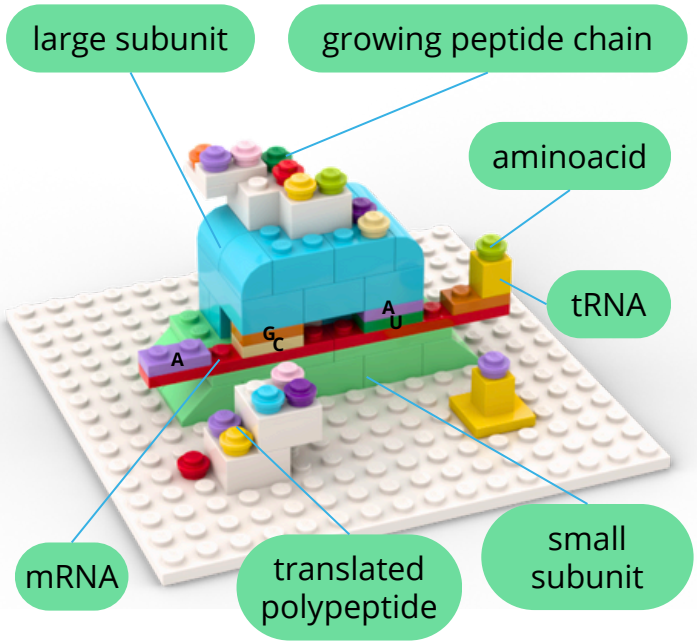
RIBOSOME

Ribosomes are the molecular factories that produce proteins in the cell. Each and every one of your cells contains many ribosomes.

When your cells need to produce a new protein, a piece of DNA in the nucleus of the cell is translated into messenger RNA (mRNA), a molecule that carries instructions to the ribosomes outside the nucleus. The ribosomes follow the instructions encoded in the messenger RNA to string specific amino acids together into a chain, much like the way a cook follows a recipe to make a cake. These long chains fold together to form proteins.



How ribosomes do this is a fascinating process. Ribosomes are composed of a large and a small subunit. The two parts lock around the messenger RNA, then move along the messenger RNA molecule and read the DNA code.

As the ribosome moves along the messenger RNA, it reads parts of the DNA code called codons. Codons consist of a sequence of three nucleotides. Each time a codon is read, the correct amino acid is transferred to the growing protein chain. The information from the messenger RNA is thus translated into a protein one step at a time. At the end of the messenger RNA, there is a stop sign that tells the ribosome to complete the protein, which is then released. After completing the protein, the ribosome disassemble.

TO SEE A MOLECULE

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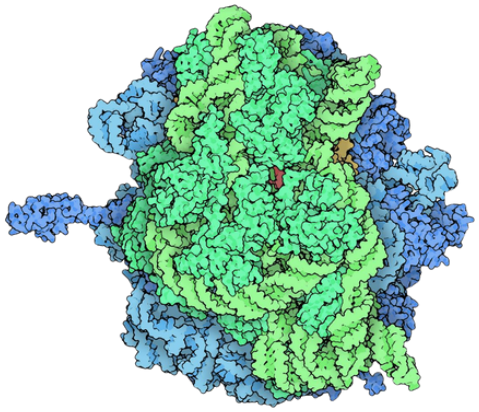
Molecules are extraordinarily small. In the tiny dot in the line above, there are over a hundred million molecules. They are so small that you can't even see them with a microscope. To find out what molecules look like, researchers use different techniques. The main ones are X-ray crystallography, cryo-electron microscopy and NMR spectroscopy.

In X-ray crystallography, researchers crystallize proteins and then expose them to an X-ray beam. The crystalline atoms cause the X-ray beam to split in many different directions, creating a pattern. Scientists use the patterns to produce a 3D image of the molecule.

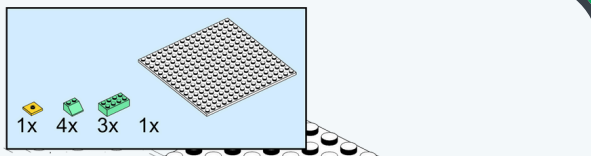


BUILD A MOLECULE

RIBOSOME

UNIVERSITY OF COPENHAGEN
INTEGRATIVE STRUCTURAL BIOLOGY CLUSTER

1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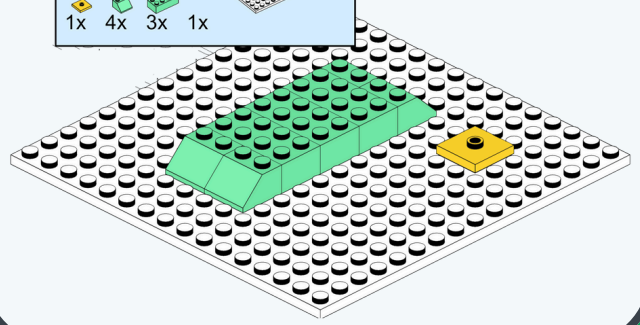

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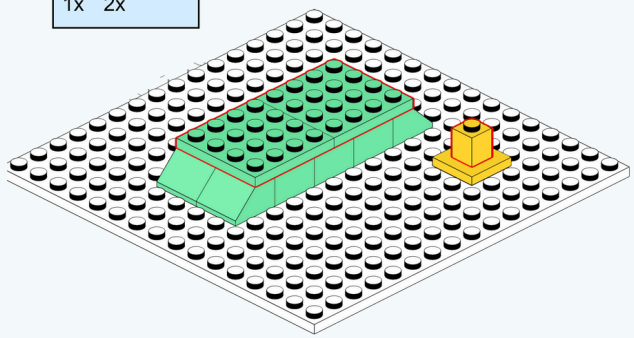

