

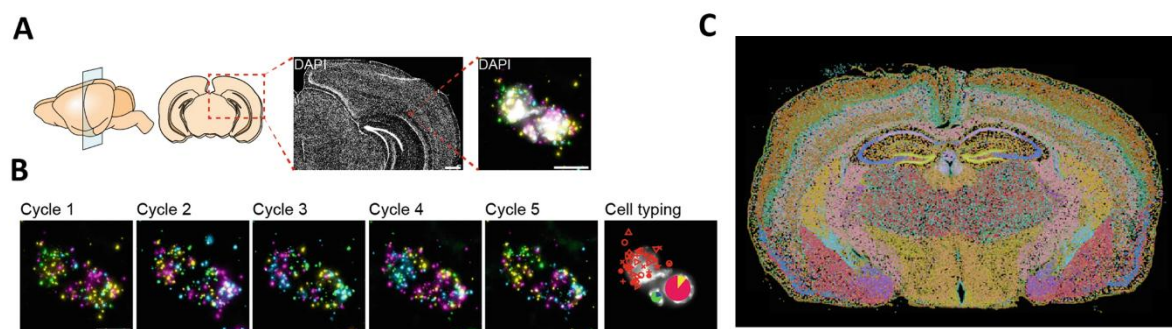
## Master's Thesis: Spatial Mapping of microRNAs in the Brain

We offer an exciting opportunity for a motivated Master's student to join Prof. Mats Nilsson's laboratory at Scilifelab to conduct research in spatial biology.

### Project Overview

The project, funded by the Marie Skłodowska-Curie Actions of the European Commission, offers the opportunity to be part of the development of a novel method based on in situ sequencing (**Figure 1**) to map the spatial distribution of microRNAs in the mouse brain.

MicroRNAs, recognized by the 2024 Nobel Prize in Physiology or Medicine, are small non-coding RNAs that regulate gene expression and play diverse roles in neuronal differentiation, synaptic plasticity and neurological diseases. Despite their well-established functions in brain physiology and pathology, the spatial organization of microRNAs in brain tissue remains largely unexplored. Uncovering their distribution can reveal molecular signatures and regulatory mechanisms underlying neurodevelopmental and neurodegenerative disorders.



**Figure 1.** In situ sequencing subjects brain tissue sections (A) to multiple rounds of molecular decoding and imaging (B), establishing spatially resolved maps of gene expression patterns (C).

### What You Will Do

Under the guidance of Prof. Mats Nilsson and Dr. Agustín Robles, you will gradually become involved in the project, receive training in the following areas, and support ongoing research in a collaborative and supportive environment:

- Sectioning and processing of mouse brain tissue
- In situ sequencing to map mRNA and microRNA directly in mouse brain tissues
- Fluorescence microscopy and image-based molecular profiling
- Bioinformatic analysis of spatial gene expression data
- Cell culture of neural/tumor-derived cell lines for mechanistic studies
- TaqMan-based assays for validation of microRNA expression

### Where: at Scilifelab, Karolinska Campus Solna

The Nilsson Lab, based in SciLifeLab, is leader in spatial biology, known for developing innovative molecular methods to study gene expression in situ.

### Who can apply

Masters students in Neurobiology, Molecular Neuroscience or related fields with a strong interest in gene regulation, RNA biology and neuroscience. Laboratory experience is a plus.

### References

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2. Liu I, Jiang L, ..., Mats Nilsson, et al. The landscape of tumor cell states and spatial organization in H3-K27M mutant diffuse midline glioma across age and location. *Nat Genet*. 2022. doi: 10.1038/s41588-022-01236-3.
3. Shang R et al. microRNAs in action: biogenesis, function and regulation *Nat Rev Genet*. 2023doi: 10.1038/s41576-023-00611-y.

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