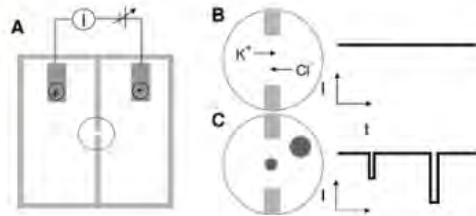


Investigating primary protein structure by nanopores

Coulter-counter



1953 - Patented
1970 - widely used for cell counting



- Current recorded through the pore
- Particles floating through the pore hinder the current flow:
 - # of particles = Fq of current drops
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Nanopores

Howorka S, Siwy Z, Chem Soc Rev, 2009

Defining properties of NP analytics

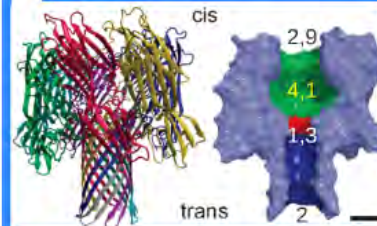
- "blank" pores; no specificity to substrate detection is based on steric effects
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Various types of Nanopores

protein, silicone, polymer (PET, PC), glass nanopipettes

Protein Nanopores

- α -hemolysin (α HL); heptameric, robust blank no moving part
- OmpG; monomeric good for single mutations flexible loops
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Engineering of protein Nanopores

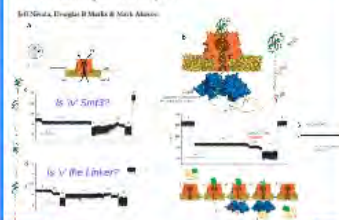
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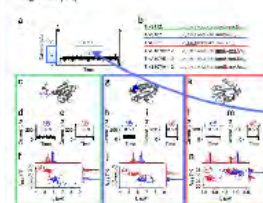
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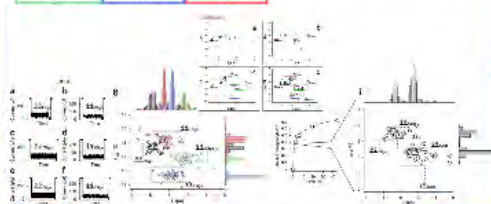
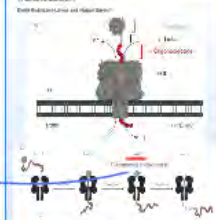
Thank you for your attention!

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Multistep protein unfolding during nanopore translocation

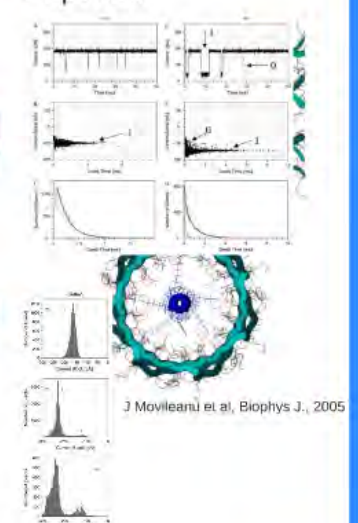


Analytes

Nucleotides



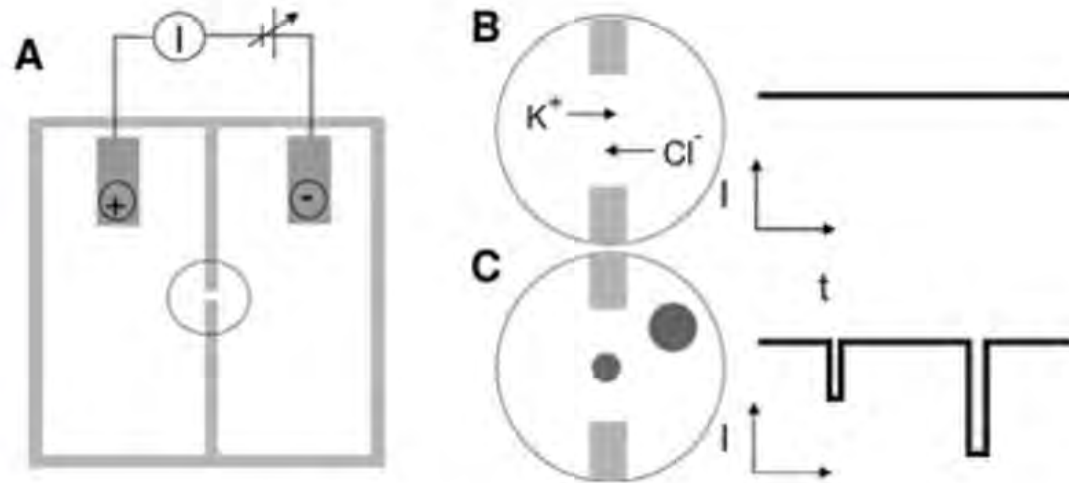
Peptides



Folded/unfolded proteins

- solid-state pores for detecting folded proteins
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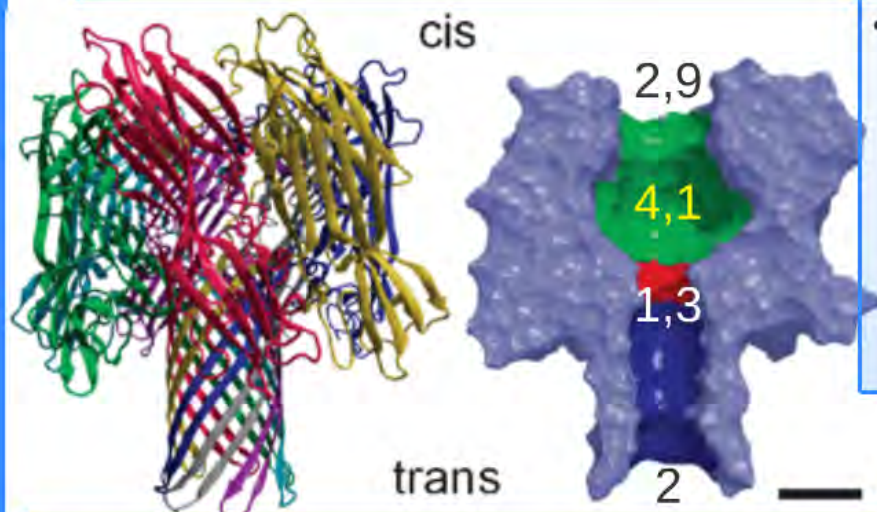
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Table 1 Sensing and

