WHAT'S IN A NAME

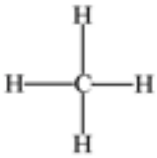
CHEMISTRY AND THE CREATION OF LIFE

1. C the creation of life (the chemical story)

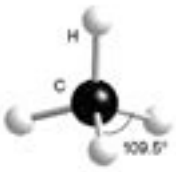
If you were asked to create life starting from basic elementary building blocks, there can only be one element you should pick to get things started and where it all comes down to: the carbon atom (C). It is carbon that will always serve as the basic skeleton and where all other stuff is attached to.
The only other thing you need is energy, which in organic life is stored in phosphate (P) in ATP. The reason why carbon serves as the backbone of all organic life probably has to do with two special characteristic qualities of carbon:

1. "catenation": is the linkage of atoms of the same element into longer chains. Carbon can form covalent bonds with other carbon atoms to form longer chains and structures: C-C, -C-C-C-.
Starting from a molecule of 1 carbon atom (CH_3 : methane) to molecules with 2 carbon atoms (C_2H_6 : ethane), 3 (C_3H_8 : propane), 4 (C_4H_{10}) ….etc

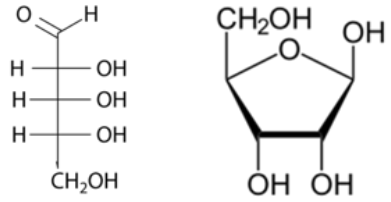
2.The spatial appearance of the tetravalent carbon atom, which automatically drives carbon molecules to form (3-dimensional) pentagons and hexagons. Carbon is tetravalent: meaning that it has 4 electrons readily available to form covalent chemical bonds. E.g. methane:



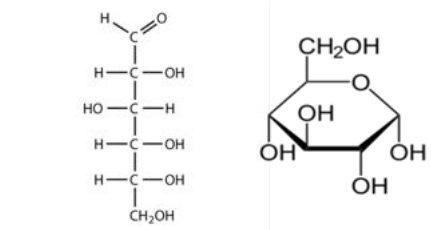
But you should not picture these molecules in one (flat) plane. These structures have a 3 dimensional spatial appearance.



The angle of inclination of the covalent bonds is such that spatially, as soon as the carbon chains gets as long as 5 or 6 atoms, has the natural tendency to form pentagons and hexagons.



Ribose



Glucose

You find this phenomenon of automatic formation of pentagons and hexagons not only in the organic molecules with pentoses and hexoses, but also in the other carbon structures like charcoal, graphite, diamante, fullerenes, etc…

Carbons' (special) property of "catenation" and the spatial appearance of carbon atoms is the reason for the vast number of organic compounds and the abundance of different stable organic compounds (about 10 million different carbon molecules are known). Organic chemistry essentially being the study of catenated carbon structures.

So building life all starts with the formation of the carbon cytoskeleton and the basic step to get things started is obviously photosynthesis: the process in which the energy of light is used to form carbohydroxate (CO2) into carbohydrates. First into 2 chains of 3 carbon atoms (glyceraldehyde-3-phosphate (C-C-C-P)) that are subsequently combined into the basic hexagons containing 6 carbon atoms: e.g. glucose. These can be used to derive all other sugars from and by extension subsequently all other organic molecules.

The chemical formula is written down as 6 H_2O + 6 CO_2 -> $C_6H_{12}O_6$ + 6 O_2, but the actual reaction/construction takes shape in what is known as the Calvin cycle.

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In photosynthesis, first the energy of sunlight is stored in the phosphate of ATP and the necessary electrons in NADPH. This takes place in "the light reaction". Subsequently the energy and electrons are used in the construction of glucose itself: the Calvin Cycle. Here the 2 molecules of glyceraldehyde-3-phosphate (C-C-C-P) are formed and stuck together to form a basic sugar e.g. glucose.

Once a basic sugar is formed, all other molecules come natural;

- Simply adding extra carbon, hydrogen and oxygen and you form all other different sugars, chitins, alcohols and fatty acids.
- Adding nitrogen and you construct the alkaloids and with nitrogen and sulfur you form all amino acids.
- Add an extra phosphor and DNA, RNA and ATP are formed

2. The beauty of CCP, PCC and the missing CC

If you would ask a chemical engineer to take a close look at C.C.P. (Cosmopolitan Chicken Project) and P.C.C. (Planetary Community Chicken), he would probably speculate there are one or two carbon atoms missing to form the basics of all life.

Add a C to C-C-P and a C to P-C-C. This would give you exactly 2 glyceraldehyde3-P molecules (C-C-C-P). And everything gets started.

Better start looking for the CC.

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