

Monitoring Astronaut Health with DNA Sequencing

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ISS as a Functional Lab

- International laboratory conducting high impact research
 - Organisms/systems
 - Coverage of cell/molecular biology
 - WetLab-2 (current success in PCR)
- one shot with high enough sensitivity and accuracy

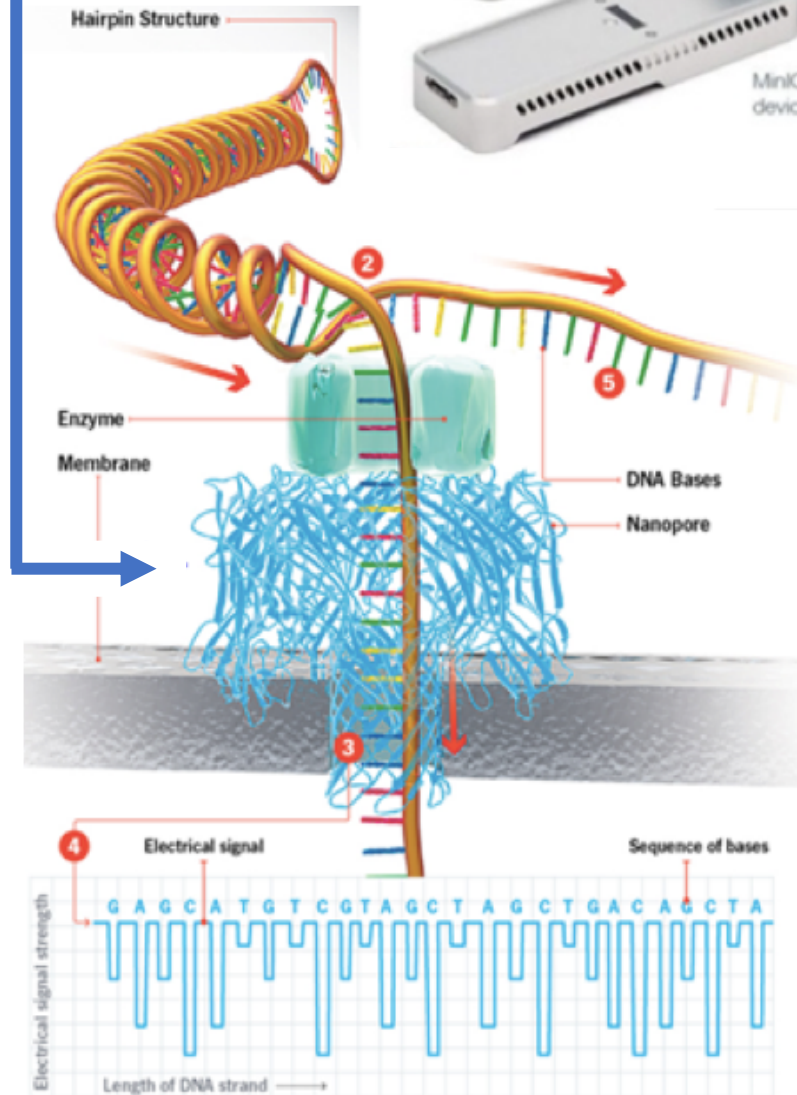


TRISH: Human Health on Land and in Space

- Monitor astronaut health In spaceflight:
 1. Rapid diagnosis of infection
 2. Microbiome monitoring
 3. Changes in gene-expression
- Omics analysis in real time with just a laptop computer
- Faulty diagnostics on Earth: single assay to detect variety of pathogens
- Personalized medicine
 - Case study: 14 year old boy

