

MAKING THE FIRST CELL

The creation of the first living cell or biological unit of life will be broken down into seven stages as follows:

1. Basic raw materials.
2. Energy source and proper environment.
3. Monomers (basic organic molecules): amino acids, sugars, phosphates, and organic bases.
4. Polymers: polypeptides and polynucleotides.
5. Clumping: microspheres and coacervates.
6. Completed components: proteins, enzymes, and nucleic acid.
7. First living cell.

These stages are shown schematically in Figure 6.9.

Stage 1. Basic Raw Materials. Through volcanic processes the Earth outgassed its atmosphere of water vapor and dense gases. As the Earth's crust cooled, the water vapor condensed to form shallow seas. Many gases were retained by the Earth in its atmosphere. In addition to water vapor, these included carbon dioxide (CO₂), carbon monoxide (CO), methane (CH₄), ammonia (NH₃), together with nitrogen (N) and hydrogen sulfide (H₂S).

The list of materials above sounds like a formula for acid rain, and some of these components were undoubtedly condensed into the primeval seas as the rains fell. Not only were these raw materials present in the waters and atmosphere of the early Earth, but recent studies of interstellar space have indicated that many of these compounds exist there as well. In addition, meteorites that have fallen to Earth also contain carbon-rich compounds. The origin of life involves many unsolved problems, but the presence of abundant raw materials is not one of them.

Stage 2. Energy Source and Proper Environment. To transform the raw materials of life to the next stage and beyond requires energy. Available energy existed in several forms, one of which was energy from the Sun. This source was a mixed blessing. While it could supply energy, it could also destroy biological life that was not shielded from its ultraviolet rays because the Earth was not protected by an ozone screen during the formation of early life. Moreover, recent observations of young stars suggest that our primordial Sun