OCTOBER 2025, ISSUE 18

# ARC Industrial Transformation Training Centre for Cryo-electron Microscopy of Membrane Proteins

*Quarterly newsletter*

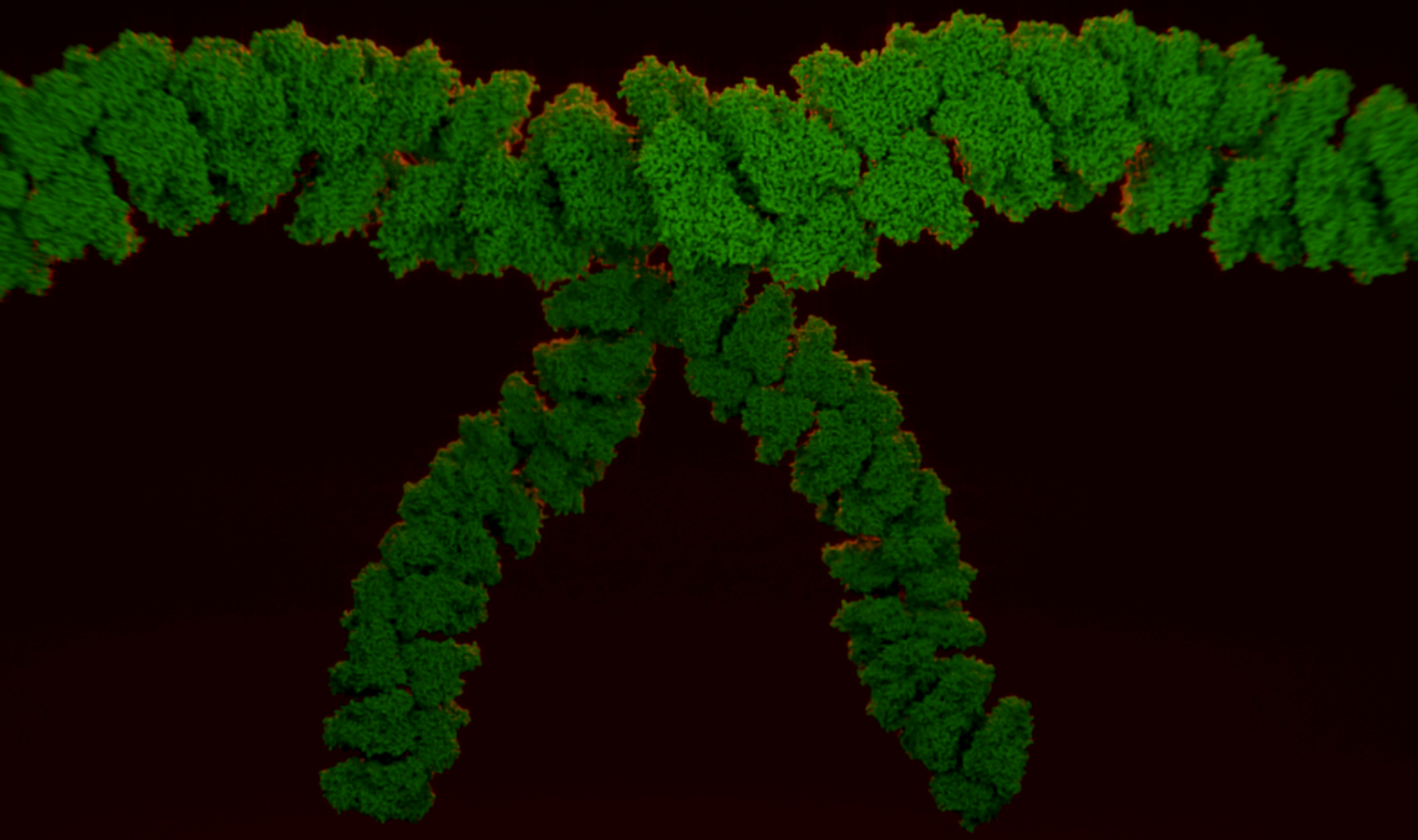


*Image credit Dr. Sarah Piper*

## INSIDE THIS ISSUE:



Australian Government
Australian Research Council
MONASH University
THE UNIVERSITY OF MELBOURNE
bio21 institute
MOLECULAR HORIZONS
UNIVERSITY OF WOLLONGONG AUSTRALIA
WEHI brighter together

CCeMMP acknowledges the peoples of the Kulin, Dharawal, Yuin and Wadi Wadi Nations on whose land the Centre and its Nodes operate. We pay our respects to their Elders, past, present and emerging.

## From the Director

Prof. Patrick Sexton

*CCeMMP Director, Prof. Patrick Sexton*

This quarter was a busy one for the Centre with our annual EduWeek workshops and training covering topics ranging from scripting, variance and dynamics analysis, assessing drug targets and commercial landscapes, business development and commercialisation, through to panels on working in industry. We learnt more about cryo-ET with a great workshop run out of the Ian Holmes Imaging Centre with many Centre members presenting and attending. We also excited to see multiple exit seminars and thesis submissions from Centre HDRs, and celebrate members and affiliates receiving awards and funding. In addition, lots of presentations and new publications highlighting the excellent science within the Centre, and, of course, some exciting new structures. Thanks to everyone in their Centre for their contributions over the last quarter and a shout out to the organising committee (and Tracie our Centre Manager) for their efforts in putting together a great program for the annual CCeMMP scientific symposium that will take place in November.

Prof. Patrick Sexton
Director

## Did you know?....

A new revolution is fast approaching, time-resolved (TR) cryo-EM. Proteins work on a timescale where 'blink and you'll miss it' is an understatement. Incredibly, we are entering a realm where visualisation at a millisecond level is becoming possible and one where we are not constrained to static structures. TR cryo-EM has made it possible to reconstruct dynamic processes with near-atomic detail. The method uses specialised equipment and a mix-and-spray approach where microfluidic chips contain precisely engineered, zigzagging channels (for rapid, efficient sample mixing and smooth fluid flow) so that the protein and its ligand can be mixed before being sprayed onto a grid and frozen. The current approaches have a 'speed limit' of around 5 milliseconds, but researchers are aiming for something in the order of 10 nanoseconds! It's still early days and there is room for improvement; expertise, devices, data interpretation, just to name a few. Further challenges include: processing power to collect and analyse all the required micrographs, heterogeneity of the sample and getting the right sequence of events. What exciting cryoEM research lies ahead!

