

Social Epistasis Amplifies The Fitness Costs Of Deleterious Mutations Engendering Rapid Fitness Decline Among Modernized Populations

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[A] PAPER for Menie_SEATFCODMERFAMP_2017

1 Abstract

[T] Define the terms genome, mutation, pleiotrophy, fitness, fertility, ...

[A] BOOK1 for A Dictionary Of Genetics (7th Edition) King_ADOG_ED7_2007

[A] BOOK2 for NCI Dictionary of Genetics Terms

[E] What is a mutation?

A change in the usual DNA sequence at a particular gene locus. Although the term often has a negative connotation, mutations (including polymorphisms) can be harmful, beneficial, or neutral in their effect on cell function. The term “variant” is sometimes used as a synonym for mutation. (BOOK2)

[E] What is a gene?

The basic unit of heredity passed from parent to child. Genes are made up of sequences of DNA and are arranged, one after another, at specific locations on chromosomes in the nucleus of cells. They contain information for making specific proteins that lead to the expression of a particular physical characteristic or trait or to a particular function in a cell. (BOOK2)

[E] What is pleiotrophy?

A genetic phenomenon where a single gene influences multiple, seemingly unrelated phenotypic traits... The mechanism behind pleiotrophy is largely tied to a gene’s influence on metabolic pathways (Biology Notes Online)

[T] Purchase some book on genetics that adequately cover pleiotrophy. Also, define the remaining terms online, using an AD-Blocker (pg. 1)

[R] Claims of the abstract: (1) most work on deleterious mutations ignores considerations outside carrier organisms, (2) there are adverse effects of deleterious mutations in individuals on the population to which the individual belongs, (3) in social species, interactions between organisms, where one is a carrier of deleterious mutations, ... (pg. 1)

[Q] What is a gene-gene interaction? Is this just carrier → other member and carrier → another member, etc... in terms of fitness reduction? (pg. 1)

[Q] What are some examples of group-level processes in humans? (pg. 1)

[Q] How do we establish certain mutations as behavior altering? (pg. 1)

[Q] What other explanations exist for the sub-replacement fertilities of modernity? Women being educated and having access to birth control plays a large role (seemingly). (pg. 1)

[Q] What is the “amplification” in the social epistasis amplification model? (pg. 1)

[T] Better define the Calhoun mice experiments (e.g. the parameters and results of Universe 25) along with other famous mouse/rat experiments.

2 Introduction: The Human Mutation Load Paradox

[Q] How did previous human populations (e.g. under agriculture, hunter-gathering, or industry) become “purified” under selection pressures? What were these pressures? (pg. 1)

[T] You’ve marked references with a (dot) if you believe they’re worth looking at or downloading? (pg. 1)

[T] Look up the references for fraud and or failure to be reproduced or replicated? (pg. 1)

[R] Some of the references regarding paternal age make you feel pressured to have children sooner rather than later or to freeze your sperm now for children you have later. (pg. 1)

[Q] What methods exist for evaluating the quality of a sperm cell? (pg. 1)

[R] Use Claude to answer the above questions and have a box to mark that you have or haven’t read. (pg. 1)

[Q] What are two de novo base-substitution mutations and why would this be significant? “de novo” as “afresh” and “base substitution” as a type of genetic mutation where one nucleotide in the DNA sequence is replaced with another. (DDG Search Assist) (pg. 1)

[Q] How long is a sequence of human DNA and how risky is a two base pair substitution? “about 3 billion base pairs” and depends on genes affected and context of the mutations. (DDG Search Assist) (pg. 1)

[Q] So, at your current age, how many base pair mutations do you have in your sperm? (pg. 1)

[>] “Offspring acquire approximately 40-80 de novo mutations per genome per generation” (pg. 1)

[R] If a generation is 25 years, then that’s around 2.33% of 3 billion nucleotides with base-pair substitutions, i.e. about $7e7$ substitutions, i.e. $\frac{40}{7e7} \cdot 100 = \alpha$ percent of substitutions that become mutations. Is this how it works?

[T] See Wikipedia for more information on mutation rates and also use Claude for the above. (pg. 1)

[Q] So, base-pair substitution mutations do not occur spontaneously? What is the difference and how are mutations categorized? What determine the rate of mutation incidence?