



Vincent van Gogh's Autocatalysis

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The research story

RNA is a fundamental molecule that codes for protein and controls gene expression, playing a fundamental role in many biological processes. The genetic information contained in premature messenger RNA (mRNA) is cleared of its non-coding sections, known as introns, to be converted to proteins. In several simpler organisms, this key process is carried out by group II introns, enzymes entirely made up of RNA that are able to self-cleave and remove themselves from the mRNA filament, thereby enabling RNA maturation and protein expression. Group II introns employ magnesium atoms to perform the “self cleavage”, which help the enzyme in acting like a “double scissors” to cleave itself.

The image

In this painting, two scissors are used to represent the splicing mechanism operated by Group II intron ribozyme. This artistic rendition is an original handmade painting of Amelia Palermo (TSRI, La Jolla), digitally designed and manipulated by Lorenzo Casalino (UC San Diego), over an original idea of Giulia Palermo (UC Riverside). This painting has been inspired by recently published research on the mechanism of RNA splicing [1,2]. This artistic picture has received the first place prize at the 61st Biophysical Society Art of Science Image Contest, 2017, February, New Orleans. It has been selected as a Cover for the May 2019 issue of the *Journal of Structural Biology*.

References

- [1] Casalino L, Palermo G, Spinello A, Rothlisberger U, Magistrato A, All-atom simulations disentangle the functional dynamics underlying gene maturation in the intron lariat spliceosome. *Proc Natl Acad Sci USA* 115: 6584–6589, 2018.
- [2] Casalino L, Palermo G, Rothlisberger U, Magistrato A, Who activates the nucleophile in ribozyme catalysis? An answer from the splicing mechanism of group II introns. *J. Am. Chem. Soc.* 138: 10374–10377, Journal Cover Art, 2016.

