David Drew

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Date of Birth: 10 September 1976, Auckland, New Zealand | Citizenship: New Zealand and Sweden

Biosketch

David Drew's laboratory investigates the structures and mechanisms of SLC transporters, which move ions and small molecules across cell membranes. Drew pioneered GFP-based screening approaches for membrane proteins, now widely used for overexpression and purification screening and ligand discovery. His group determined the first structures of GLUT sugar transporters in multiple conformational states, including the first occluded state, helping establish the GLUT transport cycle and its pharmacological regulation. His work on the Na^+/H^+ antiporter NapA provided the second example of the elevator-type rearrangement first observed in glutamate transporters by Olga Boudker and colleagues. Together, Drew and Boudker went on to define the elevator alternating-access mechanism (Annu. Rev. Biochem. 2016). Other key contributions include the first structure of the bile acid transporter ASBT (Nature 2011), the first structures of mammalian exchangers across all three SLC9 subfamilies, and the recent breakthrough of ATP import into the ER by SLC35B1 (Nature 2025). From 2027, he will direct CEMERAI, a national centre for AI-driven modelling of cell membranes.

Education and Employment

2020–present	Professor in Biochemistry, Stockholm University (Wallenberg Scholar)
2013–2020	Associate Professor (Docent), Dept. of Biochemistry and Biophysics, Stockholm University (Wallenberg Academy Fellow)
2009–2013	Group Leader, Imperial College London (Royal Society University Research Fellow)
2006–2009	EMBO Postdoctoral Fellow, Prof. So Iwata, Membrane Protein Crystallography Group, Imperial College London
2000–2005	PhD in Biochemistry, Stockholm University (Dec 2005). Thesis: GFP as a tool to monitor membrane protein topology and overexpression in *E. coli*. Supervisor: Prof. Jan-Willem de Gier; co-supervisor: Prof. Gunnar von Heijne
1997–1999	M.Sc. Chemistry (Honours), Auckland University, New Zealand
1994–1997	B.Sc. Pharmacology, Auckland University, New Zealand
1999–2000	Research Assistant, Prof. Peter Metcalf, Structural Biology Group, Auckland University

Awards and Distinctions

Director, CEMERAI — "Modelling Cell Membranes with AI" (national centre)	2027
Visiting Vallee Professorship, The Vallee Foundation	2026
ERC Advanced Grant (LS1)	2024
Elected Member, Royal Swedish Academy of Sciences (chemistry class)	2024
Elected EMBO Member	2022
Göran Gustafsson Prize in Chemistry, Royal Swedish Academy of Sciences	2020
Arrhenius Medal, Swedish Chemical Society	2020
Wallenberg Scholar, Knut and Alice Wallenberg Foundation	2019
ERC Consolidator Grant (LS1)	2018
Tage Erlander Prize, Royal Swedish Academy of Sciences	2016
Ruth and Nils-Erik Stenbäck Prize, Helsinki	2015
Young Distinguished Scientist, Swedish Research Council	2014
The Svedberg Prize	2014
EMBO Young Investigator	2013
Wallenberg Academy Fellow	2013
Royal Society University Research Fellowship (success rate 6%)	2009
EMBO Postdoctoral Fellowship	2007
ESF and EMBO short-term Fellowship, Cambridge	2002