NATURE | NEWS

Analyte

DNA and RNA

ssDNA and RNA, trans

Nanopore genome sequencer makes its debut

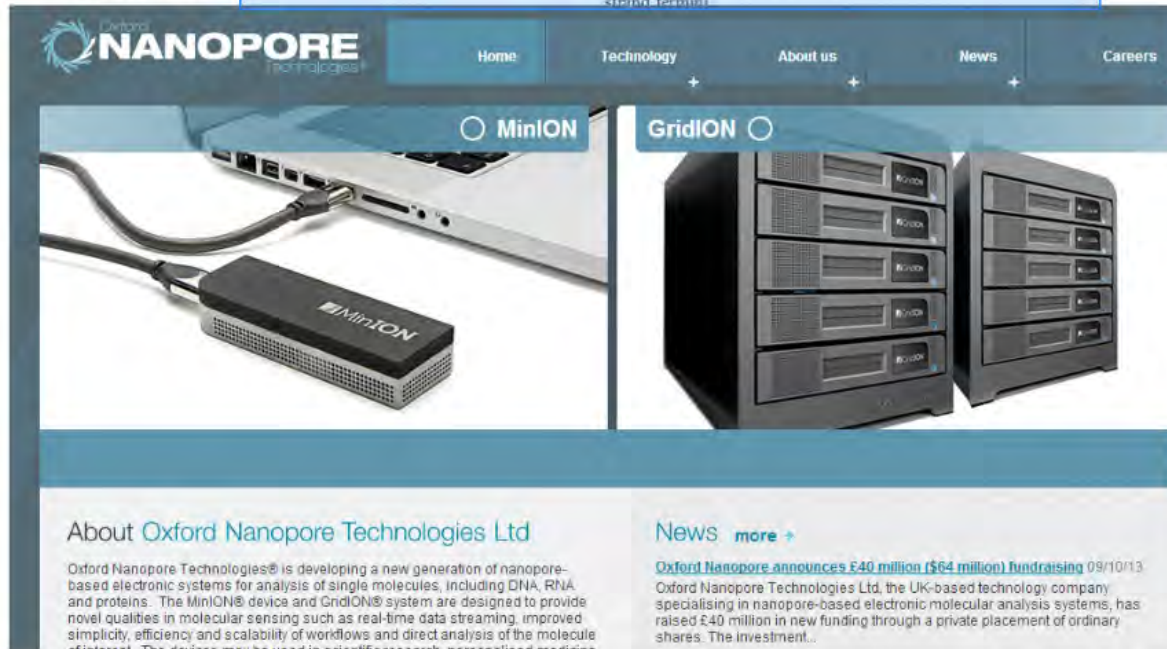
Technique promises it will produce a human genome in 15 minutes.

Erika Check Hayden

Heterogeneity of ssDNA

strand termini

168



NANOPORE Technologies

Home Technology About us News Careers

MinION GridION

About Oxford Nanopore Technologies Ltd

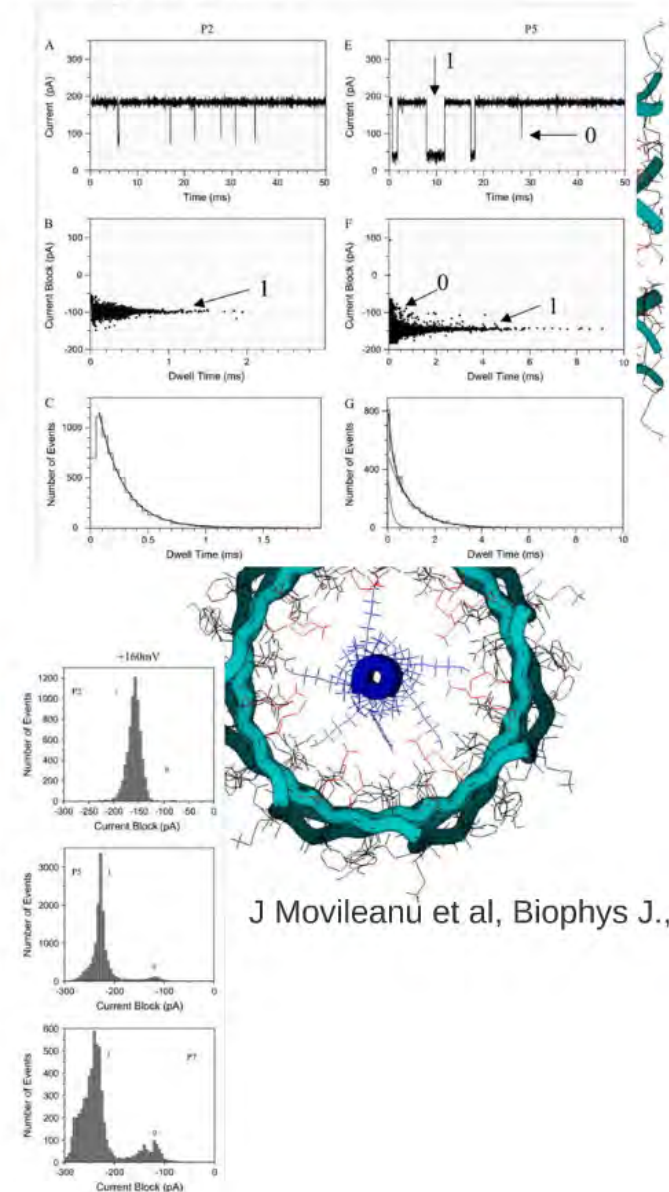
Oxford Nanopore Technologies® is developing a new generation of nanopore-based electronic systems for analysis of single molecules, including DNA, RNA and proteins. The MinION® device and GridION® system are designed to provide novel qualities in molecular sensing such as real-time data streaming, improved simplicity, efficiency and scalability of workflows and direct analysis of the molecule of interest. The devices may be used in scientific research, personalised medicine

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[Oxford Nanopore announces £40 million \(\\$64 million\) fundraising](#) 09/10/13

Oxford Nanopore Technologies Ltd, the UK-based technology company specialising in nanopore-based electronic molecular analysis systems, has raised £40 million in new funding through a private placement of ordinary shares. The investment...

