Grünewald, Kay

D.o.B. 30-12-1971

Current Position

Since 2017 Professor (W3) and Head of Research Department Structural Cell Biology of Viruses, Faculty Member of Centre for Structural Systems Biology (CSSB)

Undergraduate and Postgraduate Training

1991-1996 Studies of Biology, Friedrich-Schiller University Jena

1996 Diploma in Biology, Friedrich-Schiller-University Jena with Prof. W. Braune

2000 PhD (Dr. rer. nat.) in Biology, Friedrich-Schiller-University Jena, thesis: *'Compartmentation of secondary carotenoid biosynthesis in the unicellular green alga Haematococcus pluvialis'*

Academic and Research Posts

1997/1998 2 research visits (7 months) at the Hebrew University of Jerusalem, Israel

1997-2000 PhD student at Friedrich-Schiller-University Jena

2001 Post-doctoral research fellow at FSU Jena and Max-Planck-Institute of Biochemistry Martinsried (with Prof. Wolfgang Baumeister)

2002-2003 Post-doctoral research fellow at National Institutes of Health, Bethesda, USA, with Dr. Alasdair C. Steven (Laboratory Structural Biology Research)

2004 Scientist at the Max-Planck-Institute of Biochemistry, Department of Molecular Structural Biology, Martinsried

2004-2009 Independent Junior Research Group leader, DFG Emmy-Noether-Programme, at the Max-Planck-Institute of Biochemistry, Martinsried

since 2009 Senior Group Leader, University of Oxford, Division of Structural Biology, Wellcome Trust Centre for Human Genetics, Head of Oxford Particle Imaging Centre

2013-2017 Full Professor of Structural Cell Biology, University of Oxford, UK

since 2013 Associate scientist, Diamond Light Source, Harwell, UK

since 2014 Faculty Member of Centre of Structural Systems Biology (CSSB), Hamburg

since 2017 Visiting Professor of Structural Cell Biology, University of Oxford, UK

since 2017 Full Professor of Structural Cell Biology of Viruses, Universität Hamburg, Dept. of Chemistry and Head of Department, Heinrich-Pette-Institute, Leibnitz Institute of Experimental Virology, Hamburg

Other Scientific Roles

Since 2011 Lead scientist in INSTRUCT (Integrated Infrastructure for Structural Biology in Europe; www.structuralbiology.eu)

Since 2011 Chair of User working group for Diamond Light Source Soft X-ray microscopy/tomography beamline B24

2011-2017 Associated Member of Micron (http://www.micronoxford.com), the Oxford Advanced BioImaging Unit

Since 2011 Founding member of UK National cryoEM Facility eBIC at Diamond Light Source (DLS), Harwell, UK with Helen Saibil, Dave Stuart and Gerd Matelik

2013-2018 Expert Review Group member for Wellcome Trust

Since 2014	Head of CryoEM facility at CSSB, Hamburg; Coordinator and lead applicant in successful DFG 91b application for equipping facility with 5 high-end EMs
Since 2017	Advisory Board for Astbury Centre Leeds (UK)
Since 2018	Advisory Board for Scottish Centre for Macromolecular Imaging, Glasgow (UK)
since 2018	Associated PI, DFG Cluster of Excellence 'Advanced Imaging of Matter: Structure, Dynamics and Control on the Atomic Scale', Universität Hamburg
since 2018	Executive Board Member, Leader of Topic D, DFG Cluster of Excellence 'Resolving Infection Susceptibility (RESIST)', Hannover Medical School
2018	Coordinator and lead applicant of Leibniz ScienceCampus (LSC) InterACt - Integrative analysis of pathogen-induced compartments

Awards and Prizes

2003	Norman P. Salzmann Award in Virology, NIH, USA
2004-2009	Emmy-Noether Award of the German Science Foundation (DFG)
2006	Young Academics Award of 'Fonds der Chemischen Industrie'
2010 & 2015	Wellcome Trust Senior Research Fellow