Research Grants

Total awarded: ~200 MSEK (share-adjusted) · Current funding: ~50 MSEK

ERC Advanced Grant “MEMSUGAR” (LS1) (lead)	29 MSEK	2025–2029
Wallenberg Scholar renewal, KAW	~20 MSEK	2024–2029
Swedish Brain Foundation	6 MSEK	2025–2027
Cancer Foundation project grant and renewal (lead)	~7 MSEK	2022–2026
Swedish Research Council project grant (lead)	4 MSEK	2022–2025
SGC / Gates Foundation	0.2 MSEK	2024–2025
ERC Consolidator Grant “EXCHANGE” (LS1) (lead)	20 MSEK	2019–2024
Göran Gustafsson Prize research grant, KVA	6 MSEK	2020–2023
Wallenberg Scholar, KAW	18 MSEK	2020–2023
Novo Nordisk Foundation (lead)	~3.5 MSEK	2018–2021
KAW Wallenberg Academy Fellow extension (lead)	~10 MSEK	2018–2022
KAW project grant (lead; shared by four CBR groups)	29 MSEK	2015–2019
Young Distinguished Scientist grant, VR (lead)	18 MSEK	2014–2019
KAW Wallenberg Academy Fellow (lead)	10 MSEK	2013–2017
Swedish Research Council project grant (lead)	4 MSEK	2012–2015
Royal Society Research Grant (lead)	~1 MSEK	2011–2013
MRC project grant (Co-applicant, PI A. Cameron)	5 MSEK	2009–2013
Royal Society University Research Fellowship (lead)	~10 MSEK	2009–2013

Invited Lectures, Keynotes and Chairing

Selected invited lectures: 60 of ~120 invited seminars; 36 in the last five years

Physiology in Focus, Hamburg, Germany	2026
European Bioenergetics Conference, Stockholm, Sweden	2026
Keystone Symposium: SLC Transporters, Boston, USA	2026
EMBO Keynote Lecture, Lorne Protein Structure and Function, Australia	2026
University of Sydney, Australia	2026
University of Canterbury, New Zealand	2025
CAS Biophysics, China	2025
Westlake University, China	2025
International Symposium on Protein Sciences, SMART Institute, China	2025
Vollum Institute, Oregon, USA	2025
Stanford University, USA	2025
UCSF, San Francisco, USA	2025
NIH Transporter Elucidation Network, USA	2025
Kyoto Medical School, Japan	2025
University of Tokyo, Japan	2025
Biophysical Society Conference, Los Angeles, USA	2025
Integrated Structural Biology, University of Copenhagen, Denmark	2024
New Horizons in Membrane Biology, Frankfurt, Germany	2024
Frontiers in Biological Structures Symposium, Tsinghua University, China	2024
EMBL Seminar, ESRF, Grenoble, France	2024
University of Oxford, UK	2024
Centre for Structural Biology Symposium, Imperial College London, UK	2024
GRC: Ligand Recognition and Molecular Gating, Ventura, USA	2024
International Conference on Structure, Function and Dynamics, Hawaii, USA	2023
MRC Mitochondrial Biology Unit, Cambridge, UK	2023
Inter-Academy Workshop on Membrane Protein Folding and Structure, Sweden	2023
EMBO: Membrane Transporters, Greece	2022
EMBO: Membrane Protein Characterization, Germany	2022
Danish Research Institute of Translational Neuroscience, Denmark	2021
Biophysical Society Conference: Transporters, USA	2021
Weill Cornell Medical School, New York, USA	2021
PSI and ETH Zurich, Switzerland	2020

HTB meets Academia, Boehringer Ingelheim, Germany	2020
Westlake University, China	2019
Honoring Membrane Transporters Symposium, Technion, Israel	2019
GRC: Ligand Recognition and Molecular Gating, Ventura, USA	2018
GRC: Mechanisms of Membrane Transport, Boston, USA	2017
Lorne Conference on Protein Structure and Function, Australia	2017
100th Anniversary of the KAW Foundation, Stockholm, Sweden	2017
Japanese Biochemical Society, Sendai, Japan	2016
Symposium on Na^+/H^+ Antiporters, Max Planck Institute, Frankfurt, Germany	2015
Kyoto Medical School, Japan	2015
Chair, Membrane Protein Structure and Dynamics, IUCr Congress, Montreal, Canada	2014
GRC: Ion Channels, New Hampshire, USA	2014
GRC: Membrane Transport Proteins, New Hampshire, USA	2014
GRC: Ligand Recognition and Molecular Gating, Ventura, USA	2014
BioMed Conference on Transporters and other Molecular Machines, Barcelona, Spain	2014
European Biogenetics Conference, Portugal	2014
Benzon Symposium: Membrane Protein Structure/Function/Dynamics, Denmark	2013
GRC: Mechanisms of Membrane Transport, Boston, USA	2013
International Union of Physiology Sciences (IUPS), Birmingham, UK	2013
Structure and Function of Membrane Proteins, Campinas, Brazil	2013
SFB-807 Membrane Transport, Max Planck Institute, Frankfurt, Germany	2012
URF Conference Selected Speaker, The Royal Society, UK	2012
Cold Spring Harbor: Membrane Proteins, Structure and Function, China	2011
NIH Roadmap: Membrane Protein Technologies, Scripps, San Diego, USA	2010
GRC: Ligand Recognition and Molecular Gating, Italy	2010
Martin-Luther-Universität, Halle, Germany	2009
EMBO: New Methods in Membrane Protein Research, Sweden	2007
International Structural Genomics (ISGO), Kawasaki, Japan	2006