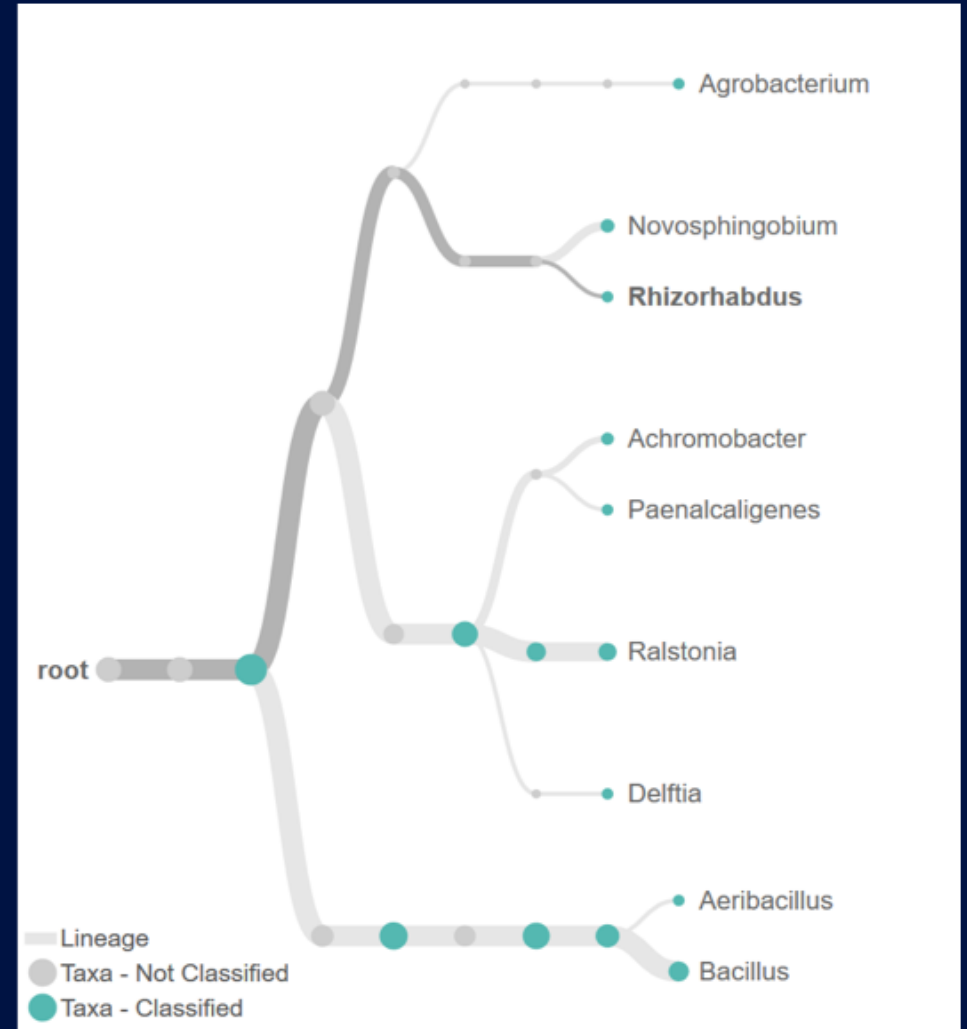
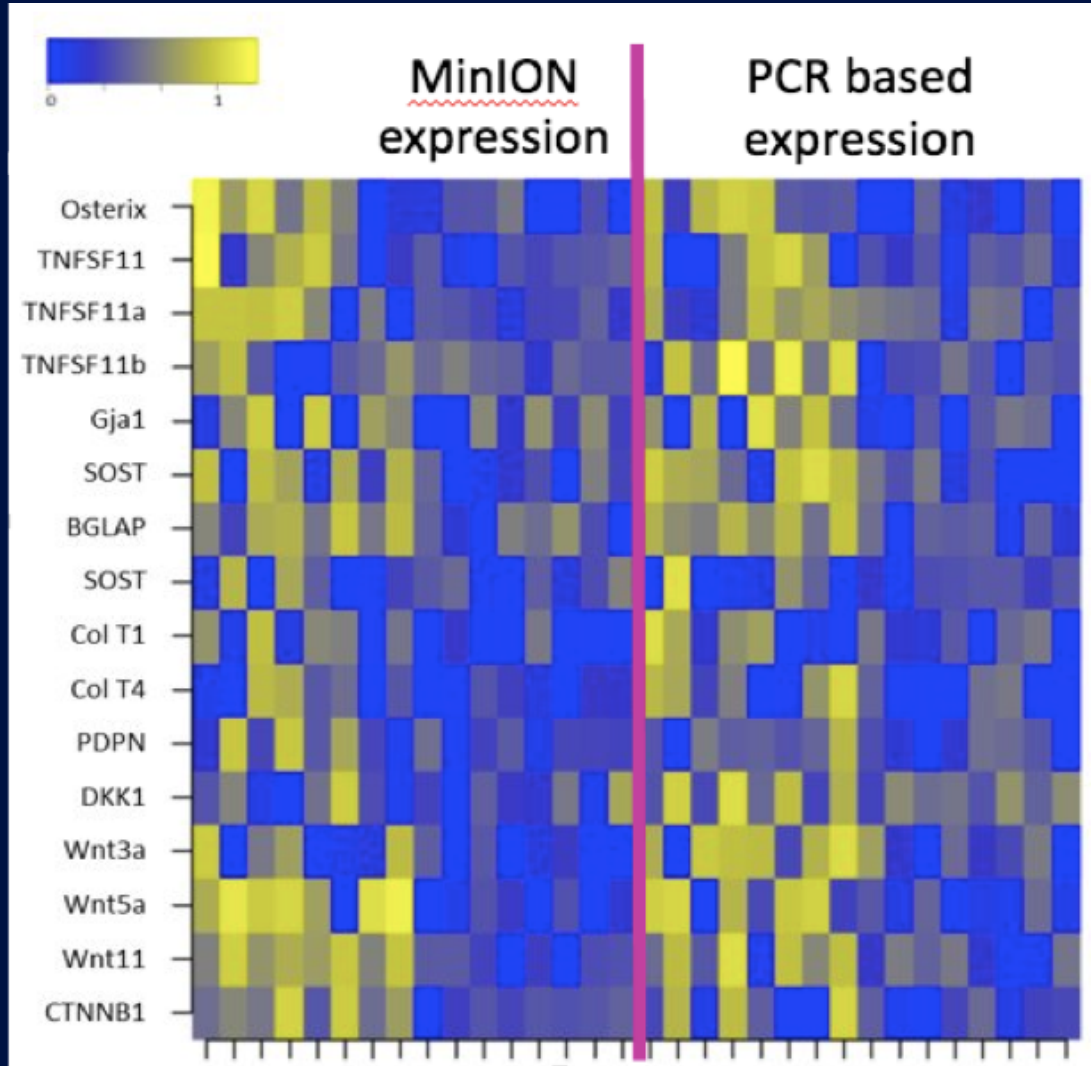


