CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY

Name(s)
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Project Number
J1301

Project Title
Chance or Design?

Abstract

Objectives/Goals
The objective of the project is to determine if evolution is mathematically probable by looking at the probability of amino acids forming a given polypeptide chain (a precursor to proteins) from a pool of amino acids under optimal circumstances.

Methods/Materials
Twenty Scrabble game tiles, labeled A through T, which represent the 20 standard amino acids in the human body, were set aside. Next, using each of the selected Scrabble tiles only once, a specific desired sequence of letters (representing a hypothetical protein needed for life) was written down. This single protein, identified with the letters BAGFJPONESTKCLDRHIQM, was chosen in order to simplify the experiment, since proteins found in the human body average in excess of 300 amino acids in length.

The 20 Scrabble letters were then placed in a bag, which was shaken for five seconds, and all 20 Scrabble tiles were then drawn out of the bag, one at a time, in order to see if the specific desired sequence of letters could be drawn. This process was repeated thirty times.

Results
The desired sequence of letters was never drawn. In fact, only 2 of the 30 draws even began with the same first letter as the sequence, and none of the draws contained the first two letters in the specific desired sequence.

Conclusions/Discussion
In conclusion, evolution tested to be mathematically improbable. The odds, using only 20 Scrabble tiles to draw the specific sequence for the hypothetical protein, are 1 in 2.433x10^18 (or in excess of 2 billion, billion), which is more seconds than there are in 70 billion years.

With proteins in the human body averaging in excess of 300 amino acids in length (and assuming the same mathematical probabilities as applied in my experiment), the likelihood of random chance properly assembling a single protein comprised of 300 amino acids is 1 in 300! or 3.0606 x 10^614 (which is 1 with 614 zeroes behind it). Mathematicians consider anything with odds greater than 1 in 10^50 to be effectively impossible. Moreover, in order to put the odds in perspective, the number of known electrons in the entire known universe is only 10^69.

I would like to further investigate the nature of amino acids and proteins.

Summary Statement
My project is designed to test whether or not evolution is mathematically probable by testing the aspect of evolution known as "random chance".

Help Received
Mother helped organize and proof read my board; Father helped with some of the mathematical concepts and research.