Nature 642, 827-829 (2025) doi: https://doi.org/10.1038/d41586-025-01889-0

***On the cover:*** *From our UoW node - A festive compilation of PDB: 9BYR, Filamentous Epstein-Barr virus annealase BALF2 ssDNA-annealing complex. Jordan Nicholls, Gökhan Tolun and Jodi Brewster, to be published. Image credit Dr. Sarah Piper*

# ICHDR Update

## Industry Placements

Marialena Georgopoulou is our ninth ICHDR to complete industry placement. Marialena has very kindly shared her experience at local company, Aculeus (Parkville) with us.

There are no current placements at the moment.

Preparations continue for other students planning to do their placements at ThermoFisher and Sanofi.

### Reflections on my Industrial Placement at Aculeus Therapeutics

*Marialena Georgopoulou*

*Over the past few months, I had the incredible opportunity to complete my industrial placement at Aculeus Therapeutics, and it was honestly one of the most rewarding experiences I've had so far. From day one, I felt welcomed and included. Being part of a small team meant I could contribute across all aspects of the work, from project planning and strategic discussions to collaborating with partners and leading initiatives. This hands-on exposure gave me a real appreciation for how research, business, and strategy come together to drive innovation, while strengthening my problem-solving, communication, and project management skills.*
*Of course, in the fast-paced world of biotech, things don't always go to plan but with the right mindset and teamwork, they usually work out!*

*I feel incredibly lucky to have worked with and been mentored by such inspiring people. Mark Devlin (Chief Executive Officer), thank you for sharing your vision with me and showing me what strong, thoughtful leadership looks like in a start-up environment. Geoff Matthews (Chief Scientific Officer), I'm very thankful for our discussions—you always made time to guide me. I learned so much from your strategic thinking. Ben Morrow (Head of Chemistry), thank you for your constant support, encouragement, and for always sharing with me your practical approaches to problem-solving.*

*Beyond the skills and knowledge, what made this placement truly unforgettable was the collaborative and encouraging team culture. With ambitious goals, the team's sense of humour, support, and openness made every challenge feel manageable and every success feel shared. I walked away not only with new technical and professional skills but also with a deeper appreciation for the grindstones that keep biotech innovation moving forward.*

*I'm very inspired and looking forward to applying what I've learned in my future career. Of course, I'll be cheering on the Aculeus team as they reach their next milestones!*

*--Marialena Georgopoulou*

# ICHDR Update

## ICHDR Exit Seminars

Two Monash Node ICHDRs, Qinghao Ou and Dongju Lee, presented their exit seminars and submitted their theses for examination this quarter. Qinghao presented his exit seminar *"Structural understanding of GIPR and GLP-1R co-agonism"* August 14, 2025. Qinghao has submitted his thesis and is currently working at Monash Institute of Pharmaceutical Sciences.

October 22, 2025, Dongju Lee presented her exit seminar *"Towards structural and pharmacological characterisation of orphan GPCRs"*. A few days later, Dongju submitted her thesis also.


*Qinghao Ou*


*Dongju Lee*

## EduWeek 2025

EduWeek has been and gone for another year. This year, CCeMMP presented the following workshops:

- **Introduction to Python and Anaconda -** Dr. Matthew Belousoff (Monash Node) and Dr. Joshua Hardy (WEHI Node)
- **cryoDRGN Masterclass -** Dr. Matthew Belousoff (Monash Node)
- **Clarivate workshops: Drug Discovery & Target Druggability; Competitive Landscape & Commercial Assessment -** Dr. Hozana Castillo (Clarivate Analytics)
- **Business Development and Commercialisation -** Julian Vultaggio and Dr. Katie Leach (MIPS Business Development Office)
- **Industry Panel -** moderated by Dr. Laura Humphrys and Alok Pradhan

### Introduction to Python and Anaconda

*Introduction to Python and Anaconda*

In this hands-on-coding one-day crash course, Dr. Matthew Belousoff and Dr. Joshua Hardy introduced attendees to Python through Jupyter notebooks and interactive coding. It covered the basics of setting up a python environment via Ananconda, Python syntax and some essential programming operations all the way to how to do some basic data science operations in Python. It was a full house with 30 attendees; in addition to 14 CCeMMP ICHDRs, there were students and postdocs from UoW (1), UoM (5) and Monash (9) nodes and our external affiliates, USyd (1).

## CryoDRGN Masterclass

*CryoDRGN Masterclass*

Following on from the Python and Anaconda workshop, Dr. Matthew Belousoff, ably assisted by Qinghao Ou, presented a two-day Masterclass where students learnt how to set up a single particle processing project to have inputs ready for 3D-Variability analysis as implemented in cryoDRGN. Using the Variable Autoencoder (VAE) neural network in cryoDRGN, that has the ability to interrogate single particle data in such a way to richly extract the best set of particles that would lead to the highest resolution 3D reconstruction, the two days were a hands-on deep dive into training the VAE network and how to analyze and curate the results in the context of MASSIVE. As part of this, students were shown how to export the best set of particles back to RELION (or cryoSPARC) for a better quality 3D refinement. Fourteen ICHDRs attended, joined by a further 10 participants from UoW (1), UoM (5) and Monash (3) nodes and an external affiliate, USyd (1).

## Clartivate Analytics

Dr. Hozana Castillo from our Education partner Clarivate Analytics presented two workshops.

**Workshop 1: Drug Discovery & Target Druggability** - Cortellis Drug Discovery Intelligence (CDDI) is a platform that integrates the most comprehensive biological, chemical, and pharmacological data of drugs with competitive intelligence, allowing you to identify and prioritize of targets for de novo drug discovery or drug repurposing, to benchmark the experimental performance of compounds, to understand the competitive landscape around a target or therapy area and to make early research decisions with more confidence. In this workshop, attendees were shown: How to identity and prioritize targets for a condition (for de novo drug discovery and drug repurposing); Understand the competitive landscape of drugs under development for a specific target/disease; Benchmark drug candidates based on experimental performance; Run a structure search; Identify the biomarkers to monitor treatment outcome.

**Workshop 2: Competitive Landscape & Commercial Assessment** - Cortellis Competitive Intelligence (CCI) is a platform that provides access to data such as drug pipeline, deals, patents, global conferences and company content, along with the latest industry news and press releases, allowing you to make critical portfolio decisions backed by accurate, comprehensive pipeline and competitive intelligence. This workshop demonstrated: How to use CCI to understand the market competitive landscape in a therapeutic field, the target novelty, and drug sales numbers / sales forecast; How to understand the intellectual property landscape.