Peptides



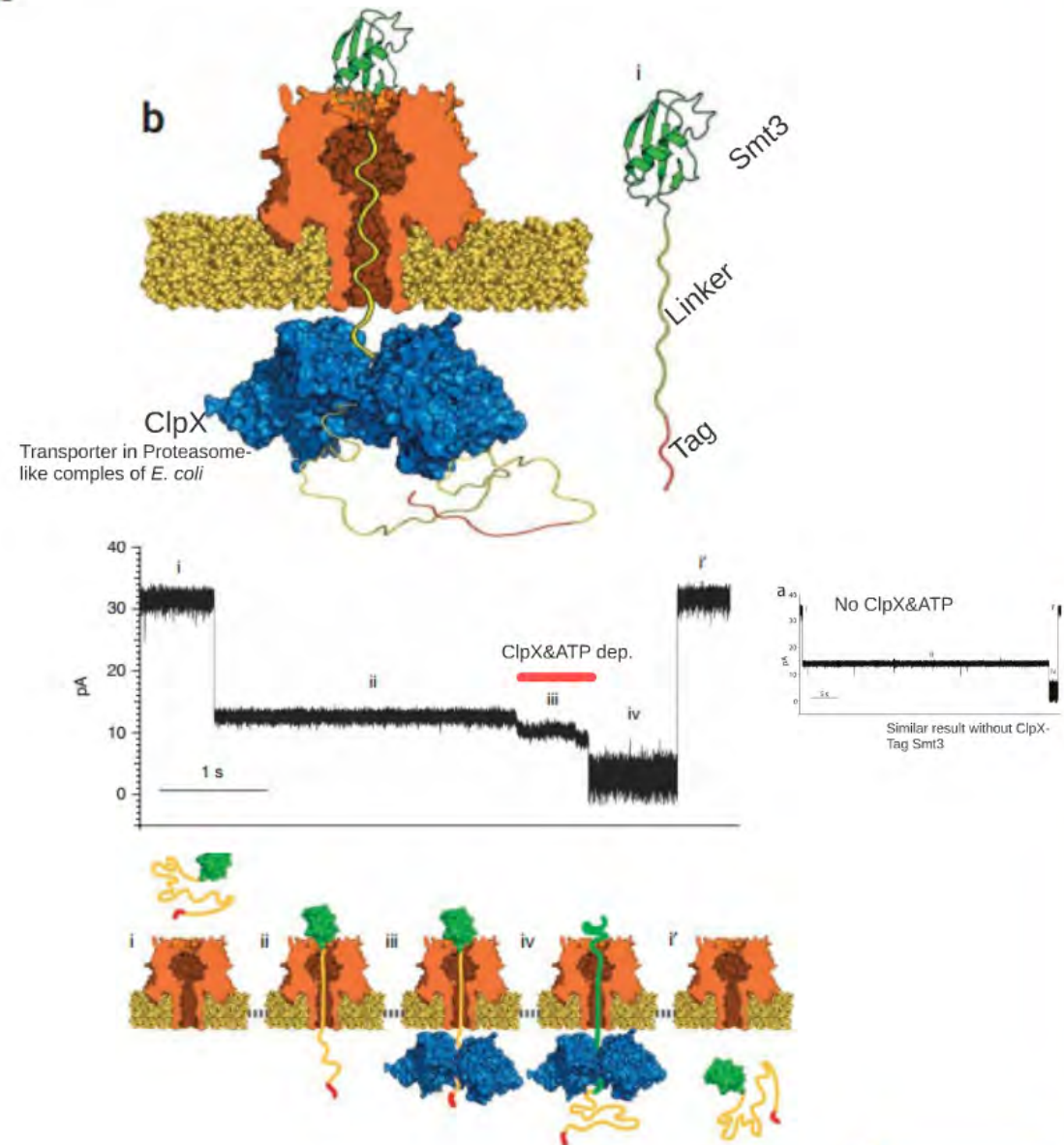
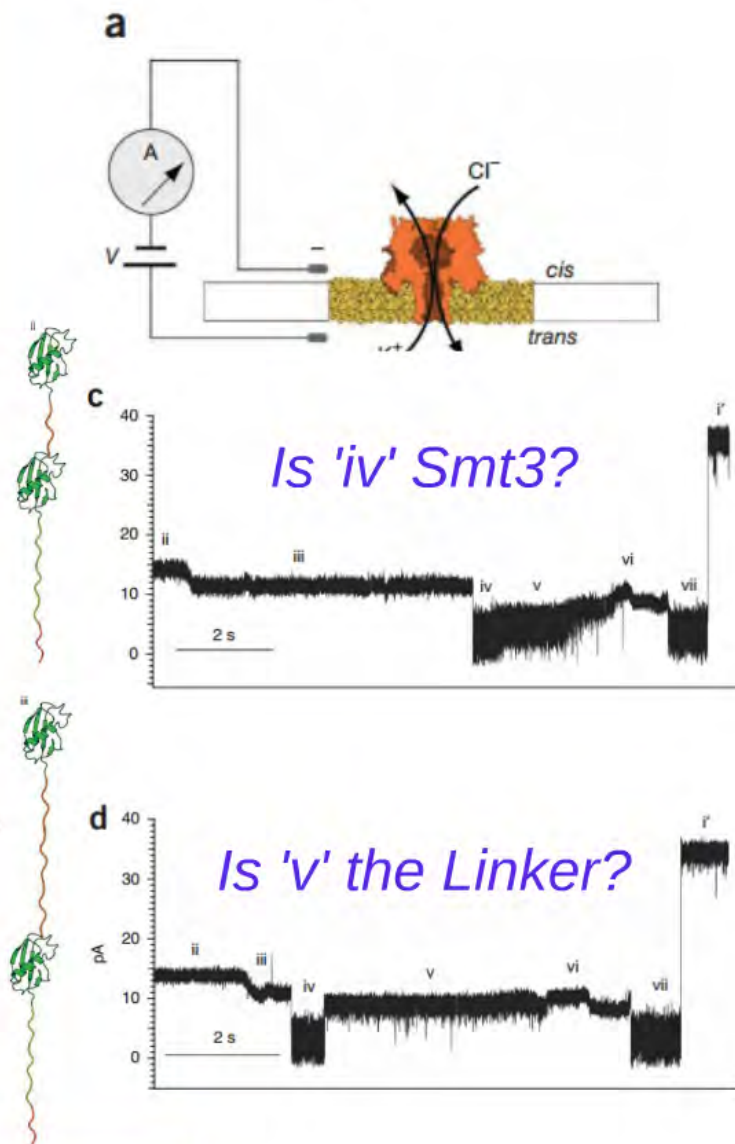
J Movileanu et al, Biophys J., 2005

