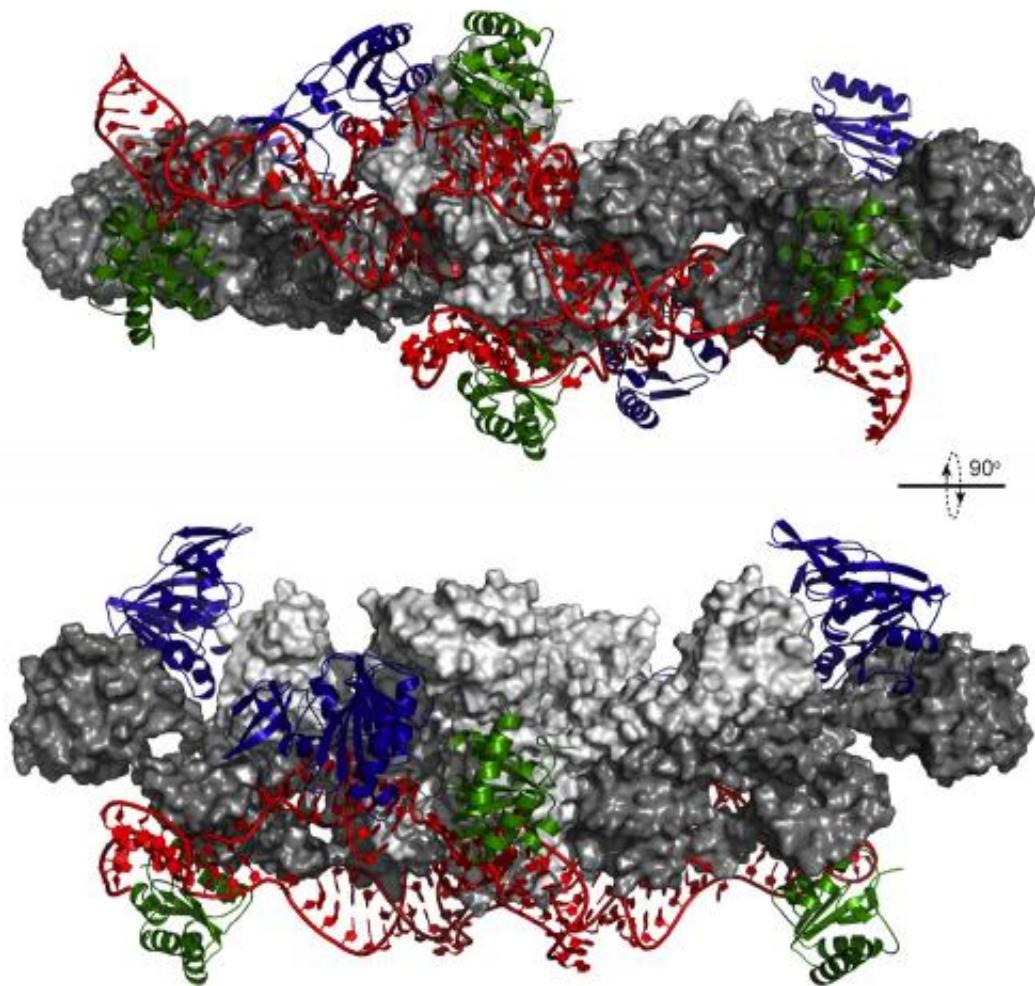


Choreographed origami: Folding ribosomal RNA requires paired tagging sequence

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Structure of the RNA-tagging machinery shows that only one pair of proteins (blue) can add tags to the RNA (red) at a time. Credit: EMBL/Carlomagno

the cell's protein factories – is like a strictly choreographed dance, scientists at the European Molecular Biology Laboratory (EMBL) in Heidelberg, Germany, have discovered. To build these factories, other 'machines' inside the cell have to produce specific RNA molecules and fold them into the right shape, then combine the folded RNA with proteins to form a working ribosome. Like a budding origami artist pencilling in the folds, the cell uses tags called methyl groups to help mark where and how an RNA molecule should be folded.

In work published online today in *Nature*, the scientists have discovered that pairs of these tags are added in a specific order. The study combined [nuclear magnetic resonance](#) at EMBL and neutron scattering at the Institut Laue-Langevin (ILL) in Grenoble, France.

Led by Teresa Carlomagno at EMBL, the scientists were able to determine the 3D structure of the complex that adds methyl tags to the RNA, with the RNA molecules attached. They discovered that the different components of this tagging machine pair up and move in sequence, like dancers following a set choreography.

"We found that the complex has four copies of each protein, and four methylation sites on the RNA, but those methylation sites aren't all the same," Carlomagno says. "They come in pairs, and one pair has to be methylated before the other."

The fact that the pairs of tags have to be added in a particular order could be a way for the cell to control how the RNA is folded, and ultimately when and where ribosomes are formed, the scientists believe.

More information: The structure of the box C/D enzyme reveals regulation of RNA methylation, *Nature*, [DOI: 10.1038/nature12581](https://doi.org/10.1038/nature12581)

Provided by European Molecular Biology Laboratory

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