

## What My Doctor Should Know About Evolution

It's 4:30 afterschool on a Wednesday. My legs swing back and forth as I sit on the bench waiting for my doctor to come in. I'm here for a routine physical. As I wait, I think about that essay that I need to write for AP Bio; the one that Ms. Kennedy will be entering into the contest. Why would I want Dr. Tantawi to have studied evolution? I've done some reading, and I know the basics of evolution. When Charles Darwin sailed the ocean blue in 1859, his research at the Galapagos Islands was published as *The Origin of Species by Means of Natural Selection*. Scientists continue to build on his idea that explains the origin of all species and their interrelatedness. Since there is a competition for resources among too-numerous offspring, natural selection occurs, and offspring with the proper fitness for survival will produce a population with their adaptations. It is this groundbreaking theory that has penetrated all forms of science, this theory that unified biology, and the very theory that Dr. Tantawi has not studied in her quest for doctorhood.

Well, does she really need it? *Homo sapiens* are not evolving into a new species that doctors need to catch up with anytime soon. Our anatomy and physiology matter, so she knows what my body looks like and with chemistry can tell me what it is made up of. What's it to her if my ancestors were a little colony of amino acids and glucose? As my reading proved, it should be a lot to her.

Viruses are the most commonly cited reasons to study evolution in medicine. These viruses have very short life spans and therefore, mature early. Mix their high recombination rate with their high mutation rates and you get viruses that not only reproduce at alarming rates, but will mutate in accordance to changes in the environment. Some creationists argue that each time a mutation occurs information is lost, but this argument does not hold against evidence. The classic example is that of HIV and the "cocktail" drugs used to treat it. When a single drug was used for treatment, the virus would multiply so quickly and mutate that it would become resistant to the new drug very quickly. Information was not 'lost,' but rather manipulated by the virus to create an adaptation. The only way to combat the effects of the virus is to use a variety of drugs so that the virus cannot adapt as easily to the numerous drugs attacking it.

Even evolution-related genetics are of importance to my doctor. Once, when paying a visit to my aunt at the hospital after she had given birth, a nurse came in and to her horror, procured a needle, paying no attention to the screams of the baby. Adopting a condescending academic attitude, I informed her that the baby was of course simply being tested for phenylketonuria, PKU disease. Through the Hardy-Weinberg Theorem, the amount of children that have a possibility of being affected can be predicted.

The founder effect, when a few members of a population colonize another area and become isolated from its parent population, also attributes to certain inherited disorders in the human population. On Tristan da Cunha, a higher percentage of the rare disease retinitis pigmentosa that causes gradual blindness occurs when compared with other populations. Back in 1814, the island was colonized by 15 people from Britain and one of them probably carried a recessive allele that would go on to affect homozygous individuals. Without evolution, doctors would not understand why this was occurring.

Continuing with genetics, our genes contain two alleles for each trait. Since one allele will be dominant, potentially harmful alleles will be carried through each generation in recessive alleles. We contain numerous alleles of old viruses from thousands of years of being carriers of these alleles.

If it were not for evolution, we also would be unpleasantly unaware of the heterozygote advantage. For certain traits, particularly for resistance to disease, heterozygotes have an advantage. The example of sickle-cell anemia is often used to show that heterozygotes have a bigger advantage over homozygous individuals. This heterozygosity is effective to protect them from malaria, particularly where it is a major killer in certain parts of the world.

More importantly, it casts common notions about medicine in an entirely new light. While medicine reaches for proximate explanations for disease, evolutionary explanations reach further back into the history of evolutionary development to teach us about disease. For example, it has revealed that coughing developed as a mechanism to expel foreign material out of the body or have it swallowed into the stomach where it can be broken down. Fertility-related problems that medicine tries to solve can actually be adaptations that have evolved for our benefit. Morning sickness in pregnant women has been shown to prevent the fetus from being infected by toxins. Infertility is a prevention method to keep diseased children from being born.

Evolution consistently proves its advantages in predicting disease, in identifying potential carriers, in treating ailments, and providing explanations to concepts that other fields of science cannot answer. How can we know where we are going if we do not know where we came from? As I finish that thought, Dr. Tantawi walks in. Of course, I will not be exposing the gap in her medical education anytime soon. She is a fairly intimidating woman, particularly when she turns her chin up at you to stare miles down her nose. I'll leave that to you. But then again, it is my health...