only living things were those that could be seen. This idea completely changed with Robert Hooke's *Micrographia* and Antony van Leeuwenhoek's homemade microscopes, which provided the first human glimpse at the microbial world (Gest 2004). Since then, revolutionary discoveries have shaped the field of biology, notably genome sequencing, DNA cloning by PCR and the theory of evolution by natural selection. Centuries ago, the idea of genes and an invisible selective force shaping our existence would be a mere fable, yet are now the basis of biological theories. Barash reminds biologists old and new, that although humans may in fact be vehicles, they might be more than the sum of their parts. Biologists can dissect every car part, but the true answers might

be, like the microbes, simply not in plain sight. We are so caught up in being the single, polished Lamborghini that we forget it would not exist without the road, the gas, the environment, and the driver, together forming one interconnected system. Further, this Lamborghini might be in good condition for a while, but no matter how many repairs it receives it will eventually have to retire and lend its parts to another. In terms of more sustainable living, Barash's insights and new perspectives offer some clarity as to what might be getting in our way. Perhaps we need to "pull over" and open our minds, change our perspectives, look at the map in a different way, for a smoother drive to our final destination.

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