Professional Service and Outreach

Conferences organized

Co-organizer, 23rd European Bioenergetics Conference, Stockholm	2026
Co-organizer, Keystone Symposium: first conference dedicated to SLC transporters (with G. Superti-Furga and K. Giacomini)	2026
Co-organizer, 40th Small Meeting on Yeast Transporter and Energetics, Stockholm	2025
Co-organizer, GRC “Mechanisms of Membrane Transport” (with J. Robertson)	2023
EMBO Young Investigator Structural Sectorial Meetings	2018–2019

External services

EMBO course committee	2025–
EMBO postdoctoral fellowship committee	2023–
EMBL-Hamburg external review committee	2023
Editor, eLife	2020–2024
Guest editor, PNAS (x4)	2024, 2026
Guest editor, Current Opinion in Structural Biology	2017
Tenure/promotion reviewer: Tsinghua (×3), Columbia, Oxford, Peking (×2), Zurich (×2), Groningen, HKUST	2019–2026

Internal services

Swedish Research Council infrastructure accessibility committee	2026
Director, PhD programme in Biophysics, Stockholm University	2024–
Swedish National Committee for Molecular Biosciences	2025–
Course leader, Biomembrane course	2014–
Mentor, Wallenberg Academy Fellows	2020–2023
Working group for gender equality in chemistry, Stockholm University	2019–2021

Teaching and workshops

EMBO fellowship outreach, Istanbul, Turkey 2024
High-throughput protein production course, OPPF, Didcot, UK 2015
SGC protein production workshop, Oxford, UK 2013

Examiner and reviewer roles

Faculty opponent for 20 PhD defences (Karolinska Institutet, Lund, Uppsala, Copenhagen, Aarhus, Gothenburg, Oxford, Warwick, KTH, Umeå). Awards reviewer for KVA, KNAW and GBM. Grant reviewer for The Royal Society, Wellcome Trust, MRC, BBSRC, ERC, EMBO, ISF, NWO, DFG, SNSF and ANR. Journal reviewer (~10/year) including PNAS, EMBO J, PLOS Biology, Nature, Science and Cell journals.

Research Group

27 PhD students and postdocs trained to date. Four now hold academic group-leader or lecturer positions and six hold senior industry positions.

Supervised PhD theses

Chiara Lee (Imperial College London) 2009–2013
Yusuke Sekiguchi (co-supervisor, Imperial College London) 2010–2014
Povilas Uzdavinys (SU; Högskoleföreningens prize) 2013–2017
Abdul Aziz Qureshi (SU) 2013–2019
Iven Winkelmann (SU) 2015–2021
Yurie Chatzikyriakidou (SU) 2015–2021
Pascal Meier (SU) 2016–2022
Sarah McComas (SU) 2018–2023
Surabhi Kokane (SU) 2020–2025
Sukkyeong Jung (SU) 2020–2025