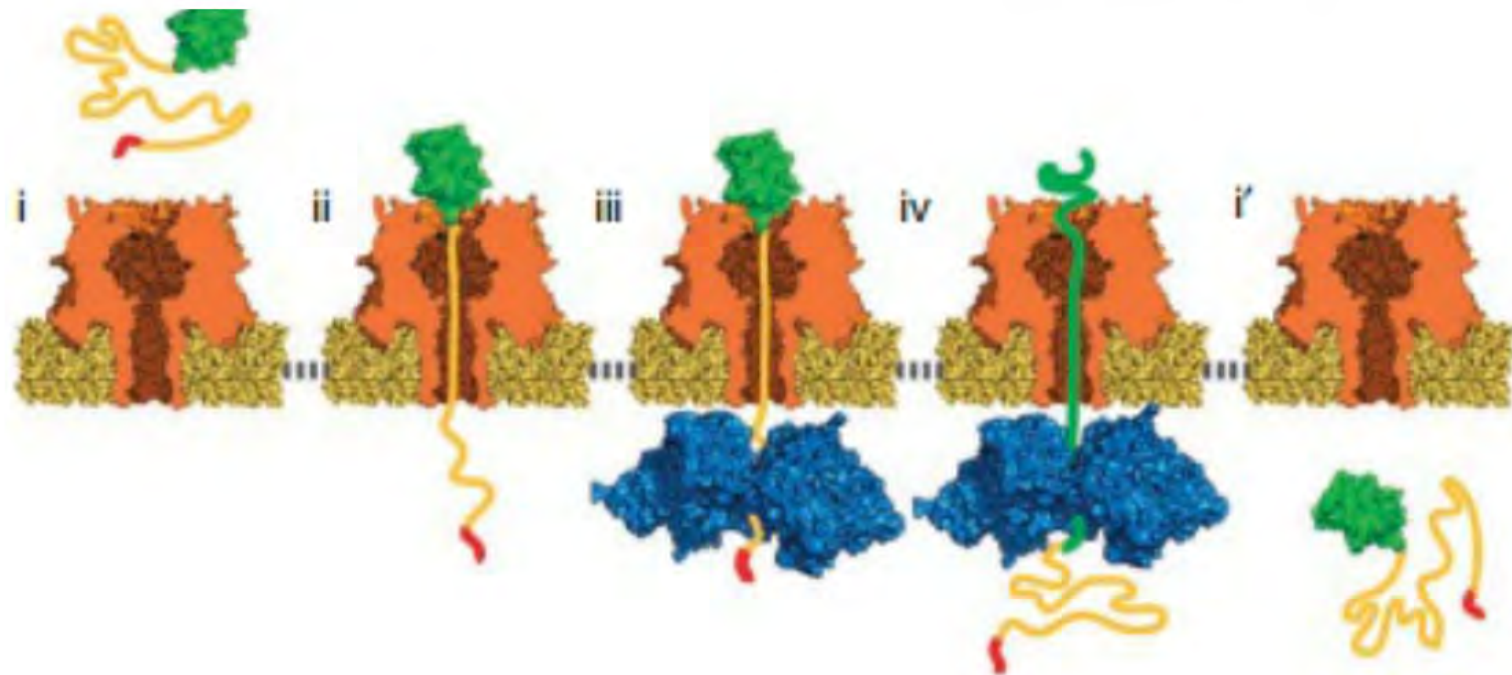
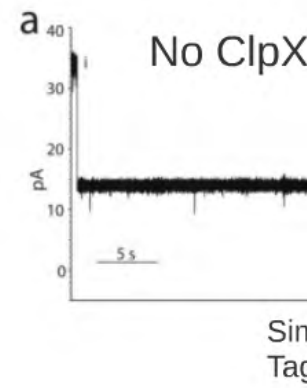
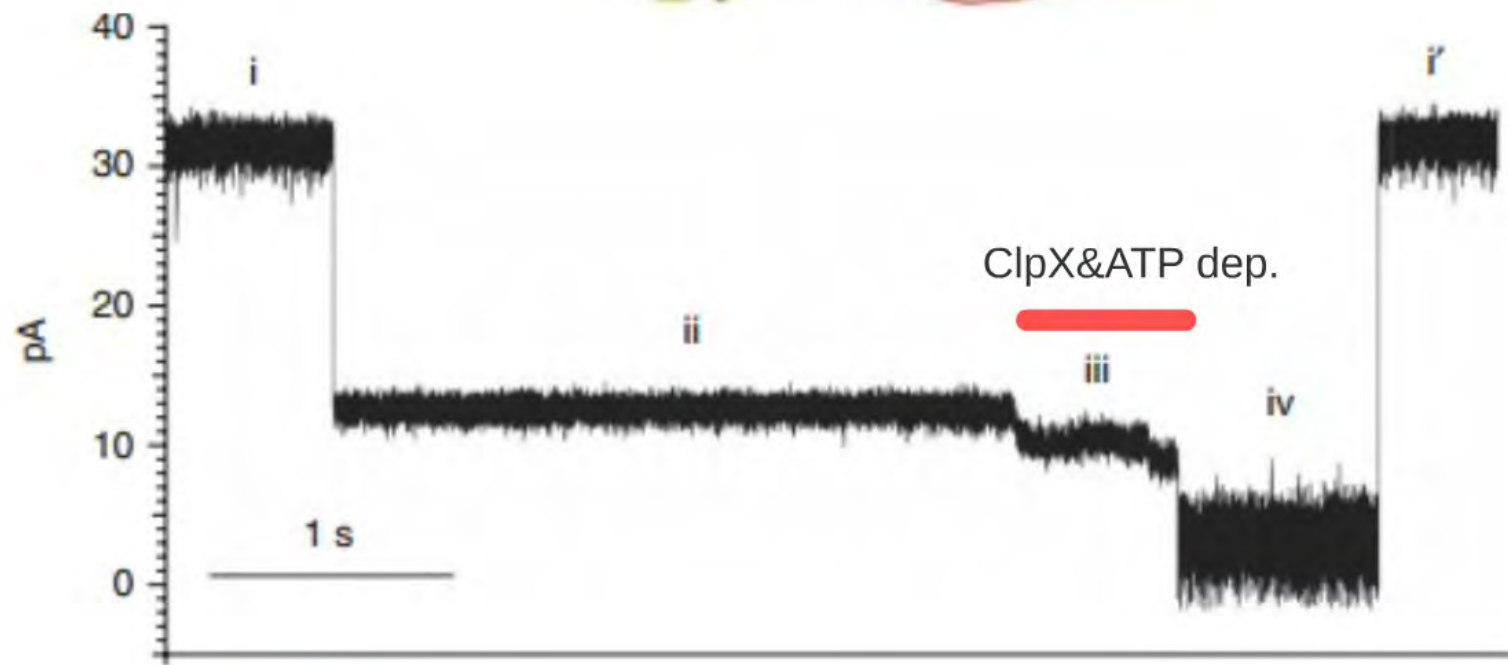
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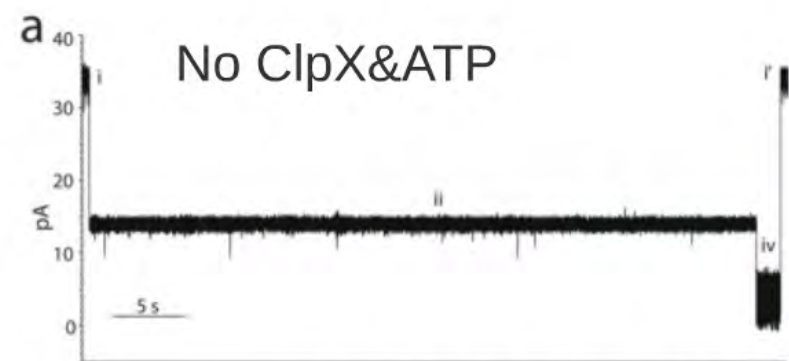
