

Supplemental Material

CBE—Life Sciences Education

Carr *et al.*

Supplementary Material: An example DNA “translation” assignment that could be used as in-class assignment or homework assignment.

In this exercise, you will learn to identify the polypeptide (amino acid) sequence encoded in a region of double-stranded DNA (dsDNA) of length L base pairs. This will require identification of the single Open Reading Frame (ORF) that corresponds to a polypeptide sequence, shown according to the single-letter code. The other five reading frames are closed by one or more ‘stop’ triplets, shown as ‘*’.

- 1) Go to [<http://www.ucs.mun.ca/~donald/orf/randomorf/>].
- 2) Enter “Length” as 15; click on “Generate dsDNA”.
- 3) The display will show a color-coded dsDNA sequence, with 5’ and 3’ ends labeled.
- 4) Identify the single **Open Reading Frame**.
 - a) Identify the **5’** and **3’** ends of the **ORF**.
 - b) Give the **sequence of the polypeptide** encoded by that reading frame. (Use the IUPAC single-letter code).
 - c) Label the **N (amino)** and **C (carboxyl)** termini of the polypeptide.
 - d) Is this process ‘*Translation*’? Explain.
- 5) Click on “Show ORF”: the ORF will be shown highlighted.
 - a) Did you identify the ORF correctly? If not, review theory and your work.
 - b) Generate a new example by again clicking ‘Generate dsDNA’
 - c) Repeat until you are confident that you understand the principles; increase the length L to L = 25 and repeat.