10 Selected Publications (of 74 original publications)

1. **Moser, F., Pražák, V., Mordhorst, V., Andrade, D.M., Baker, L.A., Hagen, C., Grünewald, K., Kaufmann, R.** (2019) Cryo-SOFI enabling low-dose super-resolution correlative light and electron cryo-microscopy. PNAS (in press).
2. **Chorev, DS, Baker LA, Wu D, Beilsten-Edmands V, Rouse SL, Zeev-Ben-Mordehai T, Jiko C, Samsudin F, Gerle C, Khalid S, Stewart AG, Matthews SJ, Grünewald K, Robinson** CV (2018) Protein assemblies ejected directly from native membranes yield complexes for mass spectrometry. Science 362: 829–834.
3. **Baker LA, Sinnige T, Schellenberger P, de Keyzer J, Siebert CA, Driessen AJM, Baldus M, Grünewald K (2018)** Combined 1H-Detected Solid-State NMR Spectroscopy and Electron Cryotomography to Study Membrane Proteins across Resolutions in Native Environments. Structure 26(1): 161-170.
4. **Clare DK, Siebert CA, Hecksel C, Hagen C, Mordhorst, V, Grange M. Ashton AW, Walsh MA, Grünewald K, Saibil HR, Stuart DI, Zhang** P (2017) Electron Bio-Imaging Centre (eBIC): the UK national research facility for biological electron microscopy. Acta Cryst. D73, 488–95.
5. **Stoeber M, Schellenberger P, Siebert CA, Leyrat C, Helenius A, Grünewald K (2016)** Model for the architecture of caveolae based on a flexible, net-like assembly of Cavin1 and Caveolin discs. PNAS 113(50): E8069-E8078.
6. **Grange M, Vasishtan D, Grünewald K (2016)** Cellular electron cryo tomography and in situ sub-volume averaging reveal the context of microtubule-based processes. J. Struct. Biol. S1047-8477(16) 30139-3.
7. **Zeev-Ben-Mordehai T, Vasishtan D, Hernández Durán A, Vollmer B, White P, Prasad Pandurangan A, Siebert CA Topf M, Grünewald K (2016)** Two distinct trimeric conformations of natively membrane-anchored full-length Herpes simplex virus 1 glycoprotein B. PNAS 113, 4176-81.
8. **Hagen C, Dent KC, Zeev-Ben-Mordehai T, Grange M, Bosse JB, Whittle C, Klupp BG, Siebert CA, Vasishtan D, Bäuerlein FJB, Cheleski J, Werner S, Guttmann P, Rehbein S, Henzler K, Demmerle J, Adler B, Koszinowski U, Schermelleh L, Schneider G, Enquist LW, Plitzko JM, Mettenleiter TC, Grünewald K (2015)** Structural Basis of Vesicle Formation at the Inner Nuclear Membrane. Cell 163, 1692–1701.

9. **Kaufmann R, Schellenberger P, Seiradake E, Dobbie IM, Jones EY, Davis I, Hagen C, Grünewald K (2014)** Super-Resolution Microscopy Using Standard Fluorescent Proteins in Intact Cells under Cryo-Conditions. Nano Letters 4, 4171-4175.
10. **Zeev-Ben-Mordehai T, Vasishtan D, Siebert A, Grünewald K (2014)** The full-length cell-cell fusogen EFF-1 is monomeric and upright to the membrane. Nature Comm. 5: 3912.

Research Interest in RESIST

Our research focus in RESIST is the structural characterisation of stages in the herpesvirus assembly pathway. For this, we use cellular electron cryo microscopy and tomography guided by advanced light microscopy techniques. Studying processes directly inside the infected cell will significantly advance the field as the current understanding of early steps was mainly derived from *in vitro* studies of isolated particles or bulk assays. Capturing metastable assembly intermediates will allow for novel mechanistic insights. Together with other researchers in RESIST the long-term aim is to contribute to new interventions for herpesviral diseases and improving the options for combination therapies that utilize drugs acting at different stages of the viral life cycle. We will bring in our unique expertise in the area of integrative structural cell biology of herpesvirus – host cell interactions in particular for alphaherpesviruses like Herpes simplex virus 1. Within RESIST we will collaborate with the groups of Martin Messerle, Thomas Krey, Beate Sodeik and Thomas Schulz combining our structural studies with their biochemical, cell biological and crystallographic expertise allowing us moreover to comparatively include also relevant human pathogens from the beta- and gammaherpesvirsues. Furthermore, we will bring to RESIST a strong the link to the outstanding research infrastructures at the Centre for Structural Systems Biology (CSSB) Hamburg.

Forschungsinteresse in RESIST

Unser Forschungsschwerpunkt bei RESIST ist die strukturelle Charakterisierung des Prozesses der Assemblierung von Herpesviren. Dazu verwenden wir primär die zelluläre Kryo-Elektronen-Mikroskopie und -Tomographie im Zusammenspiel mit ausgebauten lichtmikroskopischen Techniken. Die Untersuchung von Prozessen direkt in der infizierten Zelle erlaubt eine neue Qualität der Einblicke. Das aktuelle Verständnis der frühen Schritte der Herpesvirus-Assemeblierung stammt hauptsächlich aus /in vitro/ Studien an isolierten Partikeln oder Analysen gemischter Populationen. Die mittels unseres Forschungsansatzes mögliche Erfassung einzelner metastabiler Zwischenzustände und Strukturen im zellulären Kontext erlaubt ganz neue mechanistische Erkenntnisse. Zusammen mit anderen RESIST-Forschern ist es das langfristige Ziel, zu neuen Interventionen gegen herpesvirale Erkrankungen beizutragen und die Möglichkeiten für Kombinationstherapien zu verbessern. Letztere nutzen Medikamente, die an verschiedenen Stadien im viralen Lebenszyklus angreifen. Wir werden dazu unsere einzigartige Expertise auf dem Gebiet der integrativen strukturellen Zellbiologie von Herpesvirus - Wirtszellinteraktionen insbesondere für Alphaherpesviren wie Herpes simplex virus 1 einbringen. Im Rahmen von RESIST arbeiten wir mit den Gruppen von Martin Messerle, Thomas Krey, Beate Sodeik und Thomas Schulz zusammen, die unsere strukturbiologischen Studien mit ihrer biochemischen, zellbiologischen und kristallographischen Expertise ergänzen. Gemeinsam werden wir auch relevante menschliche Krankheitserreger aus dem beta- und gamma-Herpesviren vergleichend einbeziehen. Darüber hinaus wird unsere Gruppe in RESIST eine starke Verbindung zu den herausragenden Forschungsinfrastrukturen des Zentrums für Strukturystembiologie (CSSB) in Hamburg herstellen.