From a ‘chemical soup’ to complex life: Understanding the beginning of evolution of life on Earth

How life emerged on Earth is among the most significant mysteries in science. Though it remains an open question in biology, scientists have some pretty promising theories as to how a chemical soup eventually generated complex, cellular life some 3.7 billion years ago. But a theory is more than just a good guess — it needs to explain the available evidence, and it also needs to be testable.

There is ample data suggesting that single-celled organisms slowly emerged from the random assemblage of chemicals floating around in water.

Now, a new study in the Journal of the American Chemical Society suggests that evolution began long before life emerged and that proteins swirling around in the primordial soup selected for preferable traits. In other words, there was a sort of Darwinian selection effect taking place (even prior to the emergence of life) among the un-living proteins and amino acids in the primordial soup.

This idea explains why, even though hundreds of different amino acids may have been present on the early Earth, all living things rely on only about 20 of these compounds.

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