

# Molecular typesetting -- proofreading without a proofreader

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Researchers at the Universities of Leeds and Bristol (UK) have developed a model of how errors are corrected whilst proteins are being built.

Ensuring that proteins are built correctly is essential to the proper functioning of our bodies, but the 'quality assurance' mechanisms that take place during this manufacturing process are not fully understood.

"Scientists have been puzzled as to how this process makes so few mistakes", says Dr Netta Cohen, Reader at the University of Leeds' School of Computing.

To create a [protein](#), the first step involves copying the relevant gene on our DNA onto a template, called RNA. This copying process is carried out by molecular machines called RNA polymerases.

"The [RNA polymerase](#) acts like an old fashioned newsprint typesetter, constructing newsprint by assembling letters one at a time. Similarly, RNA polymerase constructs RNA by reading the DNA and adding new letters to the RNA one at a time," explains Dr Cohen.

There's no way for the RNA polymerase to ensure that the correct letter is always incorporated at the right spot. "Statistically, we would expect to see a hundred-fold more errors than we actually do, so we know that some error correction must be happening. Otherwise, many more proteins in our bodies would malfunction," says Dr Cohen.

Biological experiments have shown that the RNA polymerase slides both forwards and backwards along the RNA sequence it has created. What's more, it has miniature scissors that can then cut out the last few letters of RNA.

So how are errors corrected? Intelligent typesetters would remove the last few letters when they spot an error. The new model suggests how the backward sliding stalls when passing an error, so wrong letters can be snipped off and copying can resume.

"The mechanism we've modelled has only recently been shown to be implicated in proofreading," says Dr Cohen. "In fact, there is more than one identified mechanism for ensuring that [genetic code](#) is copied correctly. The challenge now is to find out - through a combination of experimental biology and modelling - which mechanism is dominant."

Source: University of Leeds ([news](#) : [web](#))

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