CURRICULUM VITAE ET STUDIORUM

Surname	*Name*	*Organization and Current Position*
SWUEC	Paolo	Human Technopole Head of Cryo-EM Core Facility

Research and Professional experience

Jul 2020 – present **Head of Cryo-Electron Microscopy Core Facility**
Human Technopole (Italy)

Feb 2017 - Jun 2020 **Cryo-EM Lab Facility Manager**
Dept. of BioSciences, University of Milan; "Romeo ed Erica Invernizzi" Paediatric Research Centre, Milan (Italy)

Apr 2018 - Jun 2020 **Research Assistant (Ricercatore Tempo Determinato di tipo A)**
Dept. of BioSciences, University of Milan; "Romeo ed Erica Invernizzi" Paediatric Research Centre, Milan (Italy)

Feb 2017 - Mar 2018 **Postdoctoral Research Fellow**
Dept. of BioSciences, University of Milan; "Romeo ed Erica Invernizzi" Paediatric Research Centre, Milan (Italy)

Education and training

2012 - 2016 **Ph.D. in Structural Biology (**date awarded: 28th December 2016**)**
The Francis Crick Institute (London Research Institute) - University College London
London (UK)
Research activity: I combined single-particle electron microscopy and biochemistry to dissect the function and mechanism of macromolecular machines involved in DNA repair and genome stability. Supervised by: Dr. Alessandro Costa

2015 **Visiting Scientist at Genome Stability Unit**
St. Vincent's Institute of Medical Research, Melbourne (Australia)
Research activity: Preparation of baculoviral vectors for the recombinant production and purification of Fanconi anemia core complex proteins. Supervised by: Dr. Andrew Deans

2013 **"Communicating your Research" Workshop by Science Connect**
Science communication and media skills training covering: key principles of effective communication, technical writing, how to give effective scientific talks and poster presentations, how to explain science to non-specialists, and how to use blogs and social media to share their research with non-specialists.

2011 – 2012 **Research Studentship**
Crystallography and Inorganic Applied Chemistry School, University of Parma (Italy)
Research activity: Optimisation of crystalline and molecular forms of drugs, pesticides and biologically active compounds. Supervised by: Dr. Alessia Bacchi

2006 – 2011 **M.Sc. in Pharmaceutical Chemistry and Technology**
University of Padua (Italy)
Final mark: 110/110 *summa cum laude*

2011 **Erasmus Studentship**
Pharmaceutical Biophysics, King's College of London, London (UK)
Research activity: Prediction of inhibitory activities of Hsp90 inhibitors, a computational approach. Supervised by: Dr. David Barlow

Scientific Publications (peer-reviewed)

* authors equally contributed; ^ co-corresponding authors;

1. Jaciuk M*, **Swuec P ***, Gaur V *, Kasprzak J, Renault L, Dobrychłop M, Bujnicki J, Costa A, Nowotny M. "A combined structural and biochemical approach reveals translocation and stalling of UvrB on the DNA lesion as a mechanism of damage verification in bacterial nucleotide excision repair", DNA Repair (2020), doi: 10.1016/j.dnarep.2019.102746

2. Fuchsbauer O.*, **Swuec P.***, Zimberger C., Amigues B., Levesque S., Agudelo D., Duringer A., Chaves-Sanjuan A., Spinelli S., Rousseau GM, Bolognesi M., Roussel A., Cambillau C., Moineau S., Doyon Y., Goulet A. "Cas9 Allosteric Inhibition by the Anti-CRISPR Protein AcrIIA6", *Molecular Cell* (2019) doi: 10.1016/j.molcel.2019.09.012.

3. **Swuec P.^**, Chaves-Sanjuan A., Camilloni C., Vanoni M.A., Bolognesi M.^ "Cryo-EM Structures of Azospirillum brasilense Glutamate Synthase in Its Oligomeric Assemblies", *Journal of Molecular Biology* (2019) doi: 10.1016/j.jmb.2019.08.011.