MinION: A Mini DNA Sequencer

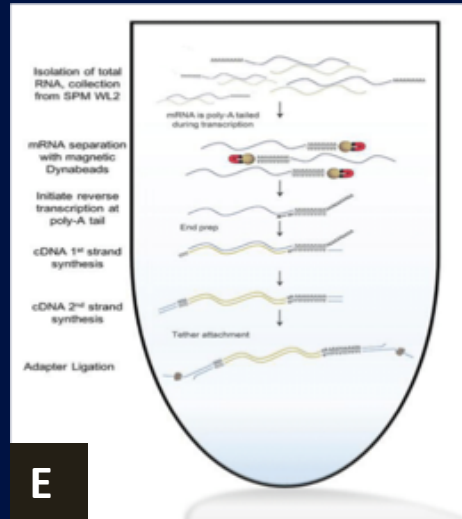
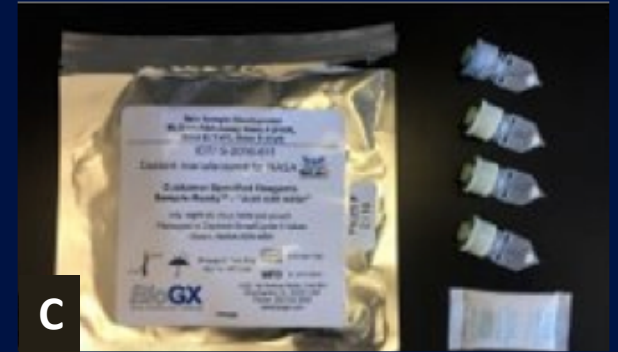


- Nanopore sequencing: detects difference in electrical potentials
- Basecalls (assigns DNA base) in real time
 - Single nucleotide accuracy
- Sequence whole chromosomes (tens of thousands of bases)
- Compact and uses laptop computer

