

Fig1-1. Left; phosphate exists as an ion in water. Middle; OH at 2'C position of a sugar, ribose, is important for the catalytic activities of RNAs. Right; deoxyribose, which is used as a chemical component of DNA, genetic material in usual living beings, does not have OH at 2'C position, causing higher chemical stability than ribose.

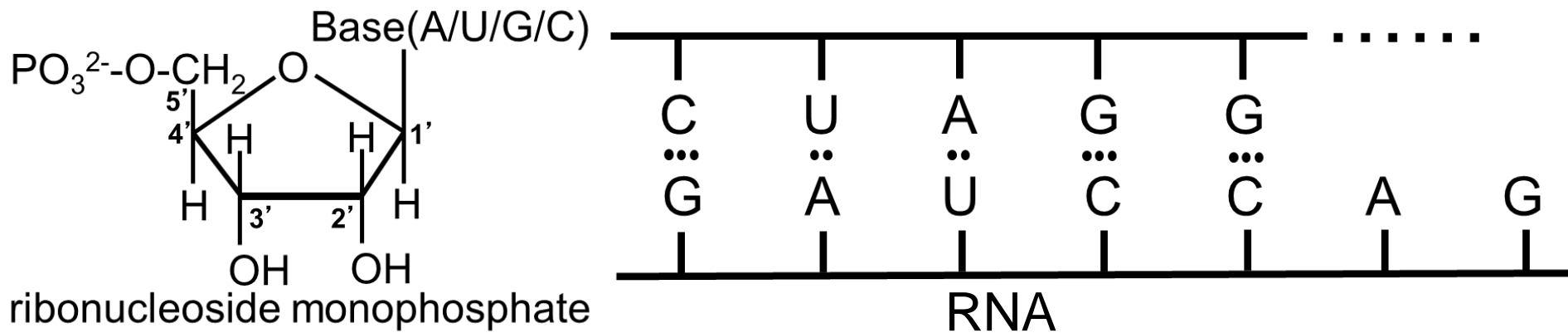


Fig1-2. Left: Nucleoside Monophosphate. One of four types of bases (A/U/G/C) is combined with ribose at the 1' carbon position. This is called a nucleoside. When a dehydration condensation reaction occurs, which produces  $\text{H}_2\text{O}$  from the phosphate ion OH (Fig.1-1) and the OH at the ribose 5' carbon position, chemical bonding (i.e., covalent bonding) can occur. When this reaction occurs in a nucleoside, it becomes a nucleotide (or, as is the case in the figure, a nucleoside monophosphate). When covalent bonding occurs between the phosphate and the neighboring ribose 3' OH, RNA is created, which has a chain-like structure. On the bottom part of the right figure is RNA. Right: A special catalytic RNA can cut and connect nucleotides. The lower RNA can work as a template to synthesize the upper RNA strand with the complementary bases to the lower RNA strand. The two or three dots between the facing bases indicate hydrogen bonding created by these bases (A & U and G & C). As can be seen in this figure, the lower RNA base sequence information is copied into the upper RNA so that the sequence of these bases properly mirrors each other by hydrogen bonding. If this process is carried out once again, the lower RNA base sequence information is doubled. In other words, RNA self-replicates. This is why it is said that they are "selfish genes."