## Business Development & Commercialisation

*Business Development & Commercialisation*

Julian Vultaggio and Dr. Katie Leach from the MIPS Business Development Office provided attendees with an introduction to business development and commercialisation - the role of business development at MIPS and in the context of the pharmaceutical sector. This covered: Why is business development important – translation of research into real-world impact through strategic partnerships; “Intellectual property

101" – protect it, partner it and profit from it; Understanding contractual obligations to protect and exploit your research - confidentiality, intellectual property rights, restrictions, and deliverables; Industry engagement – when and how to engage with industry. Eighteen attended.

### Industry Panel

Many of our students will consider working for industry after their PhD. This session explored how they can pitch your academic skills when interviewing for an industry role. To help with this, we invited a panel of industry scientists:

- Dr. Geoff Matthews - Chief Scientific Officer, Aculeus
- Dr. Katherine Jackman - Investment Manager, Brandon Capital
- Prof. Chris Langmead - Neuromedicines Discovery Centre, MIPS; co-founder & Chief Executive Officer, Phrenix Therapeutics
- Dr Robert Shepherd - Chief Commercialisation Officer, Dimerix

The session was moderated by Alok Pradhan and Dr. Laura Humphrys who led a Q&A session with our industry panel members. Students had the opportunity to ask their own questions to scientists experienced in industry and interviewing for positions within industry. We hope attendees were provided with valuable feedback in ways to rethink the PhD experience into industry language and what they can be starting to do now to open the industry door. The session was followed by afternoon tea where students could continue to chat with panel members.

*Industry Panel*

## Centre Updates

## In the Spotlight.....

# in the spotlight

## Lyn Deng

**WEHI Node**

**@ rewliiinn_k**

## Background

I completed a Bachelor of Biomedicine at the University of Melbourne in 2020, followed by my Honours project in 2021 at MCRI, where I focused on stem-cell modelling of rare paediatric mitochondrial disorders.

## Current research

I am currently a second-year PhD student in the Lucet Lab at WEHI. My research investigates the role of Doublecortin-like kinase 1 (DCLK1) isoforms in pancreatic ductal adenocarcinoma. This project involves many advanced imaging techniques, including lattice light-sheet microscopy and cryo-electron microscopy, to visualise and understand the cellular localisation and structure of DCLK1.

## Looking forward

Recent advances in cryo-electron tomography have enabled scientists to visualise proteins and protein complexes in situ. I am excited to apply this technique to explore how DCLK1 interacts with microtubules in cancer cells, which may help clarify its role in cancer.

## About me

I enjoy cycling to work in the morning breeze during the summer season. I love outdoor activities such as hiking and bouldering, and I have recently started exploring many Victorian gardens, nurseries, and orchid shows.

If you're a CCeMMP member and would like to be featured, please reach out to the CCeMMP Outreach and Public Engagement Committee (sarah.piper@monash.edu).

# CeMMP in the spotlight

## Jianjun Cao

**Monash Node**

**@ChemJ_Tsao**

### Background

I completed my PhD at MIPS and since 2023-Jan, I'm working on the structure biology of calcitonin and amylin receptors.

### Current research

I'm currently working on the drug discovery for Class B1 GPCRs, and I'm using comprehensive approaches, including SPA cryo-EM, protein structure predictions.

### Looking forward

I'm applying for funding resources to keep my roles in academia in which I could learn more advanced techniques that could be used in drug discovery projects. Such experiences would help me to pursue a position in the Biotech/Pharma if I can't stay in academia.

### About me

As someone who likes hands-on work, designing and conducting experiments suit me, and I'm satisfied when I can prove a hypothesis using data gathered through my effort.

If you're a CCeMMP member and would like to be featured, please reach out to the CCeMMP Outreach and Public Engagement Committee (sarah.piper@monash.edu).

# Node Updates

## Monash Node

*Prof. Denise Wootten, Node Leader, Monash University*

### Dr. Christy Ying receives Monash Platform Access Grant

Dr. Christy Ying (CIA), along with Vivek Naranbhai, Georg Ramm, was awarded $8,795 from 2025-2026 Monash Platform Access Grant (PAG) for the project, "Cryo-ET of human tissue to visualise the molecular anatomy of lung cancer".

### Grants Awarded

Christy Ying (CIA): 2025-2026 Monash Platform Access Grant (PAG) grant, "Cryo-ET of human tissue to visualise the molecular anatomy of lung cancer". $8,795

### New members/affiliates

PostDocs Dr. Justin Zhang, Dr. Karoline Sanches and Dr. Rex Anane and student affiliate Anish Mulchandani.

## University of Melbourne (Bio21) Node

*Prof. Isabelle Rouiller, Node Leader and Deputy Director, University of Melbourne*

### CryoET Workshop at the Ian Homes Imaging Centre (IHIC), Bio21

September 9th and 10th, 2025, Dr. Sepideh Valimehr organised a Cryo-Electron Tomography workshop at Bio21, facilitated by herself, Dr. Matthew Johnson (Bio/21/UoM), Dr Alison Van De Meene (IHIC) and Doulin Shepherd (Bio/21/UoM). The workshop consisted of hands-on training in cryoET sample preparation, grid screening, and the setup of automated data collection. It also included lectures covering the theory of cryo tomography and sub-tomogram averaging.

The workshop was limited to 10 places only, with most places taken by Centre members/affiliates, including: Dr. Fabian Munder, Lyn Deng, Abhishek Roy, Emily Park, Anish Mulchandani, Dr. Brooke Hayes and Dr. Ashleigh Kropp.

### Javaid Jabbar wins poster award

PhD student Javaid Jabbar won Best Poster Prize at the recent Australian Society for Biochemistry and Molecular Biology (ASBMB) meeting held at the University of Queensland, St Lucia, QLD for his poster presentation *"Lysine acetylation modulates s-OPA1 GTPase activity and oligomerization in mitochondrial membrane remodeling"*.

### Daniel Fox Presents Exit Seminar

It has been a busy quarter for exit seminars; PhD student Daniel Fox presented an exit seminar at Monash University, 24 October, 2025 entitled *"AI-designed de novo binders can inhibit growth of pathogenic E. coli"*. Daniel's thesis has also been submitted for examination.

*Dr. Bronte Johnstone*

## Dr. Bonte Johnstone receives Jack Brockhoff Early Career Research Grant

Dr. Bronte Johnstone received a Jack Brockhoff Early Career Research Grant for the project "Uncovering and inhibiting host-cell entry of Human T-cell lymphotropic virus type-1 (HTLV-1)". Funding ($147,663) is for over two years and commences in 2026.