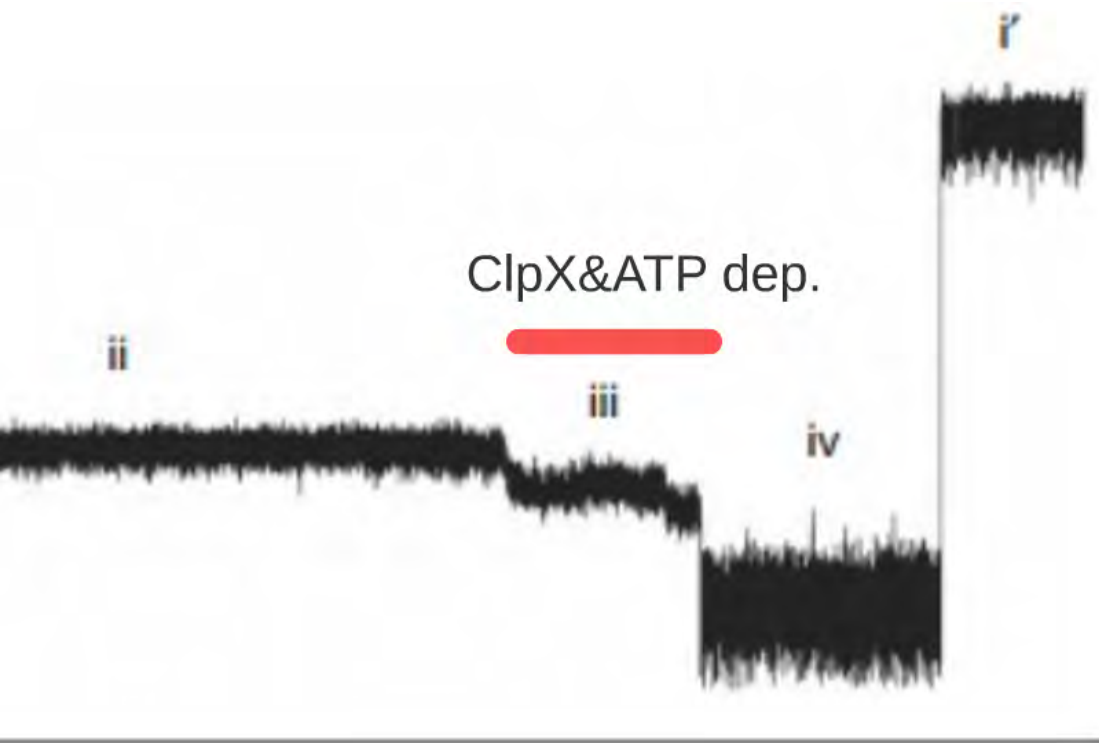
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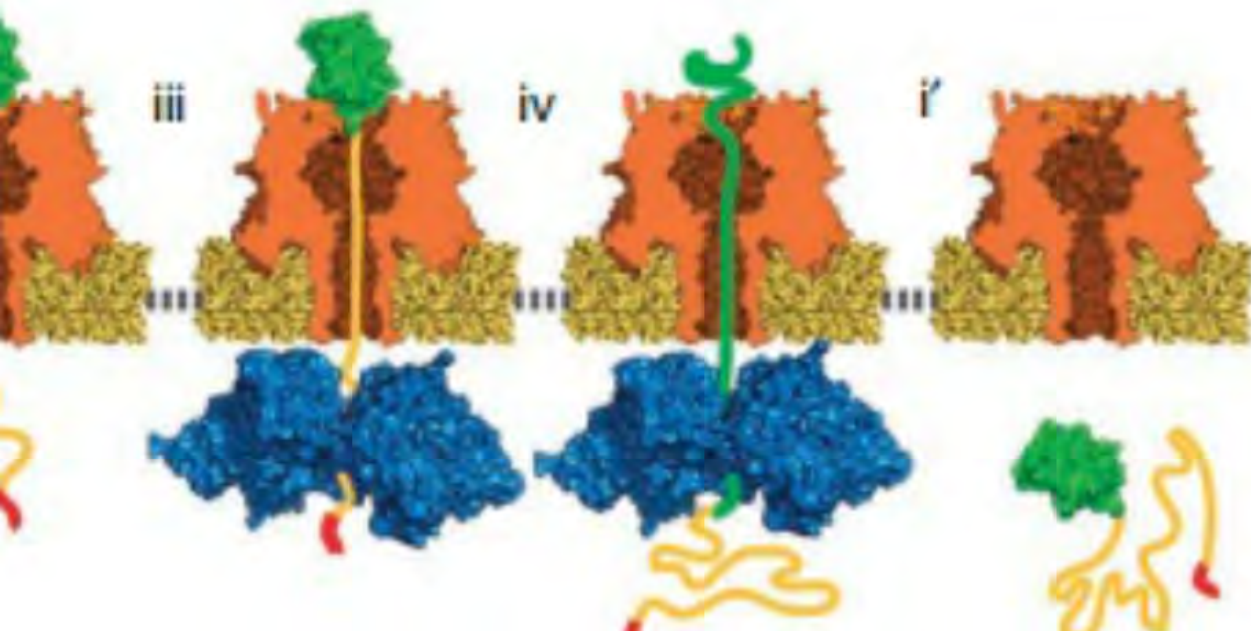
Jeff Nivala, Douglas B Marks & Mark Akeson





