

Small but Mighty: MinION Sequencing Workflow for the Efficient and Rapid Sequencing of Avian Influenza Viruses

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The portable MinION 3rd generation sequencer (Oxford Nanopore Technologies) has developed over the past years to become a serious competitor to standard 2nd generation sequencers. Thanks to the easy and quick handling and growing availability of various sequencing kits and accessories, the MinION is versatilely applicable. Alongside its ability to produce ultra-long reads, the device has proven to be excellent for shorter, segmented virus genomes, e.g. avian influenza viruses (AIV). Real-time sequencing and barcoding kits leave the sequencer exceptionally suitable for outbreak situations, where high throughput and rapid detection are indispensable.

In the case of AIV, large outbreaks with high mortality rates among both poultry and wild birds in combination with possible zoonotic potential lead to devastating economic impacts. Frequent reassortment events complicate the situation and the genetic variety shows the necessity for fast and accurate analyses of full genomes.

Employing the MinION with AIV samples from the epizootic outbreak Germany 2016-2018, we have developed and validated a high-throughput sequencing workflow and fast screening method for unknown AIV samples. In the case of an outbreak, this method could dramatically reduce the cost and time for full genome sequencing, thus accelerating the response time and aiding in disease control.

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