## Dr. Sepideh Valimehr awarded funding from the Global Bioimaging Job Shadowing Program

*Dr. Sepideh Valimehr*

ICPD, Dr. Sepideh Valimehr was awarded 2500 Euro's from the Global Bioimaging Job Shadowing Program to allow her to visit the Electron Microscope Facility at National University of Singapore.

The program, Global Bioimaging offers the opportunity to job shadow as a means of on-the-job training and professional development by visiting an overseas imaging core facility to learn from peers. The host facility also benefits with the exchange of experience and ideas, all the while supporting networking and fostering potential future collaborations between facilities. The experience allows participants to learn new aspects related to facility management, from bioimage analysis to image data storage and everything in between.

Sepideh plans to travel to Singapore around March as part of the Global BioImaging Job Shadowing Program. The aim of this visit is to learn about advanced microscopy workflows, facility management, and user training practices. During the stay, she intends to observe day-to-day operations, learn new techniques, discuss best practices for instrument maintenance and data management, and gain practical insights into coordinating imaging services within a research infrastructure.

## Grants Awarded

Dr. Bronte Johnstone: Jack Brockhoff Early Career Research Grant "Uncovering and inhibiting host-cell entry of Human T-cell lymphotropic virus type-1 (HTLV-1)", $147,663 .

Dr. Sepideh Valimehr: Global bioimaging job shadowing program, 2500 Euro to visit Electron microscope facility at National University of Singapore

## Travel Grants

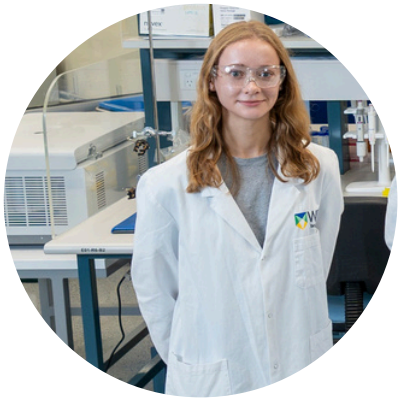
Javaid Jabbar - ASBMB 2025 student travel award

## New Members and Affiliates

New affiliates: Student affiliate Abhishek Roy

## WEHI Node

*Prof. Isabelle Lucet, Node Leader, WEHI*



*Emily Park*

### ICHDR, Emily Park, Wins Poster Award

ICHDR Emily Park won a Poster Award at the International Union of Biochemistry and Molecular Biology (IUBMB) Focused Meeting on the emerging roles of (pseudo)kinases in signal transduction' held in Queenstown, New Zealand (18-22 August 2025) for her poster entitled *"Structural basis for non-catalytic signalling mechanisms of Eph receptor pseudokinase EphA10."*

### Travel Grants

Emily Park - Company of Biologists Travel Grant to attend IUBMB Focused Meeting on the emerging roles of (pseudo)kinases in signal transduction August 18th-22nd Queenstown New Zealand.

## External Affiliates Update

The Centre continues to reach out to scientists, both within our existing Nodes and outside of the founding academic institutions, who are involved in cryo-EM and membrane protein research to provide opportunities for them to become members or affiliates of the Centre. If you are interested in becoming a member or affiliate, please reach out to us at ccemmp@monash.edu.

## Upcoming Events


Our seminar series continues on the second Tuesday of the month, 10:00 AM - 11:00 AM (AEST/AEDT). This coming quarter we will hear from

- Dr. Rie Nygaard (Weill Cornell Medicine, New York, NY, USA) November 11, and
- Dr. Lisa Eshun-Wilson (The Scripps Research Institute, La Jolla, CA, USA), December 9.

Miss a seminar? Most are recorded so you can access them from our website (https://ccemmp.org/events/ccemmp-seminar-series/) or our youtube channel.

December 9, 2025 marks the end of our seminar program for 2025. Our 2026 seminar program will commence Feb 17th, 2026 with Assistant Professor Seychelle Vos from MIT. Note this is the third Tuesday of the month as Lorne Proteins is scheduled for Feb 8-12, 2026. Please join me in thanking our seminar committee for putting together such a fantastic program for 2025.

### CCeMMP Resaerch Symposium, 2025

Looking forward to seeing everyone at the CCeMMP Research Symposium, Nov 13 and 14, 2025, to be held at Bio21. Program and abstracts can be found on our website, https://ccemmp.org/events/arc-ccemmp-research-symposium-2025-2/

### SPA Workshop 2026

CCeMMP will be running an intensive two week long single particle analysis workshop for our members and affiliates early 2026, just before Lorne Proteins. The workshop is a mixture of theory and hands-on data processing which covers everything from image formation, signal analysis, to operating a high performance compute cluster, advanced aspects of single particle alignment all the way to current approaches to molecular modelling of cryoEM density data. We are pleased to open up this course to our centre members/affiliates with priority given to PhD students. It is a unique opportunity for a student who will be utilizing this technique during their studies. As there are only 6 available spaces, we will run an application process. To apply to join this course, the student will need to outline in less than 500 words, their PhD research objectives and how single-particle cryoEM plays a pivotal role in their research aims. Please email these to tracie.pierce@monash.edu by COB December 12 2025, and these will be reviewed by the CCeMMP Graduate Research Committee. Places will be announced by December 19, 2025. The course will run Jan 27-Feb 6, 2026 at Monash Institute of Pharmaceutical Sciences (Parkville), in person only. Note Lorne Proteins starts February 8, 2026.

## Outreach

### In the Media

- **Sept 10, 2025 Prof Debnath Ghosal and lab - article in Pusuit** - https://pursuit.unimelb.edu.au/articles/revisiting-a-100-year-old-medical-treatment-to-tackle-the-growing-crisis-of-antibiotic-resistance

### Social Media

The Outreach and Public Engagement Committee have opened two additional social media channels: Bluesky and Instagram. We will continue to post on X but with many scientists leaving for BlueSky, we are now active here.

If you are on these platforms, remember to follow us!!

Bluesky – @ccemmp-outreach.bsky.social
Instagram - ccemmp_outreach
LinkedIn: ARC Centre for Cryo-electron Microscopy of Membrane Proteins

### Steptember 2025

CCeMMP had 16 participants across all four nodes, with our team open to all CryoEM enthusiasts within these nodes. We proudly raised $91 for Steptember. Congratulations to our top fundraisers, Natalie Diepenhorst (Team Red Hot MTDD Steppers, Monash Node) and Tracy Josephs (Monash Node), and to our top stepper, Chloe Cerak from Team Cyro Cruisers (WEHI Node) — thank you all for your fantastic participation!

