

How can the mystery of the birth of life be solved?

Shinji Karasawa, Miyagi National College of Technology, Professor emeritus

The cell membrane of the present organism consists of 16 or 18 hydrocarbons of carbon atoms. There is no oxygen (O₂) in the atmosphere of the primitive Earth. The first organic molecules were produced via the collision between hydrogen ion (H⁺) of solar wind and primitive atmospheric carbon dioxide (CO₂) and nitrogen (N₂) molecules. The hydrocarbons (C_nH_(2n+2)) with many carbon atoms of which melting point is lower than the surface temperature of the primitive Earth exists as a liquid state. The molecule of hydrocarbon with a small number of carbon is evaporated at the surface of the Earth and remain in the sky. The hydrocarbon molecules those consist with 16 or 18 of carbon atoms were gathered on the water surface by hydrophobic coupling.

Some hydrocarbon molecules floating on the water have molecules that replace the hydrogen at the end with a carboxyl group (COOH). The COOH- end of the molecule is heavy, so the COOH-side becomes the underwater side. An amino group is produced at interface of under water side of the membrane by connecting the acidic carboxyl group and the basic ammonia. Then, the primitive protein was formed by the peptide bond with another amino acid. The structure protein was formed to sew the film of hydrocarbons.

On the other hand, solar-wind hydrogen ions (H⁺) collide with the surface of the water to produce hydrogen molecules (H₂). The remaining hydroxyl group (OH⁻) substitutes with the hydrogen atom of C_mH_{2n+2} of the surface of the membrane. Among the various C_mO_nH_{2n} molecules of the surface, the cyclic 5-carbon sugar glucose that fits with the stereo structure of the water is existed on the membrane surface. On the other hand, phosphoric acid (H₃PO₄) of the tetrahedral structure is existed in seawater a lot.

If three of the tetrahedral-shaped combined orbits are lined up at the interface, the remaining orbits are obliquely skewed to the plane. The molecule that binds to the tetrahedral type possesses a property to construct a spiral structure in contact with a planar interface. The cyclic glucose becomes ribose in a spiral structure. The hydroxyl group of ribose is substituted with phosphoric acid. A frame of the RNA of the spiral structure is formed by a dehydration bond between such molecules. If the spiral structured nucleic acid is synthesized, it may not stay on the membrane, and becomes messenger RNA (m-RNA).

The protein is synthesized at the back side of m-RNA side. Since the peptide bonds are stronger than the hydrophobic coupling of the membrane, the synthesized protein also leaves from the membrane. So, the part of the membrane that possesses with trace of m-RNA and that of the protein is released by segmentation of amino acid. Then, the fragment of membrane became a transport RNA (t-RNA). In order to synthesize protein, the released m-RNA must be combined with t-RNAs. If the length of password is the same, the mechanism to combine t-RNA with corresponding part of m-RNA becomes easy. The codon was made by the combination of three of four kinds of bases as the password which plays a role to tie m-RNA and t-RNA. Since the codon was born and evolved at nucleic acid side, it is not possible to infer the nucleotide sequence of codon from the amino acid side.

There is a flow of the metabolism from the outside to the inside as a metabolism of the membrane. In other words, the reaction moves to the side that synthesizes the internal protein from the nucleic acid side of the membrane. The m-RNA was synthesized at the surface of the membrane, and the protein was made at the back side. By this flow of reaction, synthesis of the protein begins by the generation RNA. The spiral structure of the tetrahedral water molecules in the vicinity of membrane rotates with the same rotational direction of the m-RNA structure. But, the direction of the traveling direction of the spiral structure of m-RNA is reversed to the progression of the protein. Therefore, molecules with different chirality in the front and back of the membrane are synthesized. In other words, the carbohydrate of D body is made on the surface of the membrane, and RNA is made from the carbohydrate of the D body. On the other side, the amino acid of L body was connected, and the protein was synthesized.

The scenario of such a life birth is not possible, if it is assumed the cell membrane of the double layer with the same head on both sides. Evolution is an ongoing trial and error in the existing organization. If there is an error, the evolution does not continue. The mystery on the origin of life will be clarified by reviewing the existing idea.