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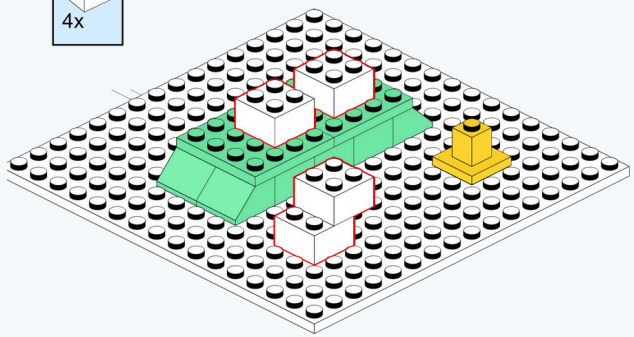

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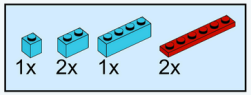
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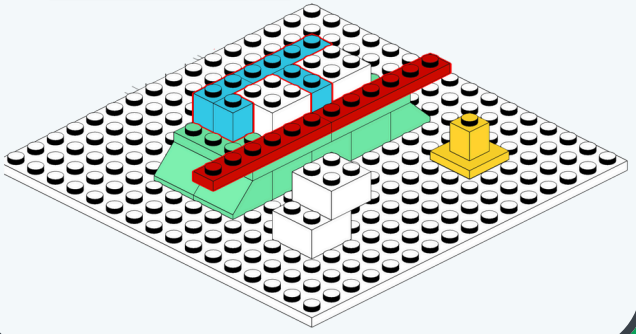

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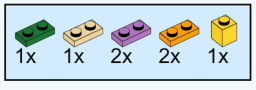
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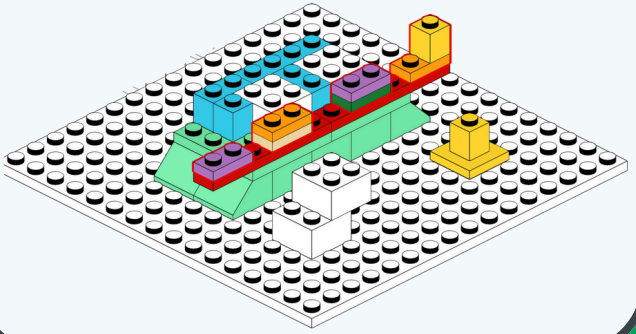

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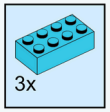
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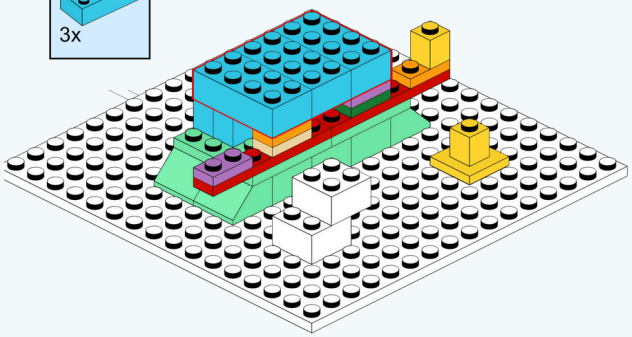

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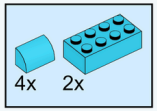
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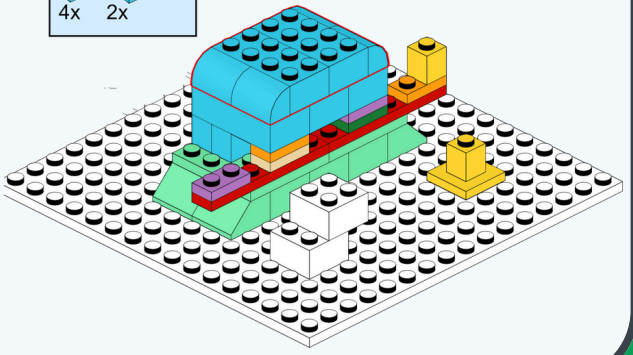

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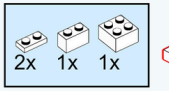
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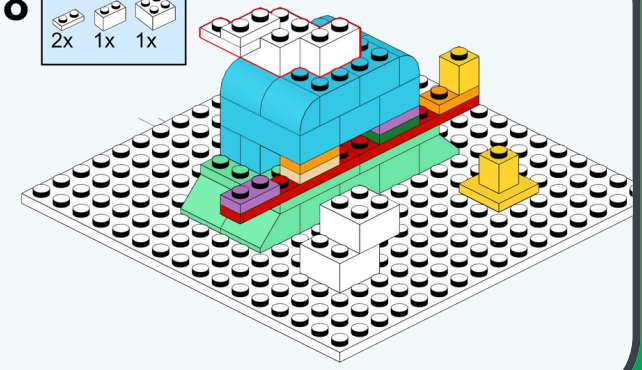

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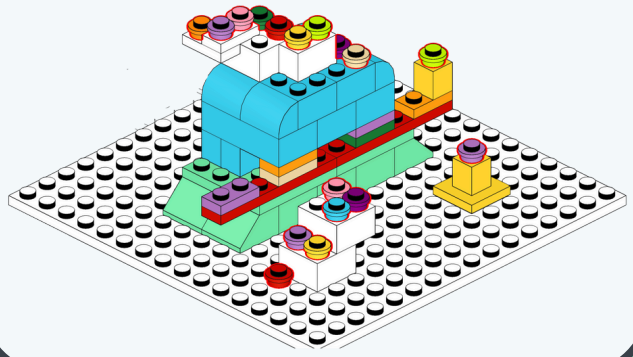
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