## Other Training

- Dr. Winnie Tan continues to provide training in Mass photometry, WEHI
- Daniel Fox: Helped organise and present at the AI Protein Design Programme designing de novo binders with AI workshop, Monash University, Caulfield, 27 October 2025. Daniel presented the workshop Inhibiting heme piracy using AI-designed de novo binders.
- Dr. Matthew Belousoff: Advanced AI workshop and coding course, presented at Monash Institute of Pharmaceutical Sciences, Monash University, Parkville.
- Dr. Sarah Piper: Blender workshop at Coventry University, Coventry, UK, 11 September, 2025.

## Training (attendee)

Several members attended the CryoET training workshop held at the Ian Holmes Imaging Centre Bio21, Sept 9-10, 2025 and facilitated by Dr. Sepideh Valimehr and Dr. Matthew Johnson: Dr. Fabian Munder, Lyn Deng, Abhishek Roy, Emily Park, Anish Mulchandani, Dr. Brooke Hayes and Dr. Ashleigh Kropp.

## Social Media


Bluesky – @ccemmp-outreach.bsky.social

Instagram - ccemmp_outreach

## Industry Engagement

Members and student members continue to have their regular meetings with their respective industry partners (Astex, Servier, Dimerix and Pfizer). ICHDRs and their supervisors are also talking with industry partners regarding their 3 month placements. ICHDRs continue to meet with their industry mentors.

Dr. Sarah Piper: AstraZeneca seminar. "Staying "in the loop": structures and dynamics of a GPCR displayed in 3D animations." 23 September, 2025, Astra Zeneca, Cambridge, UK.

# Recent Centre Activities and Achievements

## "Rotation 3" - CCeMMP Single Particle Analysis Workshop, Aug 18th - 29th.

It will always be known as "Rotation 3", but now that our ICHDRs have all completed this rotation, we should adapt and start calling it the "CCeMMP SPA Workshop". We had 23 strong applications for only 15 places. This was a two-week intensive in-person, hands-on training in processing of cryo-EM data, co-ordinated by Dr. Matthew Belousoff (Monash Node) and Dr. Sepideh Vahlimer (UoM/Bio21 Node). This year, it was held at UoM/Bio21. Dr. Matthew Belousoff and Dr. Sepideh Valimehr delivered most of the components of this rotation. A/Prof. Alisa Glukhova (WEHI Node) lectured on sample optimisation and preparation techniques. The program concluded with Dr. Fabian Bumbak and Dr. Theo Nettleton (both Monash Node) presenting PDB validation and final steps for ensuring your data is ready for publication.

We will continue to offer this valuable training opportunity to our student affiliates. The next session should run early 2026. Those that missed out this year have a guaranteed place for 2026, which leaves limited places available!!. The call out to members and affiliates has been made, please see earlier in the Newsletter for details.

## Bench to Art Competition, 2025

This year we had 14 entries for our Bench to Art competition. Eleven entries were from our foundation nodes, the remaining 3 entries were from Mexico and the USA (Stanford and The University of Michigan).

For 2025, the judges awarded first place to "Too Hot to Chandle", created by Laura Humphrys. For bragging rights, second and third places were awarded to One and Four GLP-1Rs by Kenta Ishii and "Cat jumping from respiratory complex" by Muyuan Chen, respectively. Our winner received $300 AUD.

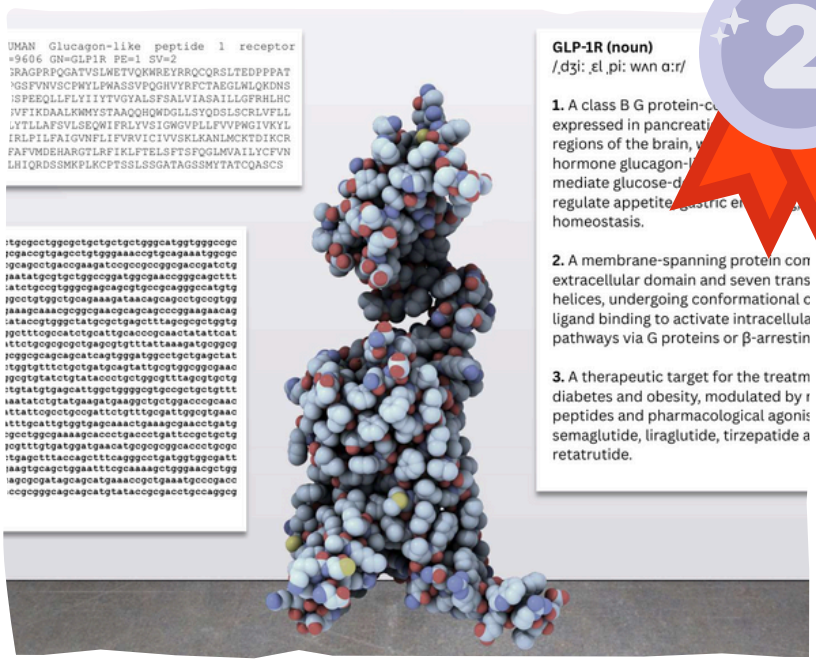

### *Too Hot to Chandle*

Scented, handmade, soy wax candle of the TRPV4; a representative of the heat-sensitive ion channel family. The gradient of colour shows the flow of activation from top to bottom, outside the cell to inside the cell. The top red/orange is scented as bonfire and lit by fire for heat sensation, and the bottom section inside the cell is scented with lemon myrtle, a gentle citrus ready to accept basic ions when activated.

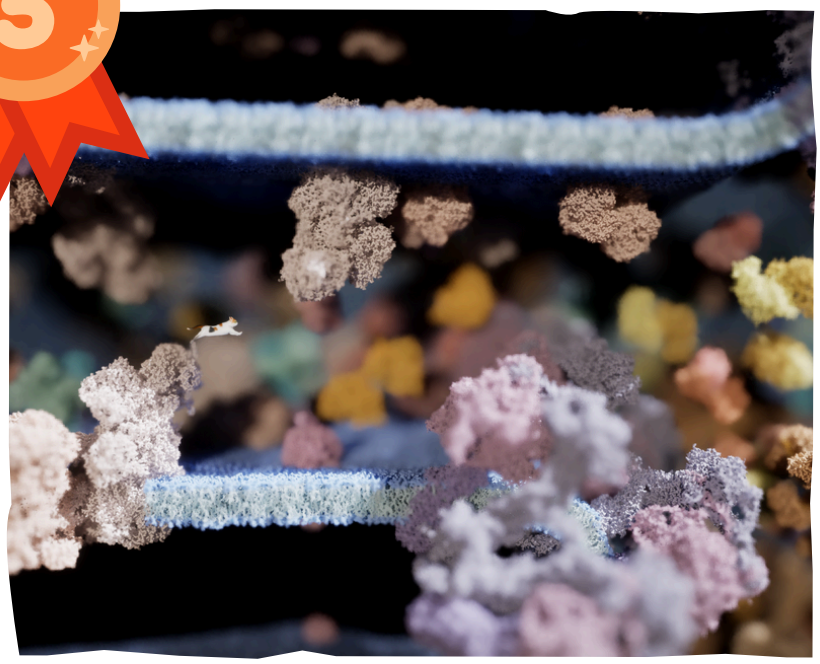
From the judges: *"Laura's 'Too hot to Chandle' candle was an absolutely delightful concept."*
*"I wished I could both smell and visualize this art work! A tremendously clever use of the candle form to make us visualize (and smell) signalling as an active relationship within the protein structure. "*

