

Methods and Applications of Nano-channel-based Optical DNA Mapping

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Nano-channel-based optical DNA mapping is a technology for locating specific DNA sequence patterns. A typical protocol involves fluorescent labelling of nicking sites, linearization of DNA molecules, and high-resolution microscopy. Due to the long molecule lengths (up to 1Mb or even more), it is useful for detecting large-scale genomic rearrangements such as structural variations (SVs). Due to special properties of optical mapping data, analysis methods developed for handling sequencing data cannot be directly applied. In this talk, I will introduce methods for aligning, assembling, visualizing and simulating optical mapping data. I will also describe how SVs can be identified using optical mapping alone or in combination with sequencing, with applications in population genetics and cancer genomics. Finally, I will discuss recent developments of optical mapping in epigenomics.