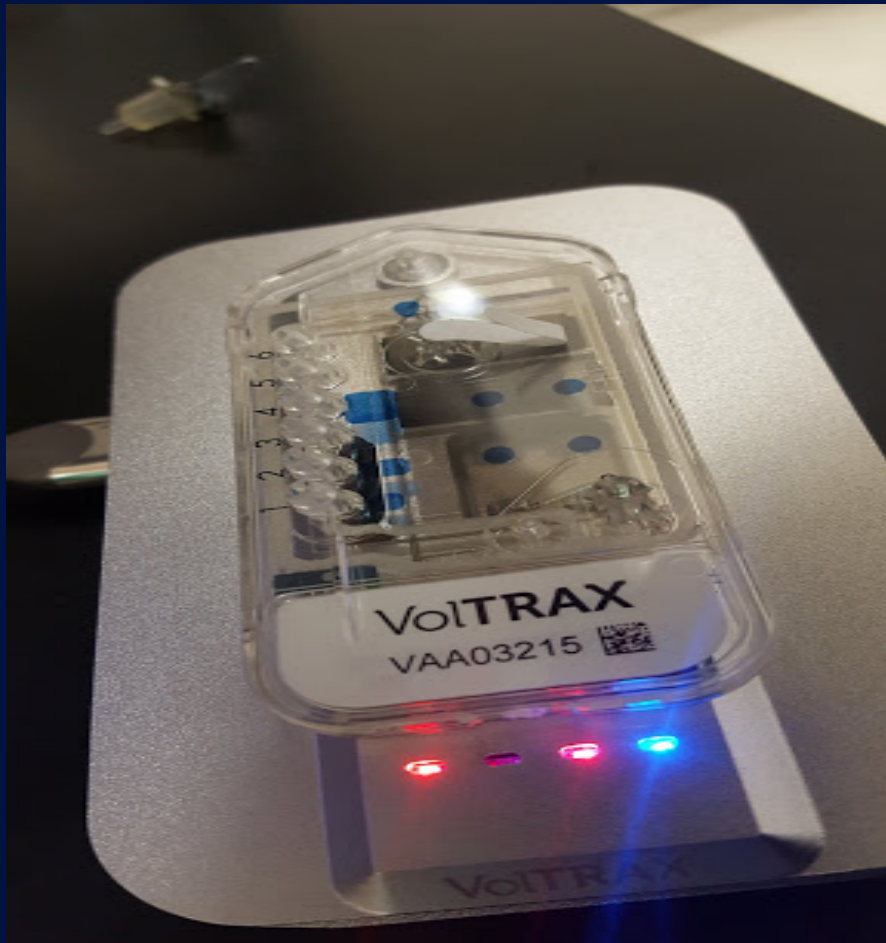
Sequencing Sensitivity



From WL2 to MinION

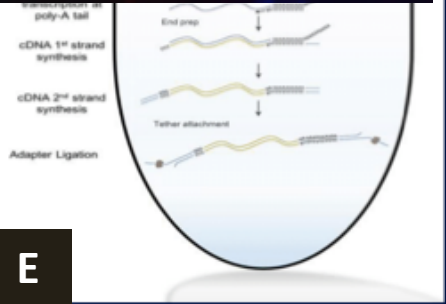
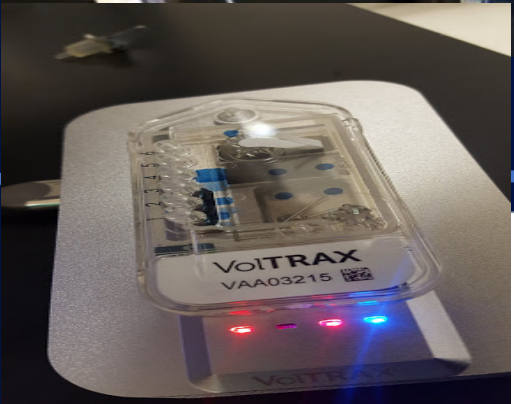
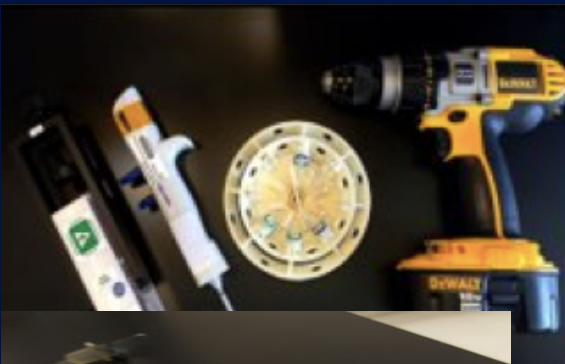