## *One and Four GLP-1Rs*

Inspired from One and Three Chairs (1965) by Joseph Kosuth, this 'art' reimagines the GLP-1 receptor in four forms: a 3D structure, its amino acid sequence, the matching nucleotide code, and a dictionary-style definition. Here, science meets conceptual art - who says receptors can't be philosophical?




From the judges: *One and four GLP-1Rs "A very clever adaptation of Joseph Kosuth One of Three Chairs linking science and the art world on the real interpretation of the protein. "*
*"I love how it encourages the viewer to consider a protein 'in all its forms' - visual, expressed in language and even numerical terms. It reminded me that whilst discovery happens in the lab, it is realised on the page. At what point does a new discovery actually happen?"*



## *Cat jumping from respiratory complex*

A cat is jumping from a respiratory supercomplex inside mitochondria. This is a snapshot of a video game, currently being made, where players can navigate inside the cellular environment. Membrane geometry and large protein placement is adapted from CryoET data of mitochondria, and high resolution structures are from the PDB.

From the judges: *Cat jumping from respiratory complex: "A very creative entry - the only video game!"*
*"I just love the idea!"*

## *Meet the Judges*

This year we had Prof. Wai-Hong Tham (ANU/WEHI), Rachel Ung (Marketing Manager, Monash University) and Tamara Tegethoff (Designer and Illustrator).

### *Prof. Wai-Hong Tham*

Wai-Hong is a Lab head and infectious diseases expert at ANU and WEHI. She enjoys the wonderful illumination of protein function using structural biology.

### *Tamara Tegethoff*

Tamara is a freelance artist, illustrator, author and art teacher whose main focus is portraits and semi-realistic whimsical visual worlds. She works digitally as well as with traditional mediums such as water colour, acrylic and oil.

### *Rachel Ung*

Rachel is the Marketing Manager at Monash (Parkville) in the Faculty of Pharmacy and Pharmaceutical Sciences. She has a keen interest in all forms of art and loves encouraging science folk to explore their creative side.

## People's Choice

This year, there were 324 votes in the People's Choice Award, with votes being made across the world: Australia, Mexico, USA, UK, Italy, Dominican Republic, Israel, France, Germany, Brazil, Greece, New Zealand, The Netherlands, India, Bulgaria, and Canada.

The People's Choice Award went to "Mercurio", created by Juan Valenzuela (Mexico). For bragging rights, second and third place went to "Yarnborne Virus" by Somavally Dalvi (UoM/Bio21 Node) and "Too Hot to Chandle" by Laura Humphrys (Monash Node), respectively.

Our winner received $100 AUD. Thank you to all who got involved - those who entered and those who voted in the People's Choice. Winning images will also be featured in our 2026 calendar.

## People's Chouce

### Mercurio

Life on other planets? Can we relate "planets" and "proteins?" How are they similar? The planet Mercury is made of rock and metal. Mercury's titanium stabilizes volcanic regions, which is very beneficial because the deformation of its crust still persists. I illustrate a human actin-binding protein represented in helices and sheets. This structure is expressed in all cells of the body, especially in muscles, as it participates in muscle contraction. The gold textures are artificial visualizations of Mercury used to study the different types of metals that predominate there.

### Yarnborne Virus: Dead or Alive

I study the life cycles of viruses using cryo-electron tomography, capturing them in the act of infection and host killing. When the real viruses stress me out, I crochet them instead! This cuddly virus model shows top right = the full viral villain; top left = cross-section with spikes, envelope and capsid; bottom left = the capsid; and bottom right = double-stranded RNA.


### Too Hot to Chandle

Scented, handmade, soy wax candle of the TRPV4; a representative of the heat-sensitive ion channel family. The gradient of colour shows the flow of activation from top to bottom, outside the cell to inside the cell. The top red/orange is scented as bonfire and lit by fire for heat sensation, and the bottom section inside the cell is scented with lemon myrtle, a gentle citrus ready to accept basic ions when activated.

# Conference Presentations

## International Meetings

A/Prof. David Thal: Selected talk. Structural and pharmacological investigation of the P2X1 receptor for non- hormonal male contraception. World Congress on Purines, 5-11 September, 2025, Chengdu, China.

Emily Park*: Poster presentation. Structural basis for non-catalytic signalling mechanisms of Eph receptor pseudokinase EphA10. IUBMB Focused Meeting on the emerging roles of (pseudo)kinases in signal transduction, 18-22 August 2025, Queenstown, New Zealand.*Poster Award*.

## National Meetings

Prof. Denise Wooten: Invited talk. Insights into class B1 GPCR regulation and signalling. The Australian Society of Biochemistry and Molecular Biology, ASBMB2025, 29 Sept - 1 Oct, 2025 , The University of Queensland, St Lucia, QLD.

Somavally Dalvi: Selected oral presentation. Crossing the barrier: Understanding the life cycle of membrane-containing phages at molecular resolution. The Australian Society of Biochemistry and Molecular Biology, ASBMB2025, 29 Sept - 1 Oct, 2025 , The University of Queensland, St Lucia, QLD.

Daniel Fox: Selected oral presentation. AI-designed de novo binders can inhibit growth of pathogenic E. coli. The Australian Society of Biochemistry and Molecular Biology, ASBMB2025, 29 Sept - 1 Oct, 2025 , The University of Queensland, St Lucia, QLD.

