

Benjamin Towbin, PhD

Curriculum Vitae

Assistant Professor
Institute of Cell Biology
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Date of birth: 7 September 1982
Married, 2 children (dual career family)
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I am an Assistant Professor with an interdisciplinary background in quantitative Systems Biology, Developmental Biology, and Genetics. I strive to break new ground at disciplinary interfaces and motivate students to think across classical disciplinary boundaries.

Current position

Nov 2024 - **Assistant Professor with tenure track**
Institute of Cell Biology, University of Bern, Organismal Systems Biology Lab

Nov 2019-
Okt 2024 **SNSF Eccellenza Assistant Professor**
Institute of Cell Biology, University of Bern, Organismal Systems Biology Lab

Employment history

Sept 2016-
July 2019 **Senior postdoctoral researcher** (independently funded by MSCA, Engelhorn)
Friedrich Miescher Institute for Biomedical Research, Basel (CH)
Host laboratory: Dr. Helge Großhans

Mar 2013-
Aug 2016 **Postdoctoral researcher** (independently funded by HFSP, SNSF)
Weizmann Institute of Science, Rehovot (IL)
Advisor: Prof. Dr. Uri Alon
most important output: Towbin et al., [Nature Communications](https://doi.org/10.1038/s41467-017-00000-0), 2017

Education

Dec 2007-
Jul 2012 **PhD thesis in Genetics** (*summa cum laude, best thesis award at Univ. of Basel and FMI*)
Friedrich Miescher Institute for Biomedical Research, Basel (CH)
Thesis title: "Dynamics of subnuclear chromatin organization during *C. elegans* development: a role for H3K9 methylation"
most important output: Towbin et al., [Cell](https://doi.org/10.1016/j.cell.2012.03.012), 2012
Advisor: Prof. Dr. Susan Gasser, Date of PhD defense: March 14, 2012

Sep 2005-
Nov 2007 **MSc in Biomedical Sciences** (*with distinction*)
University of Utrecht (NL)
Advisors: Prof. Dr. Ronald Plasterk, Prof. Dr. Susan Gasser

Sep 2002-
Aug 2005 **BSc in Molecular Biology**
University of Basel (CH)

Career breaks

Paternity leave (dual career family), two children
Aug 2012-Mar 2013 (7 months, 25% employment) and Nov 2014 - Jan 2015 (3 months)

Extramural funding as principal investigator

Dec 2024- **Molecular Mechanism of a Life-History Tradeoff between Growth and Survival** 562'500 CHF
SNSF Lead Agency collaboration grant (with Prof. R. Baugh, Duke, US)

Oct 2023- **Mechanisms of spatio-temporal growth coordination in *C. elegans*** 1'092'669 CHF
SNSF Project grant

Nov 2019-
Oct 2024 **Design principles in the environmental control of growth and aging** 1'822'960 CHF
SNSF Eccellenza Professorial Fellowship

Jan 2022- Jun 2023	Deciphering stress-induced ribophagy in <i>C. elegans</i> to improve cytotoxic chemotherapy in cancer UniBE ID grant in collaboration with Dr. M. Tschan (Institute of Pathology, Bern)	108'819 CHF	pi
July 2021	Mechanisms of Organ Growth Coordination of <i>C. elegans</i> Burggemeinde Bern	5'000 CHF	
April 2020	Coordination of organ growth and size during organismal development Novartis Foundation for medical-biological Research	60'000 CHF	
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		3'651'948 CHF	

Fellowships by junior investigators under my guidance

2023	ThinkSwiss research scholarship to Souvik Mandal	10'500 CHF
2022	SNSF Postdoctoral Fellowship to Peter Lenart	261'812 CHF
2021	ThinkSwiss research scholarship to Aaditya Saxena	4'800 CHF
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		277'112 CHF