4. Elia CA, Tamborini M, Rasile M, Desiato G, Marchetti S, **Swuec P**, Mazzitelli S, Clemente F, Anselmo A, Matteoli M, Malosio ML, Coco S. "Intracerebral Injection of Extracellular Vesicles from Mesenchymal Stem Cells Exerts Reduced Aβ Plaque Burden in Early Stages of a Preclinical Model of Alzheimer's Disease", *Cells* (2019) doi: 10.3390/cells8091059.

5. **Swuec, P.**, Lavatelli, F., Tasaki, M., Paissoni, C., Rognoni, P., Maritan, M., Brambilla, F., Milani, P., Mauri, P., Camilloni, C., Palladini, G., Merlini, G., Ricagno, S. & Bolognesi, M. "Cryo-EM structure of cardiac amyloid fibrils from an immunoglobulin light chain AL amyloidosis patient", *Nature Communications* (2019) doi: 10.1038/s41467-019-09133-w.

6. Eichwald, C., De Lorenzo, G., Schraner, E. M., Papa, G., Bollati, M., **Swuec, P.**, De Rosa, M., Milani, M., Mastrangelo, E., Ackermann, M., Burrone, O. R. & Arnoldi, F. "Identification of a Small Molecule That Compromises the Structural Integrity of Viroplasms and Rotavirus Double-Layered Particles", *Journal of Virology* (2018) doi: 10.1128/JVI.01943-17

7. **Swuec, P.**, Renault, L., Borg, A., Shah, F., Murphy, V. J., Van Twest, S., Snijders, A. P., Deans, A. J. & Costa, A. "The FA Core Complex Contains a Homo-dimeric Catalytic Module for the Symmetric Mono-ubiquitination of FANCI-FANCD2", *Cell Reports* (2017) doi: 10.1016/j.celrep.2016.11.013

8. Van Twest, S., Murphy, V. J., Hodson, C., Tan, W., **Swuec, P.**, O'rourke, J. J., Heierhorst, J., Crismani, W. & Deans, A. "Mechanism of Ubiquitination and Deubiquitination in the Fanconi Anemia Pathway", *Molecular Cell* (2017) doi: 10.1016/j.molcel.2016.11.005

9. Ballandras-Colas, A., Maskell, D. P., Serrao, E., Locke, J., **Swuec, P.**, Jonsson, S. R., Kotecha, A., Cook, N. J., Pye, V. E., Taylor, I. A., Andresdottir, V., Engelman, A. N., Costa, A. & Cherepanov, P. "A supramolecular assembly mediates lentiviral DNA integration", *Science* (2017) doi: 10.1126/science.aah7002

10. **Swuec, P.** & Costa, A. "DNA replication and inter-strand crosslink repair: Symmetric activation of dimeric nanomachines?", *Biophys Chem,* (2017) doi: 10.1016/j.bpc.2016.11.001

11. Pike A.C.*, Gomathinayagam* S., **Swuec P. ***, Berti, M., Zhang, Y., Schnecke, C., Marino, F., Von Delft, F., Renault, L., Costa, A., Gileadi, O. & Vindigni, A. "Human RECQ1 helicase-driven DNA unwinding, annealing, and branch migration: insights from DNA complex structures", *Proc Natl Acad Sci USA* (2015) doi: 10.1073/pnas.1417594112

12. **Swuec, P.** & Costa, A. "Molecular mechanism of double Holliday junction dissolution", *Cell Biosci* (2014) doi: 10.1186/2045-3701-4-36

13. Costa, A., Renault, L., **Swuec, P.**, Petojevic, T., Pesavento, J. J., Ilves, I., Maclellan-Gibson, K., Fleck, R. A., Botchan, M. R. & Berger, J. M. "DNA binding polarity, dimerization, and ATPase ring remodeling in the CMG helicase of the eukaryotic replisome", *Elife* (2014) doi: 10.7554/eLife.03273

14. Coulthard, R., Deans, A. J., **Swuec, P.**, Bowles, M., Costa, A., West, S. C. & Mcdonald, N. Q. "Architecture and DNA recognition elements of the Fanconi anemia FANCM-FAAP24 complex", *Structure* (2013) doi: 10.1016/j.str.2013.07.006

15. **Swuec, P.** & Barlow, D. J. "Prediction of inhibitory activities of Hsp90 inhibitors", *Bioorg Med Chem* (2012) doi: 10.1016/j.bmc.2011.10.069

