

An Introduction to Minion Sequencing

What the session will include:

What is a minION?

A live demonstration of a MinION Protocol

A chance to do some pipetting for the protocol

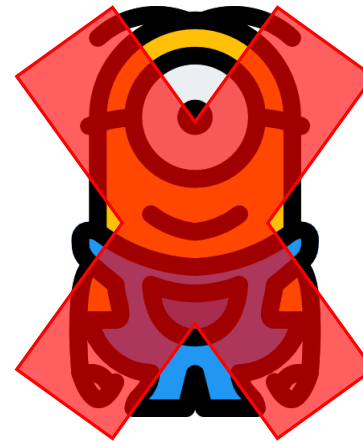
Transferrable skills in the laboratory

Hands on experience with MinION flowcells

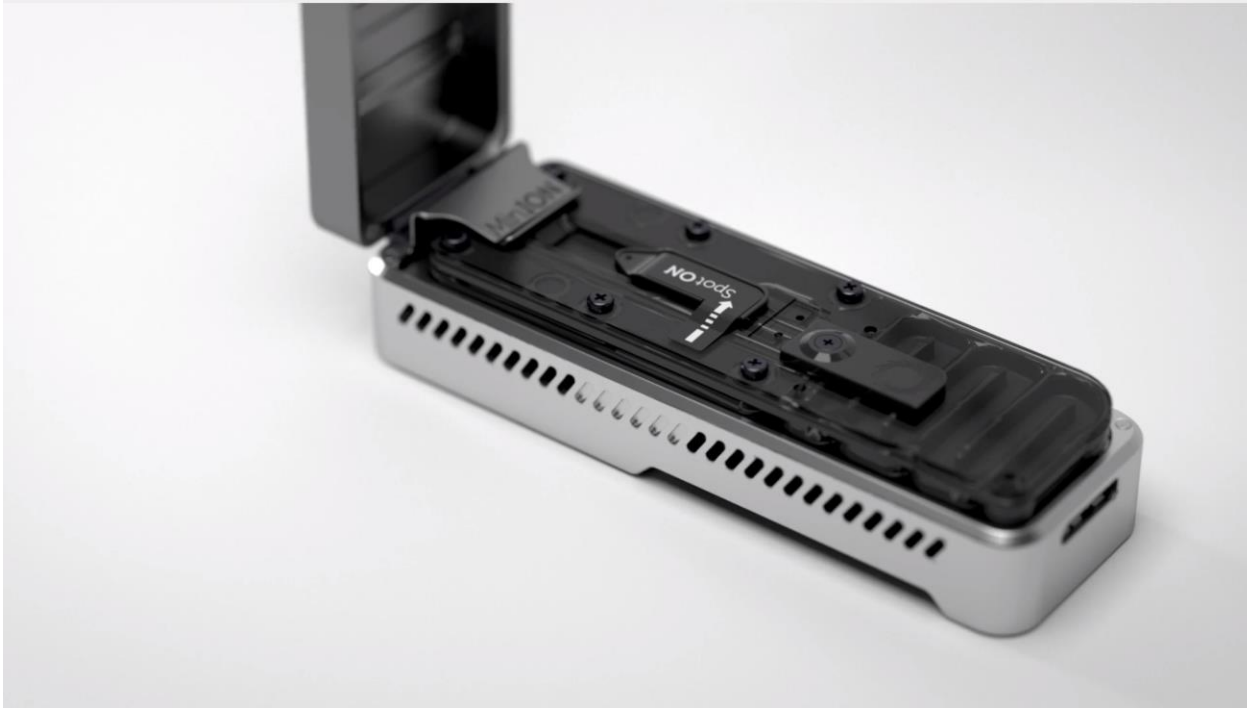
Loading practice of old flowcells using water

What is a MinION?

- A MinION is a powerful, portable sequencing device that delivers access to gigabases of long read data
- It works by monitoring changes to an electrical current as nucleic acids are passed through a protein nanopore. The resulting signal is decoded to provide the specific DNA or RNA sequence.
- Connects to laptop with a USB cable, uses a software called MinKNOW



Video



<https://nanoporetech.com/applications/dna-nanopore-sequencing#:~:text=Nanopore%20sequencing%20is%20a%20unique,specific%20DNA%20or%20RNA%20sequence.>

Quiz Question – Where hasn't a Minion been used to sequence DNA?

- A Laboratory
- The Emirates Stadium
- Rural Thailand
- Space
- The Antarctic

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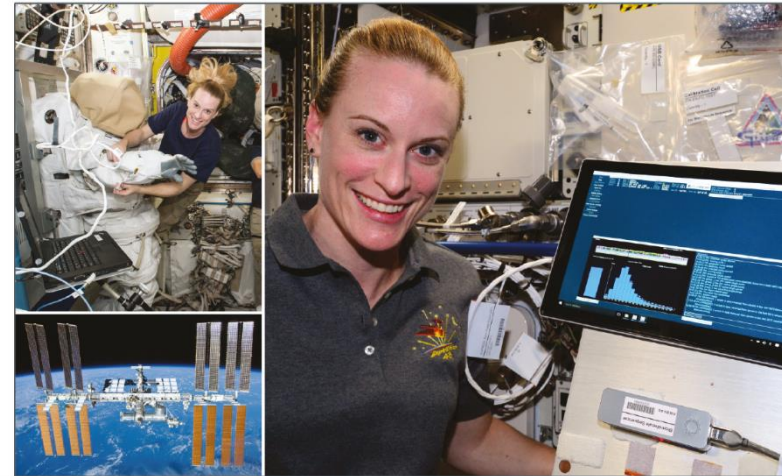


Fig. 1 Astronaut Kate Rubins on the ISS

Answer: Trick question – They've been used at all of them!