Javaid Jabbar*: Poster presentation. Lysine acetylation modulates s-OPA1 GTPase activity and oligomerization in mitochondrial membrane remodeling. The Australian Society of Biochemistry and Molecular Biology, ASBMB2025, 29 Sept - 1 Oct, 2025 , The University of Queensland, St Lucia, QLD. **Best Poster Award*

Jhonnatan Reales-Gonzalez: Poster presentation. CryoEM structure of Salmonella bacteriophage P22 annealase erf: Unveiling a family-defining protein. The Australian Society of Biochemistry and Molecular Biology, ASBMB2025, 29 Sept - 1 Oct, 2025 , The University of Queensland, St Lucia, QLD.

Dr. Winnie Tan: Poster presentation. MORC2 is a phosphorylation-dependent DNA compaction machine.The Australian Society of Biochemistry and Molecular Biology, ASBMB2025, 29 Sept - 1 Oct, 2025 , The University of Queensland, St Lucia, QLD.

## Local Meetings

Ania Beyger: Oral presentation. Structural and pharmacological characterisation of CXCR3 isoforms and their inhibition by small molecule mAbs. 1 October, 2025, DDB student symposium, Monash University, Parkville.

Anastasia Chen: Oral presentation. "Understanding the molecular mechanisms of IL-11Rα-mediated signalling through its ligands". Research-in-progress (RIP) talk, 11th Sept, 2025, Bio21, Parkville.


*Ania Beyger - DDB Student Symposium, Oct 2025*

*Bhavika Rana - DDB Student Symposium Oct 2025*

Bhavika Rana: Oral presentation. Structural and pharmacological validation of allosteric sites at the M5 mAChR. 1 October, 2025, DDB student symposium, Monash University, Parkville.

## International Academic Seminars

Dr. Sarah Piper: Oxford University seminar. "Visualising PAC1 receptor structures and dynamics through 3D animations." Oxford University, Oxford, UK, 28 August, 2025.

Dr Sarah Piper: Münster University seminar. "Structures and dynamics of Class B1 GPCRs in 3D animations." 29 August, 2025, Münster University seminar, Münster, Germany.

Dr. Sarah Piper: Coventry University seminar. "Visualising structures and dynamics of PAC1 receptor splice variants." 4 September, 2025Coventry University, Coventry, UK.

## National Academic Seminars

Daniel Fox: PhD Exit Seminar. AI-designed de novo binders can inhibit growth of pathogenic E. coli. Monash University, Clayton, 24 October 2025.

Dr. Joshua Hardy: Seminar. "ProteinDJ: A high-performance and modular protein design pipeline", presented at WEHI, 25 September, 2025.

Dr. Joshua Hardy: Seminar. "ProteinDJ: A high-performance and modular protein design pipeline", presented online for Australian BioCommons 7 October, 2025.

Dr. Joshua Hardy: Seminar. "ProteinDJ: A high-performance and modular protein design pipeline", presented at ANU, 14 October, 2025.

Dr. Bronte Johnstone: CCeMMP Seminar Series. "Utilising cryo-EM and cryo-ET to investigate host-pathogen interactions mediated by membrane molecular machines." Online, 9 September 2025.

Dongju Lee: PhD Exit Seminar. “Towards structural and pharmacological characterisation of orphan GPCRs”. Monash University, Parkville, 22 October 2025.

Qinghao Ou: PhD exit seminar. “Structural understanding of GIPR and GLP-1R co-agonism.” Monash University, Parkville, August 14, 2025.

Dr. Sarah Piper: CCeMMP Seminar Series. "Structures, dynamics and function of PAC1 receptor variants: staying 'in the loop'." Online, 13 October, 2025.

Dr. Winnie Tan: Seminar "Capturing snapshots of chromatin remodelling using multiscale biological systems", La Trobe University, 8 October, 2025.

# Publications

## New Publications

**Burger WAC, Mobbs JI, Rana B**, Wang J, Joshi K, Gentry PR, **Yeasmin M,** Venugopal H, Bender AM, Lindsley CW, Miao Y, **Christopoulos A, Valant C, Thal DM** (2025). Cryo-EM reveals an extrahelical allosteric binding site at the M5 mAChR. Nat Commun, 16(1): 7046. https://doi.org/10.1038/s41467-025-62212-z

Chen MZ, Yuen D, McLeod VM, Yong KW, Smyth CH, Herling BR, Payne TJ, Fabb SA, **Belousoff MJ**, Algarni A, **Sexton PM**, Porter CJH, Pouton CW, Johnston APR (2025). A versatile antibody capture system drives specific in vivo delivery of mRNA-loaded lipid nanoparticles. Nat Nanotechnol, 20(9):1273-1284. doi: 10.1038/s41565-025-01954-9

Deo O, Pham V, Alvi S, Barnes N, Gondin AB, **Christopoulos A**, Poole DP, Carbone SE, **Thal DM**, Jörg M, Capuano B, **Valant C**, Scammells PJ (2025). A structure–activity relationship study of novel positive allosteric modulators for the δ-opioid receptor. ACS Chem Neurosci, 16(15): 2958-2977. https://doi.org/10.1021/acschemneuro.5c00280

Farrelly MD, Mohebali N, **Dal Maso E,** Nowell CJ, **Wootten D, Sexton PM**, Martin LL, Thang SH (2025). Native adenosine A2A receptor solubilisation by a library of amphipathic copolymers. Biomater Sci. Oct 27. doi: 10.1039/d5bm01011j. Online ahead of print.

**Fox DR**, Taveneau C, **Clement J**, **Grinter R**, Knott G (2025). Code to complex: AI-driven *de novo* binder design. Structure, 33(10):1631-1642. doi: 10.1016/j.str.2025.08.007

Gao J, Cree S, Ham S, Nowell C, Parker A, Zhao P, Whiting L, Sloop KW, Samms RJ, **Sexton PM, Wootten D**, Hutchinson DS (2025). Contrasting roles for GLP-1R and GIPR in a model of diet-induced obesity. J Mol Endocrinol, 75(3):e250053. doi: 10.1530/JME-25-0053

Gorasia DG, Hanssen E, **Mudaliyar M**, Morton CJ, **Valimehr S**, Seers C, Zhang L, Doyle MT, **Ghosal D,** Veith PD, Reynolds EC (2025). Insights into type IX secretion from PorKN cogwheel structure bound to PorG and attachment complexes. Nat Commun 16: 7735. https://doi.org/10.1038/s41467-025-63163-1 PDB:9P6H, EMDB-71309; PDB:9MYJ, EMDB-48741; EMDB- 48722.