Supervised postdocs — current positions

Hae Joo Kang — PostDoc with Dale Wigley, Imperial College, UK
Nein-Jen Hu — Assoc. Prof., Institute of Technology, Taiwan
Gregory Verdon — Senior scientist, Sosei Heptares, UK
Mathieu Coincon — Cryo-EM facility scientist, SciLifeLab, Stockholm
Robin Löving — CSO, Salipro Biotech, Stockholm
Saba Abdul-Hussein — Science and Technology office, British Embassy, Stockholm
Emmanuel Nji — Wellcome Trust International Intermediate Fellow, Kenya
Joseph Brock — Lecturer, ANU, Australia
Laura Orellana — Assoc. Prof., Karolinska Institute, Stockholm
Jan Skerle — PostDoc with Kvido Strisovsky, Czech Republic
Rei Matsuoka — Principal scientist, OMass Therapeutics, UK
Roman Fudim — Senior Scientist, MorphoSys, Germany
Rachel North — Lecturer, Sydney University, Australia
HyunKu Yeo — Senior postdoc, SNU, Korea
Dohwan Ahn — recently finished, industry position
Tom Reichenbach — Protein production facility senior scientist, Stockholm

Current group members

PhD students: Marta Jaśkiewicz, Maryam Paryar, Jordi Cordinach. Postdoctoral fellows: Ashutosh Gulati (Wenner-Gren fellowship), Jianan Chen, Jakob Silberberg (EMBO LTF), Albert Suades, Hang Li, Ved Mehta, Sigurbjörn Markusson (EMBO LTF), Yunlong Qiu, Claudia Alleva, Marta Bonaccorsi. Lab manager: Magnus Claesson.

Selected Commentary

2023 Nature News & Views on the Drew lab's SLC9C1 structure: "An ion transporter in sperm that has features of a channel" (J. Orlowski)

2020 Nature News & Views on the Drew lab's *Pf*HT1 structure: "Protein structure reveals how a malaria parasite imports a wide range of sugars" (Althoff & Abramson)

2016 Nature Struct. Mol. Biol. News & Views on the Drew lab's two-state NapA structures: "Elevating the alternating-access model" (Ryan & Vandenberg)

2013 Nature Struct. Mol. Biol. News & Views on the Drew lab's NapA structure: "An express elevator for Na^+/H^+" (M. Montoya)

2017 Trends in Biochemical Sciences commentary "Lipids Can Make Them Stick Together" (C. Govaerts) on interfacial lipids and membrane-protein oligomers paper with Carol Robinson

2013 Nature careers feature "Europe: Swedish success story" (Drew interview)

Publication List

h-index 43 · >10,038 citations (Google Scholar, Oct 2026) ·
18 publications >200 citations, 27 >100 · scholar.google.com/citations?user=2ZSggEIAAAAJ

Jung S, Yeo H, Li H, Kokane S, Reichenbach T, Gulati A, Albano G, Kirschbaum C, Ho TM, Landreh M, Abramsson M, Robinson CV, Fuster DG, **Drew D.** Structure of NHE6 and its lipid-mediated interactions regulating endosomal pH. **Nature Communications**, (2026) 17: 8177.

Ahn D, Ruda A, Reichenbach T, Alleva C, Gulati A, Bonaccorsi M, Silberberg J, Claesson M, Suades A, Delemotte L, Widmalm G, **Drew D** A two-step mechanism for sugar translocation **Nature Structural & Molecular Biology** (2026) 33:652–663.

Bicer, D, Matsuoka, R, Moumbock, A, Sukumar, P., Suades, A., Cheruvara, H., Quigley, A., **Drew, D.**, Pardon, E., Steyaert, J., Henderson, P. J. F., Caffrey, M., Griese, J. J. Nj,E. Structural basis of lysine-specific transport in Pseudomonas aeruginosa for regulation under extreme acidic conditions **Nature Communications**. (2026), 17:37.

Jung S, Kokane S, Li H, Iwata S, Nomura N, **Drew D** Structure and Inhibition of the Human Na^+/H^+ Exchanger SLC9B2 **Int. J. Mol. Sci**. (2025), 26: 4221.