Advantages of Nanopore Sequencing

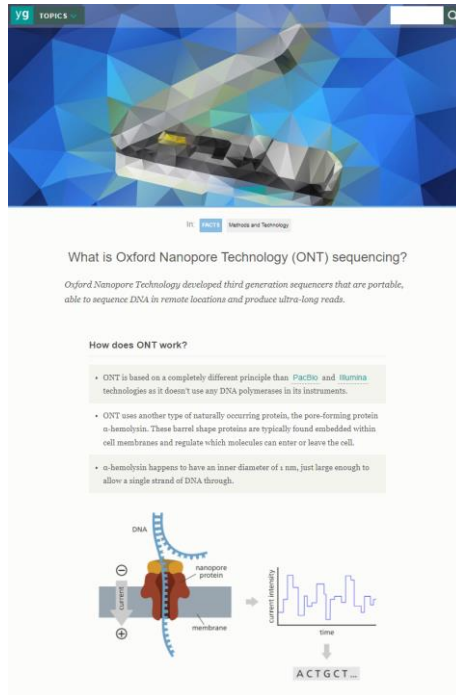
- Portability
- Fast library preparation
- Scalability eg. GridION & PromethION
- Ultra – Long read lengths
- Direct molecular analysis



Disadvantages of Nanopore Sequencing

- Expensive
- Can only use ONT sequencers and kits
- Accuracy of ~90%, compared to ~99% of the illumine short read sequences

Further reading

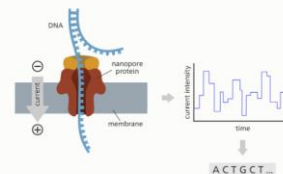


What is Oxford Nanopore Technology (ONT) sequencing?

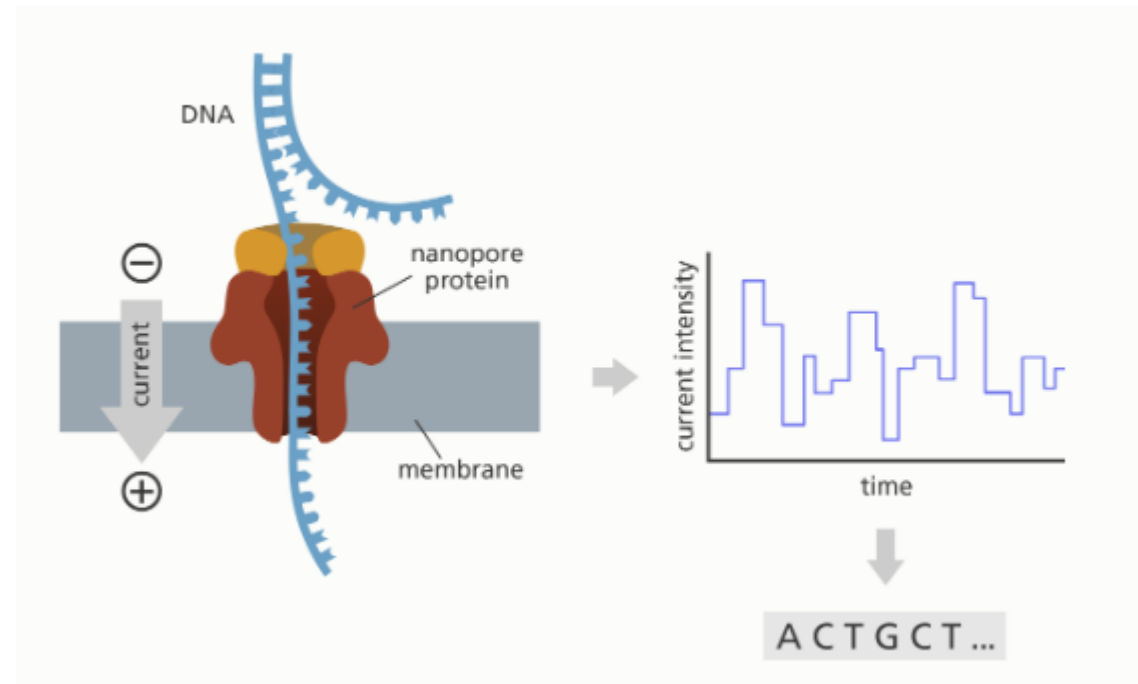
Oxford Nanopore Technology developed third generation sequencers that are portable, able to sequence DNA in remote locations and produce ultra-long reads.

How does ONT work?

- ONT is based on a completely different principle than **PacBio** and **Illumina** technologies as it doesn't use any DNA polymerases in its instruments.
- ONT uses another type of naturally occurring protein, the pore-forming protein **α-hemolysin**. These barrel shape proteins are typically found embedded within cell membranes and regulate which molecules can enter or leave the cell.
- **α-hemolysin** happens to have an inner diameter of 1 nm, just large enough to allow a single strand of DNA through.



ACTGCT...



<https://www.yourgenome.org/facts/what-is-oxford-nanopore-technology-ont-sequencing/>