Other Scientific Publications

* authors equally contributed;

- D'Arrigo G, Gabrielli M, Scaroni M, **Swuec P**, Amin L, Cojoc D, Legname G, Verderio C. "Astrocytes-Derived Extracellular Vesicles In Motion At The Neuron Surface: Involvement Of The Prion Protein" (*manuscript submitted to Nat Comm; under review*)

- Saponaro A*, **Swuec P ***, Giese H*, Porro A, Gasparri F, Sharifzadeh AS, Chaves-Sanjuan A, Their G, Mancia F, Bolognesi M, Santoro B, Moroni A. "Cryo-EM structures of HCN4 reveal conformational transitions in cardiac and neuronal pacemaker channels" (*manuscript under review at Nature*)

- Grinzato A, Swuec P, Albanese P, Marotta R, Saracco G, Zanotti G, Bolognesi M, Pagliano C. "High-light vs. low-light: effects on paired Photosystem II supercomplex structural arrangement" (*manuscript in review at EMBO J*)

Other Publications

- Swuec, P., Bolognesi, M., Santo, N., 2018, “Crio-microscopia elettronica di bio-macromolecole. Il Nobel per la chimica 2017”,La Chimica e l’industria - ISSN 2283-544X
- Bolognesi, M., Musco, G. e Swuec P. 2019, “Capitolo 23 - Biologia Strutturale” in “Metodologie biochimiche e biomolecolari - Strumenti e tecniche per il laboratorio del nuovo millennio” 2019, Zanichelli Ed. - ISBN: 9788808520555
- Video interview and blog post for Thermo Fisher Scientific: “Getting to Know Paolo Swuec of the University of Milan” (link: https://tinyurl.com/y4hu6rtk)

Electron Microscopy Data Bank Depositions

- **EMD-4904:** Cryo-EM structure of St1Cas9-sgRNA-AcrIIA6-tDNA59-ntPAM complex (Swuec P). Method: single-particle cryo-EM. Resolution: 3.2 Å. Atomic model PDB: 6rjg.
- **EMD-4902:** Cryo-EM structure of St1Cas9-sgRNA-tDNA59-ntPAM complex (Swuec P). Method: single-particle cryo-EM. Resolution: 3.3 Å. Atomic model PDB: 6rjd.
- **EMD-4901:** Cryo-EM structure of St1Cas9-sgRNA-tDNA20-AcrIIA6 dimeric assembly (Swuec P). Method: single-particle cryo-EM. Resolution: 3 Å. Atomic model PDB: 6rja.
- **EMD-4900:** Cryo-EM structure of St1Cas9-sgRNA-tDNA20-AcrIIA6 monomeric assembly (Swuec P). Method: single-particle cryo-EM. Resolution: 3.2 Å. Atomic model PDB: 6rj9.
- **EMD-4958:** Negative stain EM 3D reconstruction of the UvrA-UvrB-DNA complex (Swuec P, Renault L, Costa A). Method: single-particle neg. stain EM. Resolution: 25 Å.
- **EMD-4139:** Cryo-EM reconstruction of the maedi-visna virus (MVV) strand transfer complex (Pye VE, Ballandras-Colas A, Maskell D, Locke J, Kotecha A, Costa A, Cherepanov P). Method: single-particle cryo-EM. Resolution: 8.2 Å. Atomic model PDB: 5m0r.
- **EMD-4138:** Cryo-EM reconstruction of the maedi-visna virus (MVV) intasome (Ballandras-Colas A, Maskell D, Pye VE, Locke J, Swuec S, Kotecha A, Costa A, Cherepanov P). Method: single-particle cryo-EM. Resolution: 4.94 Å. Atomic model PDB: 5m0q.
- **EMD-3476:** Structure of FANCI-FANCD2 hetero-dimer co-expressed with FANCC-FANCE-FANCF proteins (Swuec P, Costa A). Method: single-particle neg. stain EM. Resolution: 18.3 Å.
- **EMD-2772:** CMG helicase bound to DNA and ATPgS (Costa A, Renault L, Swuec P, Petojevic T, Pesavento JJ, Ilves I, MacLellan-Gibson K, Fleck RA, Botchan MR, Berger JM). Method: single-particle neg. stain EM. Resolution: 17.8 Å.
- **EMD-10108:** Structure of *Azospirillum brasilense* Glutamate Synthase in a6b6 oligomeric state (Swuec P). Method: single-particle cryo-EM. Resolution: 3.5 Å. Atomic model PDB: 6s6x.
- **EMD-10106:** Structure of *Azospirillum brasilense* Glutamate Synthase in a6b4 oligomeric state (Swuec P). Method: single-particle cryo-EM. Resolution: 3.5 Å. Atomic model PDB: 6s6u.
- **EMD-10105:** Structure of *Azospirillum brasilense* Glutamate Synthase in a4b3 oligomeric state (Swuec P). Method: single-particle cryo-EM. Resolution: 4.1 Å. Atomic model PDB: 6s6t.
- **EMD-10104:** Structure of *Azospirillum brasilense* Glutamate Synthase in a4b4 oligomeric state (Swuec P). Method: single-particle cryo-EM. Resolution: 3.9 Å. Atomic model PDB: 6s6s.
- **EMD-0274:** Cryo-EM structure of cardiac amyloid fibrils from an immunoglobulin light chain (AL) amyloidosis patient (Swuec P). Method: helical reconstruction cryo-EM. Resolution: 4 Å. Atomic model PDB: 6hud.