Gulati A, Ahn D, Suades A, Hult Y, Wolf G, Iwata S, Superti-Furga G, Nomura N, **Drew D.** Step-wise translocation of ATP into the ER by human SLC35B1 **Nature** (2025) 643:855–864.

Balakrishnan A, Hunziker M, Tiwary P, Pandey V, **Drew D**, Bilker, O A CRISPR homing screen finds a chloroquine resistance transporter-like protein of the Plasmodium oocyst essential for mosquito transmission of malaria **Nature Communications** (2025) 16: 3895.

Kokane S, Meier P, Gulati A, Matsuoka R, Pipatpolkai T, Delemotte L, Fuster D, **Drew D.** PI-(3,5)P2-mediated oligomerization of the endosomal sodium/proton exchanger NHE9 **Nature Communications**, (2025) 16: 3055.

Abramsson M, Corey R, Škerle J, Persson J.L, Andén O, Abraham O, Howard R, Lindahl E, Robinson C.V, Strisovsky K, Marklund E.G, **Drew D**, Stansfeld P.J, Landreh M Engineering cardiolipin binding to an artificial membrane protein reveals determinants for lipid-mediated stabilization **eLife**, (2025).104237.1

Gulati A, Kokane S, Boerema A.P, Alleva C, Meier P.F, Matsuoka R, **Drew D.** Structure and mechanism of the K^+/H^+ exchanger KefC **Nature Communications** (2024). 15: 4751.

Drew D, Boudker O. Ion and Lipid Orchestration of Secondary-Active Transport. **Nature**. (2024) Review. 626: 963-974.

Mazza T, Roumeliotis T, Garitta E, **Drew D**, Rashid S, Indiveri C, Choudhary J, Linton K:J, Beis K. Structural basis for the modulation of MRP2 activity by phosphorylation and drugs **Nature Communications** (2024). 15: 1983 (2024)

Asami J, Park J, Nomura A, Kobayashi C, Mifune J, Ishimoto N, Uemura T, Liu K, Yato S, Muramatsu M, Wakita T, **Drew D**, Iwata S, Shimizu T, Watashi T, Park S, Nomura N, Ohto U. Structural basis of hepatitis B virus receptor binding. **Nature Structural & Molecular Biology** (2024) 31: 447–454.

Currie M, Davies J.S, Scalise M, Gulati A, Wright J, Newton-Vesty M. Abeysekera R, Subramanian R Wahlgren W, Friemann R, Allison J, Mace P, Griffin M, Soichi B, **Drew D**, Indiveri C, Dobson R, North R. Structural and biophysical analysis of a Haemophilus influenzae tripartite ATP-independent periplasmic (TRAP) transporter **eLife** (2023) 12:RP92307.

Yeo H, Mehta V, Gulati A, **Drew D.** Structure and electromechanical coupling of a voltage-gated Na^+/H^+ exchanger **Nature** (2023). 623:193–201. *[News and Views Nature. (2023) Oct 25.]*

McComas, S.E, Reichenbach T, Mitrovic D, Suades A, Alleva C., Bonaccorsi M, Delemotte L. **Drew D.** Determinants of sugar-induced influx in the mammalian fructose transporter GLUT5 **eLife** (2023);12:e84808.

Mitrovic D, McComas, S.E, Alleva, C., Bonaccorsi M, **Drew D**, Delemotte L. State-specific structure prediction to elucidate the family-wide sequence-structure relationship in sugar transporters **eLife** (2023)12:e84805.

Suades A, Qureshi A, McComas S, Coinçon M, Rudling A, Chatzikyriakidou Y, Landreh M, Carlsson J, **Drew D.** Establishing mammalian GLUT kinetics and lipid preferences in a reconstituted-liposome system **Nature Communications** (2023) 14:4070.