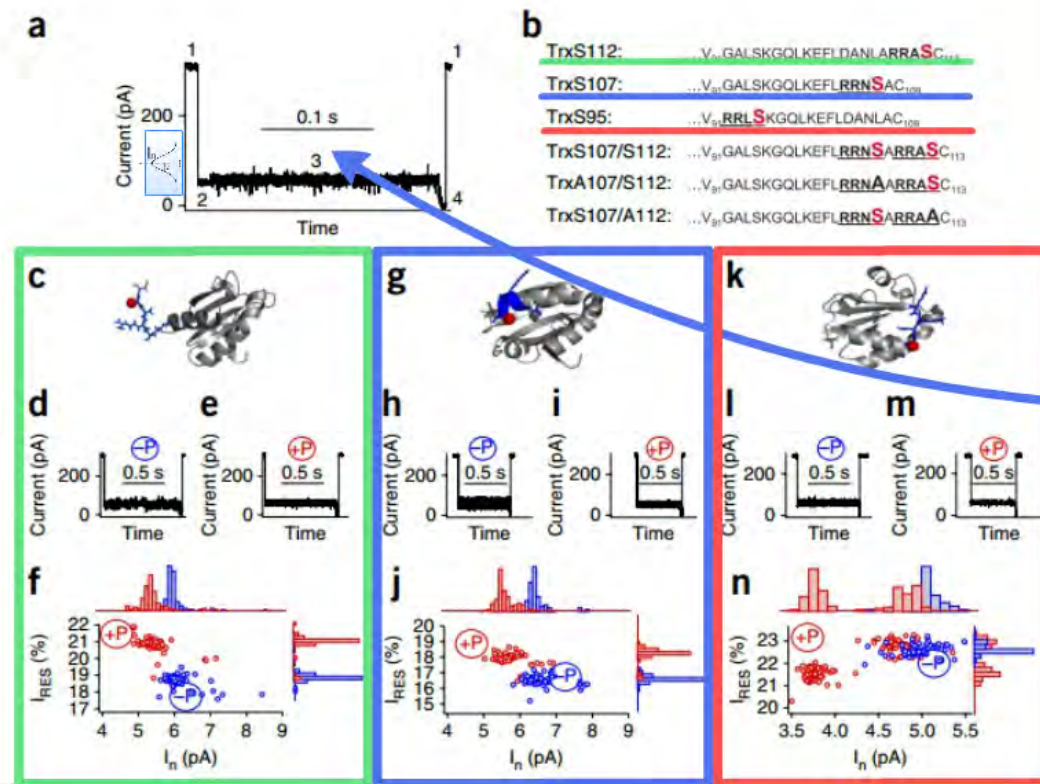


Similar result without ClpX-
Tag Smt3



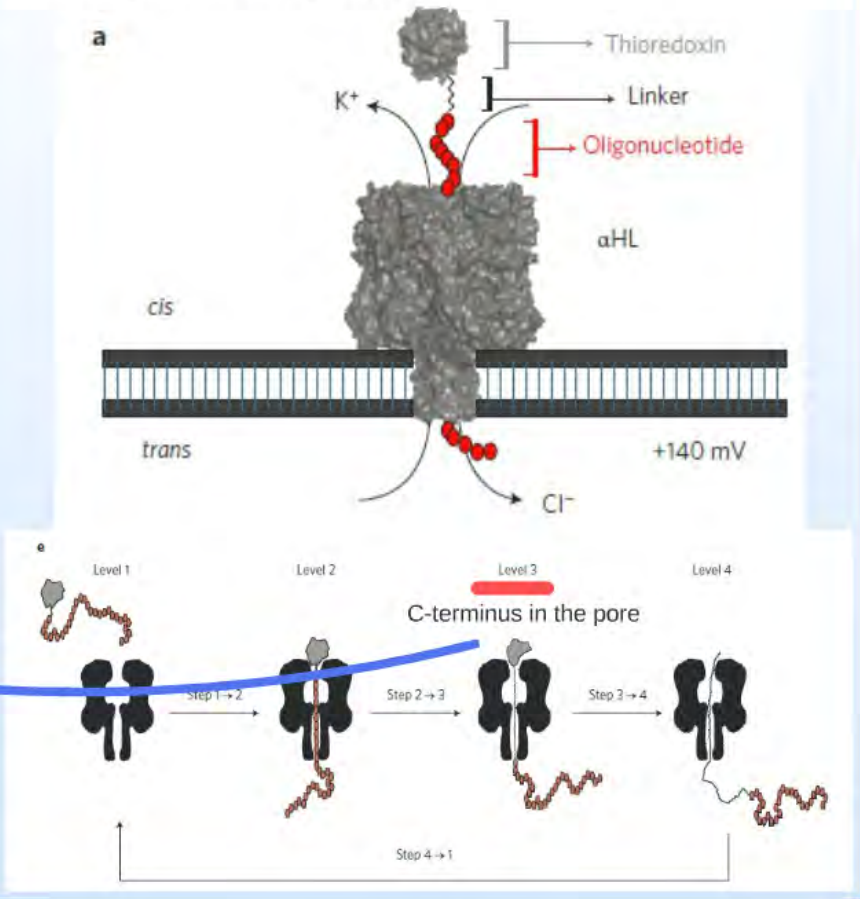
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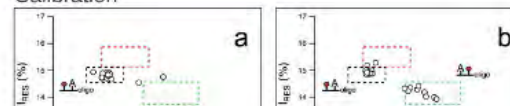


