Randomness doesn't explain origin—Part I

0:00 "Were we just incredibly lucky? Or was there more involved than blind chance and random (随机) interactions of matter and energy?

0:15 "So why is chance such an unsatisfying option? Perhaps because many analysts have done the math and understand the formidable odds (可怕的赔率) against success.

Chance is defined as the unknown and unpredictable (不可预知的) element in any event that has no assignable cause or guidance from a natural law or intelligent agent. Since the 17th century, one tool has been used consistently to predict the outcome of such events. It is called mathematical probability. In very broad strokes, here's how the theory works:

1:12 "When you flip a coin and call heads the mathematical probability of being correct is 50% or one chance out of two = ½.

1:22 "Flip two coins and the odds of getting two heads simultaneously (at the same time) are one chance in four $(½)^2 = 1/4$, three coins and three heads on a single try, one chance in eight $(½)^3 = (1/8)$. Every time an additional coin is added the probability of success (in this case all heads on the same toss) is reduced exponentially by a multiple of two.

1:51 "So with ten coins of toss the probability of ten heads is $(½)^{10} = 1/1024$, or less than 1 chance in 1000.

2:09 "When applied to the origin of life and the random formation of large biomolecules, probability theory clarifies the limitations of chance as a creative agent on primordial earth. For example, what are the odds that a single protein could form exclusively through the blind interactions of chemistry?

2:33 "Our target is one smaller than average molecule made from a 150 amino acids (氨基酸) each aligned (对齐的) to ensure (确保) a folded chain (折叠链). "Researchers have calculated that on the ancient earth the probability of success was one chance in 10^{164}.

"That's one correctly sequenced protein chain for every 100,000000,000000000000,000000000000,000000000000,000000000000,000000000000,000000000000,000000000000,000000000000,000000000000,000000000000,000000000000 000000000000,000000000000 failed attempts.

3:11 "But despite these enormous odds, some theorists argue that given enough time anything is possible.

3:19 "Ok, let's test the validity of this opinion.

3:24 "We'll begin by establishing an ideal environment for chemical evolution: an imaginary world that will provide chance with every opportunity to succeed. First, we stock the oceans to capacity with amino acids. That means all the atoms on earth, including its entire supply of carbon, nitrogen, oxygen, hydrogen and sulfur are available to form 10^{41} complete sets of the twenty types of amino acids used to build proteins.

4:02 “Then we’ll alter the laws of nature to protect these building blocks from the destructive rays of ultraviolet light and chemical contamination in the primordial soup.
4:16 “Now let’s turn the chemistry loose and see what happens:
The amino acids start bonding furiously in our experiment. An entire chain of 150 units self-assembles in only one second.
4:40 “Since all 20 types of amino acids are available at the majority of sites there is a 5% (or 1 in 20) chance the correct molecule will align in the chain. If the sequencing is incorrect, the chain is immediately destroyed and a new assembly begins [this wouldn’t happen in real life, they often get stuck together].

Chance of 20 amino acids correctly arranged in a 150 length sequence
(the chance of 1 protein occurring randomly from amino acid interactions)

Try this math yourself: $(1/20)^{150}$. That’s $(½)^{150}(1/10)^{150}$ =
[Hint: Use a calculator!]

Next, the chance of **the protein being folded correctly 1 in 10^5**
That’s $(½)^{150}(1/10)^{150}(1/10)^5$ =

5:02 “Throughout the planet 6000,000000,000000000, 000000000000,000000000000 attempts will take place every minute. That means in 4.6 billion years, the oldest estimated age of the earth, the number of chains that don’t hold will exceed 10^{58}. It’s a staggering total, but nowhere near 10^{164}, the number of trials necessary on average to build a protein of 150 amino acids by chance. So if undirected chemistry can’t produce our coveted molecule during the entire history of the earth then how much time would have been needed? To find out, lets take a road trip.
5:56 “Now suppose against all odds chemical evolution produced our single functional protein would we have life? No, we’d have one protein, just a lifeless arrangement of amino acids. **The simplest living cell we know has more than 300 different proteins.**
6:17 “But proteins are only part of the story when you consider any actual cell. Remember, you’re going to have carbohydrates, complex sugars, nucleic acids, DNA and RNA, lipids, a whole variety of different chemicals which jointly constitute the living state. **Those bits and pieces all have to be brought into the same micro environment at the same moment in time.** Each chemical building block must then be assembled and organized into the network of molecular machines that will control every facet of life.
6:53 “If we can appreciate exactly how hard it is to produce one molecular machine, using nothing except atoms and energy,
7:03 “we can see that there’s a profound problem, because once you have one molecular

machine you don't have a living thing. These molecular machines need other molecular machines and even if nature was capable of producing all the molecular machines necessary that still wouldn't be enough. They have to all be together all in this tiny little membrane-bound space that we call a cell [and] it has to happen all at once, you can't do it one bit at a time because everything works together in a causal loop. The higher level of organization transcends the pieces. The spatial organization in the cell requires that molecules end up in the right place at the right time. The DNA is copied into RNA. The polymerase that does the copying has to find the right spot in the DNA to start copying. The RNA has to somehow

8:11 "that are made have to be going to a particular place.