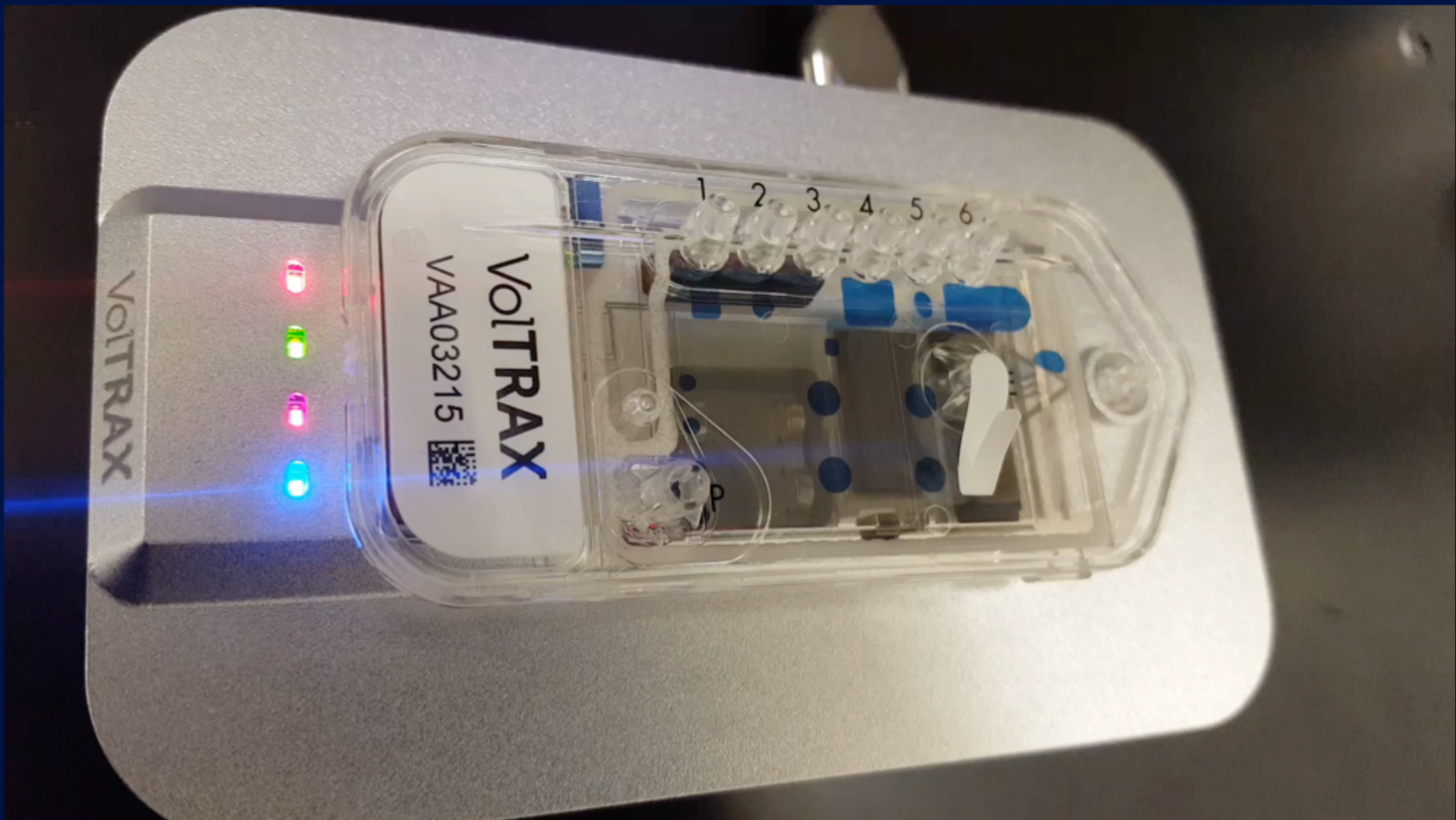
Voltrax: Automated Preparation



- Automated library preparation device (input for MinION)
 - Mixes, thermocycles, and purifies samples
 - 45 minute turnover
- New release v2.0 this month
 - Current work: optimization, accuracy, flight friendly
 - Reduce wet bench work and save astronaut time

Voltrax Saves Time and Resources





VoITRAX

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VoITRAX



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