Horne CR, Wang T, Young SN, Dite TA, Nyvall HG, Suresh S, Davies KA, Castro AG, Vaibhav V, Mather L, Dagley LF, **Belousoff MJ**, Manning G, Means AR, Burke JE, Petersen J, Scott JW, Murphy JM (2025). Unconventional binding of calmodulin to CHK2 kinase inhibits catalytic activity. Biochem J, BCJ20253431. https://doi.org/10.1042/BCJ20253431

Suzuki AK, Furukawa R, Sobti M, **Brown SHJ, Stewart AG**, Akanuma S, Ueno H, Noji H (2025). Functional and structural characterization of F1-ATPase with common ancestral core domains in stator ring. Protein Science, 34 (11): e70345. https://doi.org/10.1002/pro.70345

Toufaily C, Ma Y, Barbosa ED, Harikumar KG, **Wootten D, Sexton PM**, Liu W, Miller LJ (2025). Cholesterol residence time drives regulation of the G protein-coupled cholecystokinin receptor. Mol Pharmacol,107(10): 100074. doi: 10.1016/j.molpha.2025.100074. Online ahead of print

**Zhang L, Mobbs JI, Bennetts FM**, Venugopal H, Nguyen ATN, **Christopoulos A**, van der Es D, Heitman LH, May LT, **Glukhova A, Thal DM** (2025). Molecular basis of ligand binding and receptor activation at the human A3 adenosine receptor. Nat Commun 16: 7674. https://doi.org/10.1038/s41467-025-62872-x
PDB: 9EHS, EMD-48065;9EBH, EMD-47879; 9EBI, EMD-47880; EMD-47994; EMD-47998 ; EMD-48063;EMD-48064

## Preprints

Silke D, Iskander J, Pan J, **Thompson AP**, Papenfuss AT, **Lucet IS, Hardy JM** (2025). ProteinDJ: a high-performance and modular protein design pipeline. bioRxiv, 26 September, 2025. doi: https://doi.org/10.1101/2025.09.24.678028

## Updated Publications

Xu W, Keith AM, Ye W, Hu X, Southall N, Marugan JJ, Ferrer M, Henderson MJ, **Sexton PM,** Deganutti G, Eiden LE. (2025). Design of peptide-based PAC1 antagonists combining molecular dynamics simulations and a biologically relevant cell-based assay. Biochem Pharmacol, 242(Pt 2):117300. doi: 10.1016/j.bcp.2025.117300. Online ahead of print.

# Released Structures

**PDB: 9EK0, EMD-48111:** iperoxo-bound M5 AChR-mGq-scFV16
**PDB: 9EJZ, EMD-48110:** ACh-VU6007678-bound M5 AChR-mGq-scFv16-Nb35 complex
**EMD-48109:** receptor focus map for iperoxo-bound M5 AChR-mGq-scFV16
**EMD-48108:** receptor focus map for ACh-VU6007678-bound M5 AChR-mGq-scFv16-Nb35 complex

- Wessel Burger, Jesse Mobbs, David Thal
- Burger et al., (2025). Cryo-EM reveals an extrahelical allosteric binding site at the M 5 mAChR. Nat Commun 16: 7046-7046. DOI: https://doi.org/10.1038/s41467-025-62212-z

**PDB: 9EHS, EMD-48065:** A3AR–BRIL–BAG2–Nb–LUF7602,
**PDB:9EBH, EMD-47879:** A3AR–DNGi1–scFv16–adenosine
**PDB:9EBI, EMD-47880:** A3AR–mGsi–Nb35–Piclidenoson complex
**EMD-47994**: (receptor focus map) A3AR–DNGi1–scFv16–adenosine complex
**EMD-47998**: (receptor focus map) A3AR–mGsi–Nb35–Piclidenoson complex
**EMD-48063** (consensus map) A3AR–BRIL–BAG2–Nb–LUF7602 complex and
**EMD-48064 (**receptor focus map) A3AR–BRIL–BAG2–Nb–LUF7602 complex.

- Liudi Zhang, Jesse Mobbs, Alisa Glukhova, David Thal
- Zhang et al., (2025). Molecular basis of ligand binding and receptor activation at the human A3 adenosine receptor. Nat Commun 16: 7674. https://doi.org/10.1038/s41467-025-62872-x

**9P6H, EMDB-71309**: P. gingivalis PorK and PorN complexes
**9MYJ, EMDB- 48741**: Structure of P. gingivalis PorK and PorN complexes
**EMDB- 48722:** porK/N ring with alternative C32 symmetry

- Eric Hanssen
- Gorasia DG et al., (2025) Insights into type IX secretion from PorKN cogwheel structure bound to PorG and attachment complexes. Nat Commun 16: 7735. https://doi.org/10.1038/s41467-025-63163-1

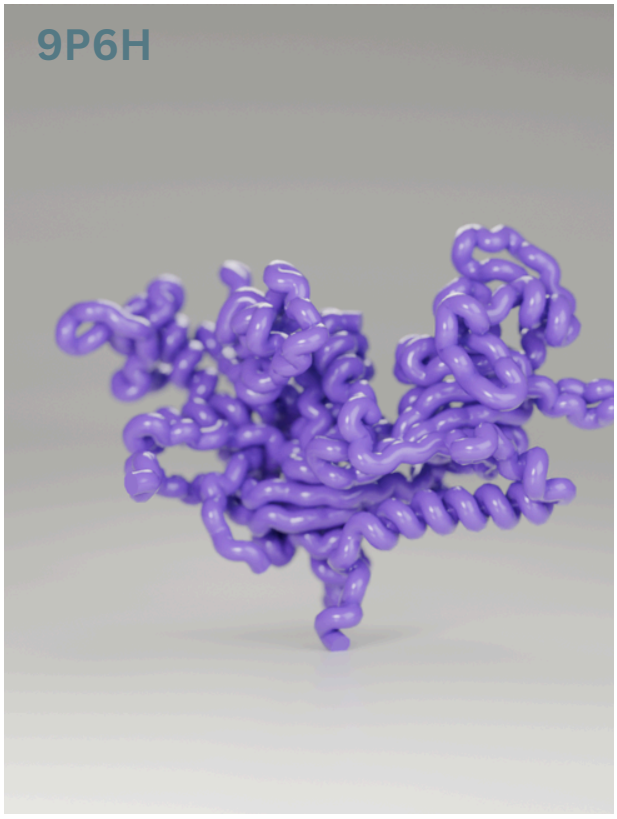
**PDB: 9BH3 (x-ray crystallography):** apo Aggregatibacter actinomycetemcomitans SiaP protein
**PDB: 9BHF (x-ray crystallography**): apo Aggregatibacter actinomycetemcomitans SiaP protein

- Renwick Dobson
- To be published

# CCeMMP Cryo-EM Structure Image Gallery







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