That's an awful lot to account for by random chance.

8:20 "The probability that you would get them in the same space at the same time becomes beyond unimaginable and the probability that you would get them within a membrane enclosure like a cell is the next best thing to impossible.

"Here's how to quickly and definitively refute the theory of evolution: It's simply a fact that life cannot exist without proteins. Proteins are essential to every cell's function and existence, however proteins require DNA to be formed. That's because proteins are chains of specifically sequenced amino acids. Amino acids must link up in the precise sequence for a protein to form. The precise sequence of amino acids which is essential to protein formation is itself determined by the precise arrangement of

9:24 "the bases in the DNA molecule. That means that the precise arrangement of the bases in the DNA molecule constitutes the code for the precise arrangement of amino acids in a chain, and the precise amino acid arrangement in a chain is itself necessary for protein formation. Therefore, to put it simply, to have life you must have DNA a protein cannot form without it, but DNA by itself is useless it can't do anything DNA doesn't go anywhere or do anything productive without already existing proteins. That's because in order for DNA to be transcribed and utilized in the cell which is essential to protein formation and life DNA requires already existing proteins. DNA also cannot even replicate, that is, make a copy of itself, without already existing proteins. Think about that it means that if you began with DNA

10:26 "but without proteins you could never get to proteins or life because DNA means already existing proteins to even function, or form proteins, and couldn't start with proteins which are devoid of DNA because proteins can only be formed from the instructions and information in DNA. That proves that both DNA and proteins, not to mention the many other molecular machines that enable them to interact must have been present from the beginning of life. One could not have evolved into the other because they require one another for sustenance and utility. They must have been and were created simultaneously. Evolution is false. Charles Darwin, the man who came up with the theory of evolution admitted, "if it could be demonstrated that any complex organ existed, which could not possibly have been formed by numerous successive slight modifications, my theory would absolutely break down."

Critical Thinking Discussion question: Can we move beyond the Neo-Darwinian evolution idea that random mutation and natural selection explain evolution?

Randomness doesn't explain origin—Part II

0:00 "Scientists generally consider anything with a probability of less than one part in 10^{70} operationally impossible and by the way that calculation [the one we saw earlier, the chance of randomly forming one protein, 1 in 10^{164}] doesn't take into consideration the information that's stored in the cell which directs the cell in all aspects of operation that estimate is solely the chance of chemicals combining to form something living, so the chance of life evolving and retaining the information needed to replicate itself is astronomically smaller than anything we know and that's only one organism think about what it would mean for millions of complex organisms to have evolved from an undirected natural process according to information science the probability is so small that it's deemed operationally impossible."

0:52 "So knowing all of this, should the popular scenarios of chemical and biological evolution be taught globally as the only explanation of the origin of life and species? It's my belief that we're not opening our minds to the possibility of other explanations. Now, one of the most basic concepts you should have learned is that if observations and data contradict the theory you're testing, then the theory should be modified or abandoned. Unfortunately, this doesn't seem to be happening to the present most popular model of origins. Instead, many scientists are trying to take information and make it fit the evolutionary models but is that good science? Critical thinking is required to realize the information science aspects of this and to make sure that whatever scenarios you're coming up with do not violate the
principles of information science.

1:58 "Too often scientists believe that information can be generated by physical processes and that simply is not true.

2:08 "Functional information cannot be generated from purely physical properties. Sigmund Freud once said, "From error to error one discovers the entire truth." As we examine history we are constantly reminded of our ever-evolving thoughts in science and, in the case of the cell, the more we research the more complex it seems to be. As we gather information it is up to us as scientists, students and colleagues to bring science to a level of integrity and critical examination that it deserves.

2:52 "If we approach science with an unsupported pre-arranged bias than what we're trying to accomplish is not really science at all. The beauty of science is that we're able to move away from accepted dogma to examine the evidences. It's not up to us to disprove a given theory, it's up to the theory to prove itself against the laws of science. If the theory fails to do this then it should be rejected and we should search for more knowledge in order to, as Sigmund Freud said, discover the entire truth.

3:21 "The possibility of life evolving using the known laws of chemistry and physics is operationally impossible. When we consider the laws of information (10^{70} at the lowest) that possibility [should be considered] impossible. Meaningful prescriptive information cannot arise from nothing no matter how much time you allow, and, until we acknowledge this, we will never discover the origin of life."

Critical Thinking Discussion question: What are some challenges in moving beyond the Neo-Darwinian evolution idea? What's your opinion about this?