DNA, Shakespeare, and the Infinite Monkey Theorem

> "Ford! There's an infinite number of monkeys outside who want to talk to us about this script for *Hamlet* they've worked out."

> "This is a thousand monkeys working at a thousand typewriters. Soon they'll have written the greatest novel known to man. Let's see. *[reading]* 'It was the best of times, it was the "blurst" of times…?' You stupid monkey!" (Mr. Burns)

What's the Infinite Monkey Theorem? The concept is mentioned all throughout pop culture, including two of my all-time favorites above, *The Hitchhiker's Guide to the Galaxy* (Douglas Adams, 1979) and *The Simpsons* (Matt Groening, 17th episode, 4th season, 1993). I had to check this out. The Infinite Monkey Theorem is a popular device used by many scientists to defend the idea that DNA code could arise by chance, given infinite time – similar to a bunch of monkeys pounding away on typewriters and eventually delivering a given text, such as Shakespeare's *Hamlet.* Now that scientists acknowledge a beginning of the cosmos, including space and time, the Infinite Monkey Theorem must give way to the more accountable Limited Monkey Theorem. With infinity off the table, the probability of random monkey masterpieces declines drastically.

The Infinite Money Theorem – The Language of Life

We now understand that the DNA molecule represents a massive amount of complex information – precise symbols with context and meaning. In fact, human DNA is comprised of 3 billion precise "letter" sequences, which, when read together, form a perfect set of genetic instructions underlying the form and function of every cell in the body.

Think about it… DNA is not similar to language – it is language. DNA is not similar to code – it is code. Thus, the theoretical comparison to monkeys, typewriters, and Shakespeare makes some sense.

> "The machine code of the genes is uncannily computer-like. Apart from differences in jargon, the pages of a molecular biology journal might be interchanged with those of a computer engineering journal." (Richard Dawkins, *The God Delusion*)

However, while the cosmic comparison makes sense, the random mathematics underlying the Monkey Theorem just don't work. Think about these "real-life" examples:

The Monkey Shakespeare Simulator is a probabilistic web program that simulates a bunch of randomly-typing monkeys trying to produce a Shakespearean play. After 2,737,850 million billion billion billion simulated monkey-years, the best the virtual monkeys could do was the following 24 matching characters from *Henry IV*, Part 2:

> RUMOUR. Open your ears; 9r"5j5&?OWTY Z0d...

Another computer program worked for 42,162,500,000 billion billion monkey-years to type the following 19 characters from Shakespeare's *The Two Gentlemen of Verona*:

VALENTINE. Cease toIdor:eFLP0FRjWK78aXzVOwm)-';8.t

Remarkably, students from the University of Plymouth, with a grant from the British National Council of Arts, even tested the Monkey Theorem beyond the computer simulations. They placed six crested macaques and a computer in a cage for a month. At the end of the experiment, the real monkeys had produced about five pages of letters, mostly "S," but not a single word. Actually, the lead male spent most of his time bashing the keyboard with a rock, while the others urinated and/or defecated on it. Go online and research this stuff – You gotta love tax-funded "performance art!"

The Infinite Money Theorem – The Probabilities without God

Joking aside (well, kinda), what are the real probabilities underlying the Infinite Monkey Theorem? Forget *Hamlet*, what are the odds that the Monkey Theorem could produce a simple Shakespearean sonnet? Check this out from Gerald Schroeder, Israeli scientist and author of *The Science of God*:

> "All sonnets are the same length. They're by definition fourteen lines long. I picked the one I knew the opening line for, "Shall I compare thee to a summer's day?" I counted the number of letters; there are 488 letters in that sonnet. What's the likelihood of hammering away and getting 488 letters in the exact sequence as in "Shall I compare thee to a summer's day?" What you end up with is 26 multiplied by itself 488 times – or 26 to the 488th power. Or, in other words, in base 10, 10 to the 690th.

> "Now the number of particles in the universe – not grains of sand, I'm talking about protons, electrons, and neutrons – is 10 to the 80th. Ten to the 80th is 1 with 80 zeros after it. Ten to the 690th is 1 with 690 zeros after it. There are not enough particles in the universe to write down the trials; you'd be off by a factor of 10 to the 600th."

This statement about the Infinite Monkey Theorem was first delivered at a New York University debate with Antony Flew in May 2004. Mr. Flew, a staunch atheist up to that point, recently declared the following in his book, *There Is A God: How The World's Most Notorious Atheist Changed His Mind* (2007):

> "After hearing Schroeder's presentation, I told him that he had very satisfactorily and decisively established that the monkey theorem was a load of rubbish, and that it was particularly good to do it with just a sonnet; the theorem is sometimes proposed using the works of Shakespeare or a single play, such as *Hamlet*. If the theorem won't work for a single sonnet, then of course it's simply absurd to suggest that the more elaborate feat of the origin of life could have been achieved by chance."

I now have a new way of thinking about Psalm 139:14 – "I praise you because I am fearfully and wonderfully made; your works are wonderful, I know that full well."