

Article Traces History of Darwinian Medicine

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(PhysOrg.com) -- Despite being a founding principle of modern biology for 150 years, evolutionary theory has played a limited role in the field of medicine. Only in the last 20 years has Darwinian medicine emerged as a discipline unto itself. An article in this month's issue of *The Quarterly Review of Biology* explains why early attempts to study disease from an evolutionary perspective failed, and how modern Darwinian medicine differs from its antecedent.

Attempts to link evolutionary theory and medicine were common among researchers from 1880 to 1940, according to author Fabio Zampieri, an [historian](#) of science at the University of Padua Medical School in Italy. But this early work in what Zampieri calls "medical Darwinism" was felled by fundamental misunderstandings of evolution. One such misunderstanding was the idea that human traits that cause disease had somehow escaped elimination by natural selection.

"Given that [diseases] were negative traits, it was natural to think that they ought to have been eliminated by natural selection," Zampieri writes. "The fact of their persistence in the heredity and natural history of humans was necessarily proof that these characteristics could escape selective elimination."

From that misunderstanding grew the idea the humans could intercede where natural selection had failed. We could artificially select "ideal" human types and discard the rest—a concept that became known as eugenics. The horrors of eugenics as applied in Nazi Germany brought

the period of medical Darwinism to a screeching halt.

It wasn't until the early 1990s that evolutionary theory began to once again be applied to medicine. But the new discipline of Darwinian medicine, which got its start and name from the work of biologists George Williams and Randolph Nesse, differs sharply from medical Darwinism.

Modern Darwinian medicine rejects the notion of an “ideal” human form or type, and understands that humans are very much the product of natural selection. Central to this new discipline is the idea that Darwinian adaptations often involve trade-offs—a positive trait can have negative consequences.

“The idea is that evolution does not shape disease, but only the anatomical, physiological, and psychological characters that can be vulnerable to disease,” Zampieri writes. “Most such characters are vulnerable because natural selection shapes optimal compromises, not perfection.”

A prime example of a Darwinian contribution to the understanding of disease is the case of sickle cell anemia. The disease is caused when a person receives two copies of a mutated gene—one from the father and the mother. A person who gets only one copy of the gene does not get the disease, but instead receives the advantage of malaria-resistant blood cells. So it's clear why [natural selection](#) would tend to keep the mutated gene in the pool, despite the negative consequences for the individual who receives two copies.

A more recent application of Darwinian medicine is the association of allergies and cancer. In a review of the allergy-cancer connection in the December 2008 issue of *The Quarterly Review of Biology*, biologist Paul Sherman and colleagues found that allergy symptoms may have

evolved as a kind of “smoke detector” that lets us know when carcinogens may be around.

Its explanatory power has helped Darwinian medicine develop into a promising new discipline, Zampieri concludes. And its better understanding of evolutionary theory makes a clean break from its flawed beginnings.

More information: Fabio Zampieri, "[Medicine, Evolution, and Natural Selection: An Historical Overview](#)." *The Quarterly Review of Biology* 84:4 (December 2009).

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