



Industrial CASE Studentship Advertisement – 2020-21

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Project Title: Studying full length mRNAs at single-cell resolution

Brief description of project (no more than 500 words):

Biology is undergoing a revolution with the introduction of single-cell methods. The cell is the fundamental unit of biological systems. The most common of these techniques, single-cell transcriptomics allows obtaining sequences from thousands of mRNAs in tens (or hundreds) of thousands of individual cells. The mRNAs of each cell are indicative of their cell type as they express cell type markers. Being able to study thousands of them individually unlocks the reconstruction of the dynamics that were formerly blended into tissue samples. Using this method in the planarian *Schmidtea mediterranea*, we were able to reconstruct the differentiation trajectories from pluripotent stem cells into dozens of mature cell types in a single differentiation tree.

However, most single-cell transcriptomic methods just allow sequencing of the 3'UTR ends of mRNAs. This prevents the analysis of many important cellular processes such as alternative splicing, RNA editing and alternative polyadenylation. Developing a method that can profile full-length mRNAs with single-cell resolution is an urgent need to establish the roles of those processes in cell differentiation, development and disease.

To establish this method, the Solana laboratory is collaborating with the Oxford Nanopore Technologies' (ONT) Genomic Applications team. The Solana laboratory has expertise in single-cell transcriptomics. ONT is a world leader in long read RNA and DNA sequencing. The student will exploit and combine both of these technologies to develop a method that can profile mRNAs at full-length resolution in thousands of single cells. Once established, the student will use this method to study the role of alternative splicing, RNA editing and alternative polyadenylation in planarian stem cell differentiation. This will reveal new insights in stem cell biology and animal regeneration.

Attributes of suitable applicants:

The candidate should have a degree from a Higher Education Institution in the UK or acceptable equivalent qualification in biology or related subject.

Funding notes:

This project is funded for four years by the Biotechnology and Biological Sciences Research Council BBSRC. BBSRC eligibility criteria apply (<https://www.ukri.org/files/legacy/publications/rcuk-training-grant-guide-pdf/> Annexe 1). EU nationals who do not meet BBSRC residence criteria are encouraged to contact the programme administrator to check their eligibility for BBSRC funding before submitting a formal application. Successful students will receive a stipend of no less than the



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standard RCUK stipend rate, currently set at £15,009 per year, which will usually be supplemented by the industrial partner.

This project is supported through the Oxford Interdisciplinary Bioscience Doctoral Training Partnership (DTP) studentship programme. The student recruited to this project will join a cohort of students enrolled in the DTP's interdisciplinary training programme, and will be able to take full advantage of the training and networking opportunities available through the DTP. For further details please visit www.biodtp.ox.ac.uk.