Technical and Software skills

- **Electron microscopy sample preparation:** carbon evaporation and coating, negative stain EM (uranyl acetate, uranyl formate, Nano-W), manual and automated cryo-EM grid plunge freezing (FEI Vitrobot Mark III and IV, Gatan CP3), sample stabilization by GraFix (ultracentrifugation in glycerol and glutaraldehyde gradient), EM grid functionalization with streptavidin 2D-crystals, Immunolabelling.
- **Electron microscopy data collection**: FEI TALOS Arctica equipped with Falcon 3EC DED and Volta Phase Plate; FEI Tecnai Spirit Bio-Twin; FEI Tecnai Twin; FEI Tecnai F20; FEI Tecnai F30; JEOL JEM-2100.
- **Protein Expression and Purification:** SDS-PAGE, western blotting, bioinformatics-based construct design, high-throughput cloning techniques (Gateway, In-Fusion, LIC, traditional), bacterial protein expression, baculovirus protein expression, AKTA HLPC Systems (Pure, Ettan, Micro), chromatographic methods (IMAC/SEC/IEX), affinity tag purification (FLAG, StrepII, MBP, SUMO).
- **Protein-Protein\Protein-DNA Interactions:** Multi-Angle Light Scattering, Fluorescence Polarization, Octet Red 96, ITC, MST, Yeast-2-Hybrid, Peptide Array.
- **Electron microscopy imaging and analyses software:** EPU, TIA, Digital Micrograph, RELION (1.2-3.0), EMAN (1.9/2.0/2.1), CryoSPARC, IMAGIC, Tigris, IMOD, Xmipp, SPARX, SIMPLE.

- **Others**: Scaffold 4, Serial Cloner, SeqMan Pro, SeqBuilder, PyMOL, UCSF Chimera and ChimeraX, ImageJ, Windows, Linux, OS X, Microsoft Office, Adobe Illustrator, Adobe Photoshop, Adobe Lightroom, EndNote, Papers.