Independent funding as a postdoctoral researcher

2017	<i>Marie Skłodowska-Curie</i> Individual Fellowship, 2 years	191'078 CHF
2017	<i>Engelhorn-Traudl foundation</i> postdoctoral-fellowship, 2 year	158'246 CHF
2016	<i>Swiss friends of the Weizmann Institute</i> fellowship, 5 months	16,000 CHF
2015	<i>Weizmann Institute Azrieli project grant</i> (with 2 collaborators)	9'000 CHF
2013	<i>HFSP</i> long-term fellowship, 3 years	178'430 CHF
2013	<i>SNSF</i> PostDoc mobility fellowship (used 10 out of 18 months)	46'097 CHF
2013	<i>EMBO</i> and <i>FEBS</i> long-term fellowships	gratefully declined
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		598'851 CHF

Prizes, awards

2023	Membership EMBO Young Investigator Programme
2014	Award for best thesis at the Faculty of Natural Sciences, University of Basel
2013	Ed Fisher Prize for best PhD thesis at the Friedrich Miescher Institute

Teaching activities

yearly since 2024	Developmental Biology (1517), University of Bern	1.5 ECT 7wks; 2h / wk 80 students
yearly since 2021	Systems Biology (473205), University of Bern and Fribourg MSc/PhD level new course created in 2021 course website: https://www.towbinlab.org/systems-biology-hs21	3 ECTS 14wks; 2h / wk 20 students my contribution: 8 wks: as teacher 6 wks: coordinator
yearly since 2021	Bioinformatics (8289), University of Bern BSc, 3rd year new online learning module for modelling in biology created in 2021	3 ECTS 9 wks 1h/wk + tutorial 50 students my contribution: 1 wk
yearly since 2019	Cellular and Genetic Networks (11470) University of Bern and Fribourg MSc/PhD level, biology	3 ECTS 14wks; 2h / wk 20 students my contribution: 1 wk
2022	Aktuelle Themen Biologie I (471676), University of Bern BSc 1st year	0.5 ECTS 14 wks, 1h/wk 100 students my contribution:

		1 wk
yearly since 2019	Methods in microscopy with lab course (25455) University of Bern BSc, 3rd year and MSc	3 ECTS my contribution: 3h course 3 students/year
yearly since 2019	Semesterarbeit Biologie (100203) University of Bern BSc 1st year, biology	4 ECTS my contribution: 2-4 students/year 3h per student
2021	Scientific Presentation Workshop ICB, University of Bern	½ day 20 students
2008-2009	Teaching assistant biology tutorial University of Basel	6 wks, 2h/wk 10 students
2003- 2004	Teaching assistant introduction to programming University of Basel	14 weeks, 2h/wk 20 students

Supervision of junior researchers

Postdoctoral researcher: Peter Lenart (starting April 2022)

PhD students: Joel Tuomaala (since Feb 2020), Sigma Pradhan (since Jan 2021), Ioana Gheorghe (since Mar 2022), Sacha Psalmon (since 2023)

MSc students: Franziska Schmid (Feb 2020 – Jan 2021), Ioana Gheorghe (2021), Julie Perey (2022), Garima Yadav (2022), Sacha Psalmon (2022) Erasums/SEMP student from Polytech Nice Sophia, Urs Nösberger (2023), Noelia Gerber (2023), Boris Gusev (2023), Santiago Marin (2024)

Undergraduate students: Stefano von Wyttenbach (Feb 2020 – May 2020), Julie Perey (2021), Aaditya Saxena (2020 & 2021), ThinkSwiss fellow from IIT Kharagpur, Urs Nösberger (2022), Noelia Gerber (2022), Delia Bogenstätter (2024), Silvan Pauls (2024), Adriel Yasmin (2024), Souvik Mandal (2024), ThinkSwiss fellow from IISc Bangalore

PhD Thesis examination committees

External referee: Jana Kracmarova (FMI Basel, ongoing), Sayanur Rahaman (Biozentrum Basel, ongoing), Stefan Lia (University of Fribourg, defended 2020), Pablo Yubero (2023, Madrid)