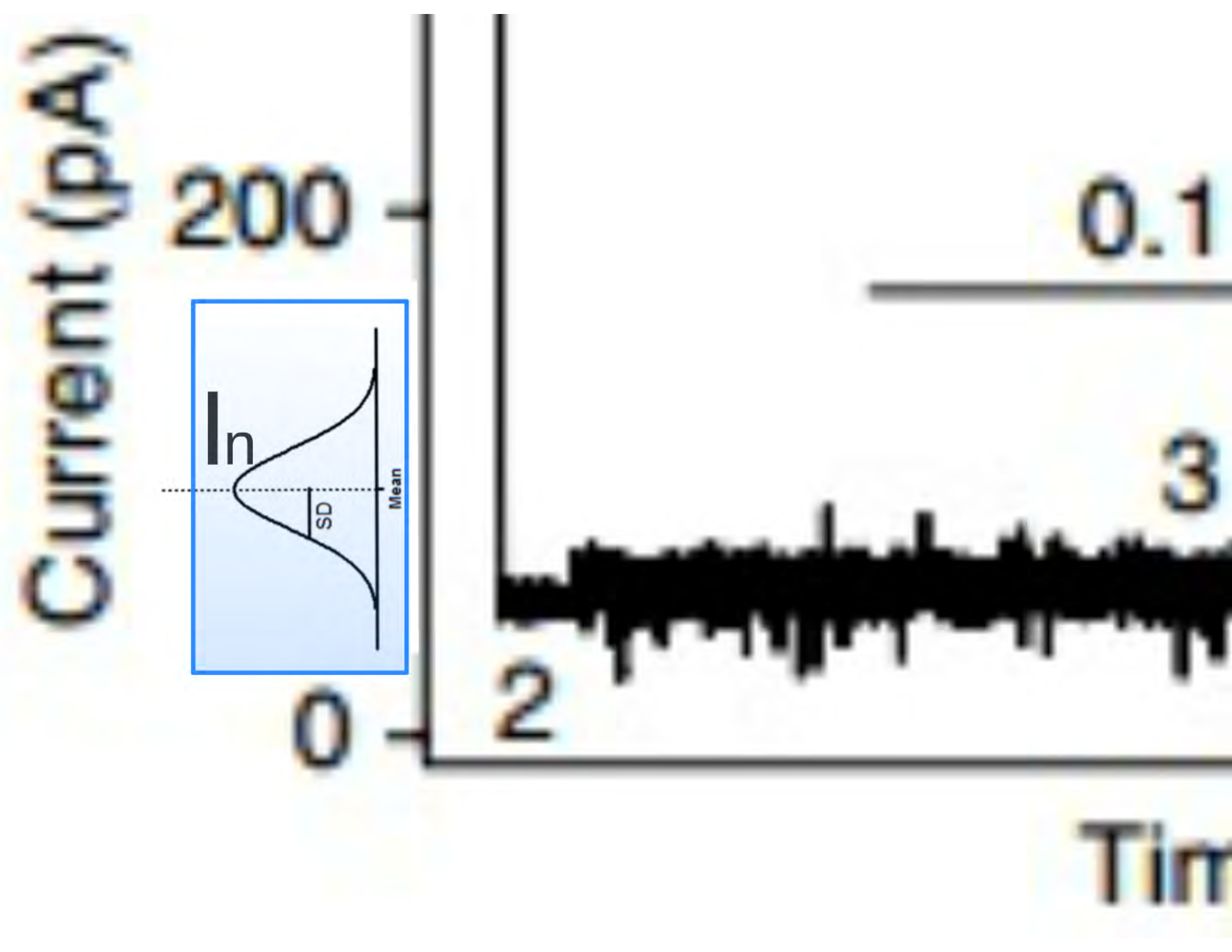
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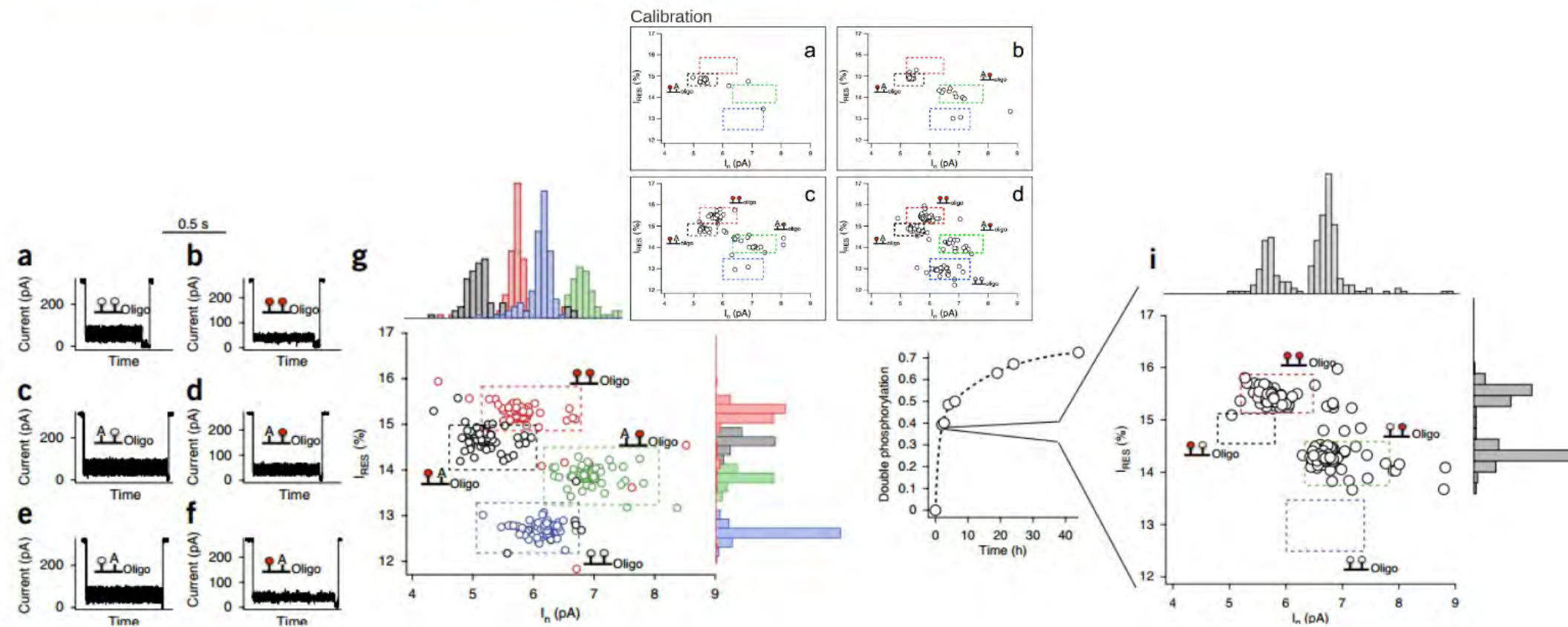
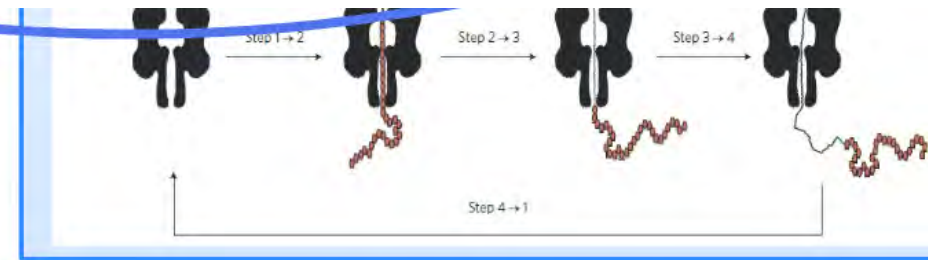
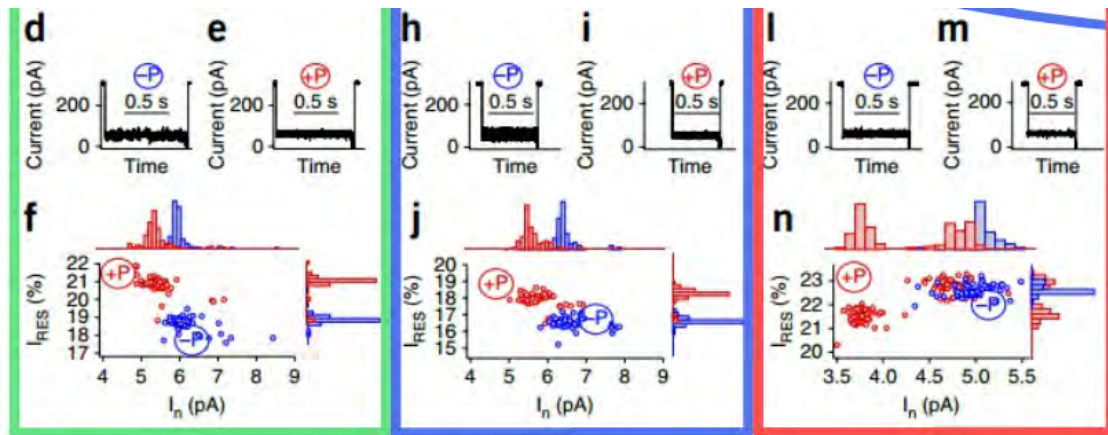
David Rodriguez-Larrea and Hagan Bayley*