Congress and Oral Communications

- Organizer and tutor at Lake Como School of Advanced Studies "Unravelling The Complexity Of Biological Systems By Transmission Electron Microscopy", Como (Italy) – (20-24/04/19)
- Poster presentation and chair of Cryo-EM Symposium at "Societa' Italiana di Biochimica e Biologia Molecolare (SIB) 60th National Congress" – Lecce (Italy) – (17-20/09/19)
- Invited speaker at Institute for Research in Biomedicine, Università della Svizzera Italiana, Seminar title: "Architecture of macromolecular machines revealed by single-particle EM" – (25/05/19)
- Organizer and Speaker at "PhD Program in Experimental Medicine: Basic and advanced techniques for electron microscopy application in biological and preclinical research" - Dept. BIOMETRA - Università degli Studi di Milano (Italy) – (15-16/04/19)
- Tutor at "Joint PhD course: Integrated structural biology" - Università degli Studi di Milano and Istituto Europeo di Oncologia (Italy) – (8-10/04/19)
- Organizer, tutor and speaker at "2nd Workshop on Single Particle Electron Microscopy: from Theory to Practice" - Università degli Studi di Milano (Italy) – (27/02/2019 – 01/03/19)
- Organizing committee member and poster presentation at "Dept. BioSciences Excellence Program Kick-off Meeting 2019" - Università degli Studi di Milano (Italy) – (17-18/01/19)
- Invited speaker at Dept. Biology, Seminar title: "A primer to High Resolution Cryo-Electron Microscopy" - University of Padova (Italy) – (28/11/18)
- Invited speaker at Ph.D. meeting 2018 at Villa Breme Forno - Universita' Degli Studi Di Milano-Bicocca (Italy) – (2-4/10/18)
- Principal organizer, tutor and speaker at "1st Workshop on Single Particle Electron Microscopy: from Theory to Practice" - Università degli Studi di Milano (Italy) – (12-14/09/18)
- Invited speaker at Dep. of Physics, University of Genova, Seminar title: "A primer to High-resolution Cryo-Electron Microscopy" - Università degli Studi di Genova (Italy) – (31/10/17)
- Invited speaker at Workshop "Experimental methods applied to biological systems. Biology and Physics working together" - Università degli Studi di Milano (Italy) – (12-14/09/17)
- Invited speaker and tutor at "AIC International School 2017 – Bridging the gap between Cryo-EM and Crystallography" - Pavia (Italy) – (3-7/09/17)
- Invited speaker at "3º Riunione dei Giovani Biochimici dell'Area milanese" - Gargnano (BS - Italy) –(25-27/06/17)
- Invited speaker at "Riunione Nazionale "A. Castellani" dei Dottorandi di Ricerca in Discipline Biochimiche" - Brallo di Pregola (PV - Italy) – (08/06/17)
- Invited speaker at "Cryo-Electron Microscopy Lab opening ceremony" - Milano (Italy) – (05/06/17)
- Invited speaker, Seminar title: "The architecture and dynamics of macromolecular machines revealed by single-particle electron microscopy" - Università degli Studi di Milano (Italy) – (21/10/16)
- Selected speaker at ICGEB conference "At the Intersection of DNA Replication and Genome Maintenance: from Mechanisms to Therapy" - Trieste (Italy) – (26/06/16 – 01/07/16)
- Poster presentation at "11th National Cancer Research Institute (NCRI) Conference" - Liverpool (UK) – (1-5/11/15)
- Poster presentation at "Insubria International Summer School (IISS) Crystallography in Health and Biosciences" - Università dell'Insubria, Como (Italy) – (18-25/06/12)
- Selected Speaker at "5th Crystal Forms@BO PolyCrystalline Workshop" - Bologna (Italy) – (19-21/01/12)

Outreach and Science Communication

- Science communicator at European Research Night "Notte europea dei ricercatori", Project: "Health League", MeetMeTonight 2017 – Milano (Italy)
- Science communicator at "Il giardino della scienza - weekend di apertura straordinaria dell'Orto Botanico Città Studi", F.A.I. - Milano (Italy)
- Science communicator at European Research Night "Notte europea dei ricercatori", Project: "La Health League ad Atlantide: immersi tra scienza e divertimento", MeetMeTonight 2018 – Milano (Italy)
- Science communicator at European Research Night "Notte europea dei ricercatori", Project: "La Health League e il mondo dei replicanti", MeetMeTonight 2019 – Milano (Italy)

Career breaks

No career breaks to declare

Le dichiarazioni rese nel presente curriculum sono da ritenersi rilasciate ai sensi degli artt. 46 e 47 del DPR n. 445/2000.

Il presente curriculum, non contiene dati sensibili e dati giudiziari di cui all'art. 4, comma 1, lettere d) ed e) del D.Lgs. 30.6.2003 n. 196.

FIRMA

Vistato da PAOLA MOSCATELLI
il 22/06/2023 alle 18:11:38
CEST

Approvato da ALESSANDRA POGGIANI

il 23/06/2023 alle 13:22:40 CEST