Mutational Genetic Load: Can the Human Genome be 100% Functional?

Abstract:
Because genomes are products of natural processes rather than “intelligent design,” all genomes should contain functional and nonfunctional parts. The nonfunctional fraction of the genome consists mostly of junk DNA, which is useless as well as harmless and on which selection does not operate. In this lecture, I review the concepts of genomic function and functionlessness from an evolutionary perspective, introduce a precise nomenclature of genomic function, and discuss the empirical evidence for the existence of vast quantities of junk DNA within the human genome. Finally, I show that a human genome that is 100% functional would have preposterous fertility consequences. That is, even with very low rates of deleterious mutation, maintaining a constant human population would require each couple in the world to produce on average 6,540,000 children of which 6,539,998 should die before sexual maturity, which is clearly absurd. Thus, a human genome that is 100% functional is a logical impossibility.