off at each link in the molecular chain. Yet water is presumably needed as both a mixing and solution medium to bring the molecules together. Driving off the water molecule at each link in the chain in order to forge the linkage requires energy. Furthermore, nucleotides are high-energy molecules which would probably not exist for any length of time in a water solution.

In present-day biological linkages this energy is transferred by what is called the Krebs cycle, which is essentially a sequence of enzymatic reactions that involve the oxidation of a two-carbon acetyl molecule unit resulting in carbon dioxide and water, which provide energy to increase ADP (adenosine diphosphate) to ATP (adenosine triphosphate) and back again. The problem is that in experiments to create the first life, the Krebs cycle and the ADP which it requires do not yet exist.

The second problem in forming polypeptides and polynucleotides is known as the "concentration gap." This is basically the problem of concentrating the essential biologically active compounds in "primordial soup" from a diluted to a concentrated state. The monomers could then come into close contact and increase their chances of connecting into polymers, but there is no known natural mechanism to bring this about. Brownian forces would actually cause diffusion of concentrated solutions into dilute ones.

Further, while it is possible to imagine a simple process of polymerization whereby monomers link up to form chains of polymers, it should be noted that if a polymer comes into contact with water, the molecules may dissociate, break the chain, and yield the original amino acids. In fact this polymer to monomer reaction known as hydrolyzation requires no energy. In the presence of water it can occur spontaneously.

The problems of dehydration and concentration are generally solved by proposing that the primordial soup existed in a "warm little pond" that evaporated. This would both concentrate and dry out the monomers so that the polymer chains would have a chance to form. There are two major problems with this scenario. The first is that the numerous other molecules present would also concentrate, greatly lessening the chances of the "correct" molecules coming into contact. Too many other molecules of the "wrong sort" would be in the way.

This negative concentration effect would be especially pronounced in sea water. One has only to visit the Great Salt Lake near Salt Lake City, Utah, to see the effects of evaporation in salt water. Salt molecules would greatly outnumber amino acid molecules (10,000 to 1 by