Davies, J. S., Currie, M. J., North, R. A., Wright, J. D., Scalise, M., Copping, J. M., Remus, D. M., Gulati, A., Morado, D. R., Jamieson, S. A., Abeysekera, G. S., Ramaswamy, S., Friemann, R., Wakatsuki, S., Allison, J. R., Indiveri, C., **Drew, D.**, Mace, P. D. & Dobson, R. C. J. Structure and mechanism of the tripartite ATP-independent periplasmic (TRAP) transporter. **Nature Communications** (2023). 14: 1120.

Winkelmann I, Uzdavinys P, Kenney I.M, Brock J, Meier P, Wagner L.M, Gabriel F, Jung S, Matsuoka R, von Ballmoos C, Beckstein O, **Drew D.** Crystal structure of the Na^+/H^+ antiporter NhaA at active pH reveals the mechanistic basis for pH sensing. **Nature Communications** (2022) 13: 6383.

Asami J, Kimura K, Fujita Y, Ishida H, Zhang Z, Nomura Y, Liu K, Uemura T, Sato Y, Ono M, Yamamoto M, Noda T, Shigematsu H, **Drew D**, Iwata S, Shimizu T, Nomura N, Ohto U. Structure of the bile acid transporter and HBV receptor NTCP **Nature**. (2022). 606: 1021–1026.

Yen H.Y, Abramsson M.L, Agasid M.T, Lama D, Gault J, Liko I, Kaldmäe M, Saluri M, Qureshi A.A, Suades A, **Drew D**, Degiacomi M.T, Marklund E.G, Allison T.M, Robinson C.V, Landreh M. Electrospray ionization of native membrane proteins proceeds via a charge equilibration step. **RSC Advances** (2022) 12, 9671-9680.

Matsuoka R, Fudim R, Jung S, Zhang C, Bazzone A, Chatzikyriakidou Y, Robinson C.V, Nomura N, Iwata S, Landreh M, Orellana L, Beckstein O, **Drew D.** Structure, mechanism and lipid-mediated re-modelling of the mammalian Na+/H+ exchanger NHA2. **Nature Structural & Molecular Biology** (2022). 29:108-20.

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Chatzikyriakidou C, Ahn D, Nji E, **Drew D.** The GFP Thermal Shift assay for screening ligand and lipid interactions to Solute Carrier transporters. **Nature Protocols**. (2021)16: 5357-76.

Cotrim C, Jarrott R.J, Whitten A.E, Choudhury H.G, **Drew D**, Martin J.L Heterologous Expression and Biochemical Characterization of the Human Zinc Transporter 1 (ZnT1) and Its Soluble C-Terminal Domain **Frontiers in Chemistry**. (2021) 9:253.

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Winklemann I, Matsuoka R, Meier P, Shutin D, Zhang C, Orellana L, Sexton R, Landreh M, Robinson C.V, Beckstein O, **Drew D** Structure and Elevator Mechanism of the Mammalian Sodium/Proton Exchanger NHE9 **EMBO Journal**. (2020) 39:4541-4559. *[Selected for EMBO J. cover]*

Landreh M, Sahin C, Gault J, Sadeghi S, Drum C.L, Uzdavinys P, **Drew D**, Allison T.M, Degiacomi M.T, Marklund E.G. Predicting the Shapes of Protein Complexes through Collision Cross Section Measurements and Database Searches **Anal. Chem**. (2020) 92, 18, 12297–12303.

Qureshi A, Suades A, Matsuoka R, Brock L, McComas S, Nji E, Orellana L, Claesson M, Delemotte L, **Drew D** The molecular basis for sugar import in malaria parasites **Nature**. (2020) 578 (7794):321-325. *[News and Views Nature. (2020) Jan 29.]*

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Nji E, Gulati A, Qureshi A. Coincon, M, **Drew D** Structural basis for the delivery of activated sialic acid into Golgi lumen **Nature Structure & Molecular Biology** (2019) Jun;26(6):415-423.

Cotrim CA, Jarrott RJ, Martin JL, **Drew D.** A structural overview of the zinc transporters in the cation diffusion facilitator family. **Acta Crystallogr D Struct Biol**. (2019) Apr 1;75(Pt 4):357-367.

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