Mentor of PhD students at University of Bern graduate school (GCB): Christian Urzi (Bern, ongoing), Ekaterina Shvetsova (Bern, ongoing), Valentina Pecoraro (Bern, ongoing)

Co-guidance prior to Professorship: Adriana Gonzales (FMI Basel, Mar 2012 - Feb 2013), Peter Zeller (FMI Basel, Mar 2012 - Feb 2013)

Publications in peer-reviewed journal

total citation count: 2625, publication count: 25, h-index:16 (source: google.scholar on 27/9/2024)

link to google.scholar, ResearchID: C-8545-2018

three most relevant publications (chronological order)

1. K. Stojanovski, I. Gheorghe, P. Lenart, A. Lanjuin, W. B. Mair, and B. D. Towbin, ‘Maintenance of appropriate size scaling of the *C. elegans* pharynx by YAP-1.’, *Nature Communications*, vol. 14, no. 1, p. 7564, Nov. 2023, doi: 10.1038/s41467-023-43230-1.
2. K. Stojanovski, H. Großhans, and B. D. Towbin, ‘Coupling of growth rate and developmental tempo reduces body size heterogeneity in *C. elegans*’, *Nature Communications*, vol. 13, no. 1, Art. no. 1, Jun. 2022, doi: 10.1038/s41467-022-29720-8.

3. B. D. Towbin, Y. Korem, A. Bren, S. Doron, R. Sorek, and U. Alon, 'Optimality and sub-optimality in a bacterial growth law', *Nature Communications*, vol. 8, p. 14123, online 2017, doi: 10.1038/ncomms14123.

Other publications (chronological order)

4. N. Al-Refai, F. Padovani, J. Hornung, L. Pudelko, F. Binando, A. Del Carmen Fabregat, Q. Zhao, B. D. Towbin, E. S. Cenik, N. Stroustrup, J. Padeken, K. M. Schmoller, and D. S. Cabianca, 'Fasting shapes chromatin architecture through an mTOR/RNA Pol I axis', *Nature Cell Biology*, vol. 26, no. 9, 2024, doi: 10.1038/s41556-024-01512-w.Fasting shapes chromatin architecture through an mTOR/RNA Pol I axis.
5. S. Nahar *et al.*, 'Dynamics of miRNA accumulation during *C. elegans* larval development.', *Nucleic Acids Res*, p. gkae115, Feb. 2024, doi: 10.1093/nar/gkae115.
6. M. Wehrens, L. H. J. Krah, B. D. Towbin, R. Hermsen, and S. J. Tans, 'The interplay between metabolic stochasticity and cAMP-CRP regulation in single *E. coli* cells.', *Cell Rep*, vol. 42, no. 10, p. 113284, Oct. 2023, doi: 10.1016/j.celrep.2023.113284.
7. H. J. Smith *et al.*, 'Neuronal mTORC1 inhibition promotes longevity without suppressing anabolic growth and reproduction in *C. elegans*', *PLOS Genetics*, vol. 19, no. 9, p. e1010938, Sep. 2023, doi: 10.1371/journal.pgen.1010938.
8. D. Maushe *et al.*, 'Stress tolerance in entomopathogenic nematodes: Engineering superior nematodes for precision agriculture.', *J Invertebr Pathol*, vol. 199, p. 107953, Jul. 2023, doi: 10.1016/j.jip.2023.107953.
9. J. Padeken *et al.*, 'Synergistic lethality between BRCA1 and H3K9me2 loss reflects satellite derepression', *Genes Dev.*, vol. 33, no. 7–8, pp. 436–451, Jan. 2019, doi: 10.1101/gad.322495.118.
10. Y. Korem Kohanim, D. Levi, G. Jona, B. D. Towbin, A. Bren, and U. Alon, 'A Bacterial Growth Law out of Steady State', *Cell Reports*, vol. 23, no. 10, pp. 2891–2900, 2018, doi: 10.1016/j.celrep.2018.05.007.
11. B. D. Towbin, Y. Korem, A. Bren, S. Doron, R. Sorek, and U. Alon, 'Optimality and sub-optimality in a bacterial growth law', *Nature Communications*, vol. 8, p. 14123, online 2017, doi: 10.1038/ncomms14123.
12. A. Bren, J. O. Park, B. D. Towbin, E. Dekel, J. D. Rabinowitz, and U. Alon, 'Glucose becomes one of the worst carbon sources for *E. coli* on poor nitrogen sources due to suboptimal levels of cAMP', *Scientific reports*, vol. 6, no. April, pp. 24834–24834, 2016, doi: 10.1038/srep24834.
13. A. Gonzalez-Sandoval *et al.*, 'Perinuclear Anchoring of H3K9-Methylated Chromatin Stabilizes Induced Cell Fate in *C. elegans* Embryos', *Cell*, vol. 163, no. 6, pp. 1333–1347, 2015, doi: 10.1016/j.cell.2015.10.066.
14. G. Aidelberg, B. D. Towbin, D. Rothschild, E. Dekel, A. Bren, and U. Alon, 'Hierarchy of non-glucose sugars in *Escherichia coli*', *BMC Systems Biology*, vol. 8, no. 1, pp. 133–133, 2014, doi: 10.1186/s12918-014-0133-z.
15. B. D. Towbin, A. Gonzalez-Sandoval, and S. M. Gasser, 'Mechanisms of heterochromatin subnuclear localization.', *Trends Biochem Sci*, vol. 38, no. 7, pp. 356–363, Jul. 2013, doi: 10.1016/j.tibs.2013.04.004.
16. A. Gonzalez-Sandoval, B. D. Towbin, and S. M. Gasser, 'The formation and sequestration of heterochromatin during development: delivered on 7 September 2012 at the 37th FEBS Congress in Sevilla, Spain.', *FEBS J*, vol. 280, no. 14, pp. 3212–3219, Jul. 2013, doi: 10.1111/febs.12319.