Calibration







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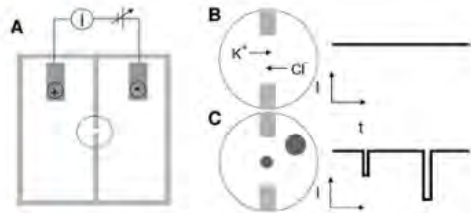
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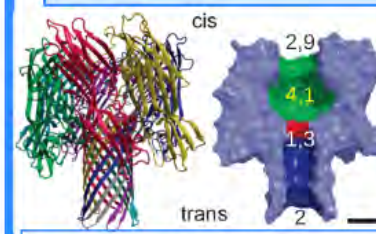
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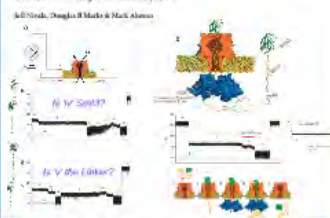
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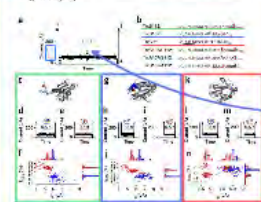
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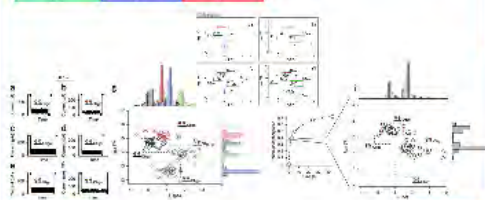
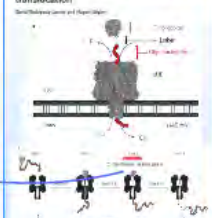
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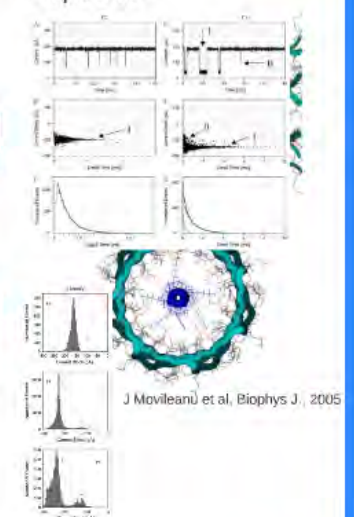
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