17. H. C. Ferreira, B. D. Towbin, T. Jegou, and S. M. Gasser, ‘The shelterin protein POT-1 anchors caenorhabditis elegans telomeres through SUN-1 at the nuclear periphery’, *Journal of Cell Biology*, vol. 203, no. 5, pp. 727–735, 2013, doi: 10.1083/jcb.201307181.
18. B. D. Towbin *et al.*, ‘Step-Wise Methylation of Histone H3K9 Positions Heterochromatin at the Nuclear Periphery’, *Cell*, vol. 150, no. 5, pp. 934–947, 2012, doi: 10.1016/j.cell.2012.06.051.
19. V. Dion, V. Kalck, C. Horigome, B. D. Towbin, and S. M. Gasser, ‘Increased mobility of double-strand breaks requires Mec1, Rad9 and the homologous recombination machinery.’, *Nat Cell Biol*, vol. 14, no. 5, pp. 502–509, Apr. 2012, doi: 10.1038/ncb2465.
20. A. Mattout *et al.*, ‘An EDMD mutation in *C. elegans* lamin blocks muscle-specific gene relocation and compromises muscle integrity.’, *Curr Biol*, vol. 21, no. 19, pp. 1603–1614, Oct. 2011, doi: 10.1016/j.cub.2011.08.030.
21. B. D. Towbin, P. Meister, B. L. Pike, and S. M. Gasser, ‘Repetitive transgenes in *C. elegans* accumulate heterochromatic marks and are sequestered at the nuclear envelope in a copy-number and lamin-dependent manner’, *Cold Spring Harbor Symposia on Quantitative Biology*, vol. 75, pp. 555–565, 2010, doi: 10.1101/sqb.2010.75.041.
22. P. Meister, B. D. Towbin, B. L. Pike, a Ponti, and S. M. Gasser, ‘The spatial dynamics of tissue-specific promoters during *C.-elegans* development’, *Genes & Development*, vol. 24, no. 8, pp. 766–782, 2010, doi: 10.1101/gad.559610.
23. B. D. Towbin, P. Meister, and S. M. Gasser, ‘The nuclear envelope--a scaffold for silencing?’, *Curr Opin Genet Dev*, vol. 19, no. 2, pp. 180–186, Apr. 2009, doi: 10.1016/j.gde.2009.01.006.

Preprints (under review)

24. J. Tuomaala, D. S. Sankar, J. Perey, S. Psalmon, N. Stroustrup, J. Dengjel, and B. D. Towbin, ‘Selective autophagy of ribosomes balances a tradeoff between starvation survival and growth resumption’, *bioRxiv*, 2024, doi: 10.1101/2024.08.28.609383.
25. P. Lenart, S. Psalmon, and B. D. Towbin, ‘Learning accelerates the evolution of slow aging but obstructs negligible senescence’, *bioRxiv*, 2023, doi: 10.1101/2023.01.24.525295.

Selected international oral presentations from last 5 years

Invited seminars

2024	Institute of Molecular Biology, Mainz, hosted by J. Padenken
2024	UniZH, Dept. of Mol. Life Science, hosted by A. Hajnal
2023	CRG Barcelona, hosted by N. Stroustrup
2022	Curie Institute, Paris (FR), hosted by W. Keil
2021	16th international course in epigenetics, Curie Institute, Paris (FR)
2021	International seminar on Cell Size and Growth, online
2020	Helmholtz Center Munich, hosted by Prof. K. Schmoller, online
2019	CNB, student invited department seminar, Madrid (ES)

Selected conference talks

2024	Invited speaker MIC research day
2023	International <i>C. elegans</i> conference, Glasgow
2022	The Company of Biologists Workshop: “Cell size and growth, from single cells to the tree of life”, Buxted Park (UK)
2021	EMBO workshop on Cell Growth and Size, online
2021	International <i>C. elegans</i> meeting, online
2019	CSHL conference on Cellular Dynamics and models, CSHL (US)
2018	EMBO workshop: Evolutionary Systems Biology, Cambridge (UK)
2018	GENiE workshop: automated measurement of aging, Barcelona (ES)
2017	GENiE workshop on <i>C. elegans</i> metabolic reconstruction, Cambridge (UK)

Institutional and societal responsibilities

Since 2024	Advisory board member Microscopy Imaging Center, University of Bern
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Since 2024	President LS2 Systems Biology
2022-2024	Vice-president LS2 Systems Biology
2024	Member of DEI working group dept. Biology, University of Bern
2021-2023	Member Equal Opportunity Commission of the Phil-Nat faculty, University of Bern
2021-2024	Deputy faculty representative of Oberer Mittelbau, Universität Bern
since 2019	Member of Graduate School Evaluation Committee, University of Bern (GCB)
since 2019	Member ICB institute steering committee

Memberships in boards and individual scientific reviewing activities

Served as reviewer: Scientific reports, BMC Biology, Frontiers in Cell and Developmental Biology, Proceedings of the Royal Society B, Nature Communications, Cell reports

Organisation of international conferences

2023/2024	Lead organizer Swiss <i>C. elegans</i> meeting
2023/2024	Lead organizer “Theory across Biology” LS2 meeting
2021 / 2023	Organizing Committee GSA International <i>C. elegans</i> Conference (GSA)
2022	LS2 conference: Systems Biology session co-chair
2021	LS2 Systems Biology Conference: session chair

Active memberships in scientific societies

since 2020	Genetic Society of America (GSA)
since 2020	Swiss Society for Aging Research
since 2018	Life Sciences Switzerland (LS ²)

Selected outreach activities from last 5 years

Since 2022	Guest lecturer in Pestalozzi school camp: “Warum wir altern”
2020	Workshop panellist for Science and Youth school project (“Wollen wir 200 Jahre alt werden?”)
2018	Guest lecturer “Numbers day”, Gymnasium am Münsterplatz, Basel
2015/2016	Presentation to federal parliament members and business delegations at Weizmann Institute
2009-2019	Workshop leader, Tage der Genforschung, FMI, Basel