

Leena Thorat, PhD

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LinkedIn: <https://www.linkedin.com/in/leena-thorat/>**PROFESSIONAL APPOINTMENTS**

Regulatory Science Policy Analyst	Environment and Climate Change Canada, Government of Canada	Starting, Sep-2021
Postdoctoral Fellow	York University, Canada	Nov-2019 to present
Principal Investigator	SPPU, India	2017 to 2019
EMBO Visiting Fellow (<i>European Molecular Biology Organization</i>)	Institut für Biologie, Freie Universität, Germany	2017
Postdoctoral Fellow	SPPU, India	2016 to 2017
DAAD Fellow (<i>German Academic Exchange Programme</i>)	Philipps-Universität, Germany	2013

ACADEMIC TRAINING

PhD	SP Pune University (SPPU), India	2015
MSc	SPPU, India	2008
BSc	SPPU, India	2006

RESEARCH PORTFOLIO (15 years' research experience)

- 20 Peer-reviewed publications
- 5 Best Young Scientist presentation awards
- 1 Patent filed
- 11 Invited conference talks
- 1 Project completed as Principal Investigator
- 2 Blog posts
- 3 Invited reviews published
- 2 Best poster presentation awards
- 20 Conference presentations
- 2 Journal cover page credits
- 3 NCBI gene sequence depositions
- 3 Invited interviews (media outreach)

RESEARCH FIELD

- Investigating the role of environmental toxicants and risk assessment analysis on animal models.
- Understanding the eco-physiological and biochemical basis of insect tolerance to climate change- and environment-related stressors.
- Leveraging the unique properties of aquatic silk from chironomid midges from biotechnological and environmental ('peace silk' industry) perspective.

INDEPENDENT RESEARCH FUNDING & PROJECTS COMPLETED

2017-2019: Principal Investigator (Department of Biotechnology- Government of India)

Project title: 'Biochemical and molecular investigation of aquatic silk protein from chironomid midge'.

Total grant amount: ~USD 150,000.00 (Grant # BT/PR19917/BIC/101/456/2016).

2018-present: Foreign Collaborating Scientist (Joint Indo-Israel funded project)

Project title: 'Role of chironomid midge microbiome versus its intrinsic physiological factors in maintaining homeostasis under environmental stress conditions.'

Total grant amount: ~USD 250,000.00 (Grant # F.No. 6-7/2018).

EDITORIAL EXPERIENCE

2021-present: Co-guest Editor (Methods Topic Collection)

Methods Topic Title: 'Coping with changing environments: insects as representative animal models to assess the impacts of climate change and environmental stressors'.

Journal: Journal of Visualised Experiments <https://www.jove.com/methods-collections/1096>

2021-present: Co-guest Editor (Research Topic Collection)

Research Topic Title: 'Insects and changing environments: emerging perspectives on abiotic stress tolerance mechanisms'.

Journal: Frontiers in Physiology

2018-present: Invited Review editor

Journal: Frontiers in Physiology

2018-present: Ad hoc reviewer for scientific journals

Journal: Scientific Reports (Nature Publishing Group), Environmental Science and Pollution Research (Springer), Physiological Entomology (Wiley), Journal of Economic Entomology (Oxford Academic Press), Ecological Entomology (Wiley) and Frontiers in Physiology (Lausanne, Switzerland).

PEER-REVIEWED SCIENTIFIC PUBLICATIONS

[†corresponding/co-corresponding author; *invited article; #cover page credit; *book chapter]

(Citation profile: <https://scholar.google.com/citations?hl=en&user=Pe4pDXkAAAAJ>)

1. †Leena Thorat, Prachi Erram, Girish Tillu, Bhushan Patwardhan and Bimalendu B. Nath (2021). *Withania somnifera* root extract ameliorates desiccation stress tolerance in *dTps1* downregulated *Drosophila*. *Under review*.
2. †Leena Thorat (2021). Desiccation stress response in insects: The pleiotropic role of trehalose and its potential for translational research. *Under review*.
3. Rotem Sela, Sivan Laviad-Shitrit, Leena Thorat, Bimalendu Nath and Malka Halpern (2021). *Chironomus ramosus* larval microbiome composition provides evidence for the presence of detoxifying enzymes. *Microorganisms* 9: 1571; <https://doi.org/10.3390/microorganisms9081571>
4. Sivan Laviad-Shitrit, Y Sharaby, R Sela, Leena Thorat, et al. (2021). Copper and chromium exposure affect chironomid larval microbiota composition. *Science of The Total Environment* 771: 145330.
5. †Leena Thorat, Emmanuel Joseph, Anuya Nisal, et al. (2020). Structural and physical analysis of Underwater silk from housing nest composites of a tropical chironomid midge. *International Journal of Biological Macromolecules* 163: 934-942.
6. Sivan Laviad-Shitrit, R Sela, Leena Thorat, et al. (2020). Identification of chironomid species as natural reservoirs of toxigenic *Vibrio cholerae* strains with pandemic potential *PLOS Neglected Tropical Diseases* 14 (12): e0008959.
- *7. †Leena Thorat and B B Nath (2018) Insects with survival kits for desiccation tolerance under extreme water deficits. *Frontiers in Physiology* 9: 1843.
8. †Leena Thorat and B B Nath (2018) Aquatic silk proteins in *Chironomus*: A review. *Journal of Limnology* 77(s1): 95-103.

9. Ekta Shukla, Leena Thorat, Ameya D Bendre, et al. (2018) Cloning and characterization of trehalase: a conserved glycosidase from oriental midge, *Chironomus ramosus*. **3 Biotech** 8: 352-358.
10. Leena Thorat, Dashrath Oulkar, Kaushik Banerjee, et al. (2017) High-throughput mass spectrometry analysis revealed a role for glucosamine in potentiating recovery following desiccation stress in *Chironomus*. **Scientific Reports** 7: 3659-3671.
11. Leena Thorat and B B Nath (2016) Quantitative assessment of larval desiccation tolerance in Oriental *Chironomus* species. **Current Science** 11: 1448-1449.
- #12. Leena Thorat, Dashrath Oulkar, Kaushik Banerjee, et al. (2016) Desiccation stress induces Developmental heterochrony in *Drosophila melanogaster* following desiccation stress. **Journal of Biosciences** 41: 331-339.
13. Ekta Shukla, Leena Thorat, Varsha Bhavnani, et al. (2016) Molecular cloning and *in silico* studies of physiologically significant trehalose from *Drosophila melanogaster*. **International Journal of Biological Macromolecules** 92: 282-292.
14. Leena Thorat, Krishnapriya Mani, Pradeep Thankgaraj, et al. (2015) Downregulation of *dTps1* in *Drosophila melanogaster* larvae confirms involvement of trehalose in redox regulation following desiccation. **Cell Stress and Chaperones** 21: 285-294.
15. Leena Thorat and B B Nath (2015) Tolerance to desiccation stress in *Chironomus ramosus* plasticity in homeostatic control. **European Journal of Environmental Sciences** 5: 86-91.
16. Ekta Shukla, Leena Thorat, Bimalendu B Nath, et al. (2015) Insect Physiological significance and Potential applications. **Glycobiology** 25: 357-367.
17. Leena Thorat and B. B. (2013) Nath Chironomid midges: a forgotten model of developmental research. **Acta Zoologica** 94: 249-253.
18. Leena Thorat, Sushama Gaikwad and B. B. Nath (2012) Trehalose as an indicator of desiccation *Drosophila melanogaster* larvae: A potential marker of anhydrobiosis. **Biochemical and Biophysical Research Communications** 419: 638-642.
19. Leena Thorat and B. B. Nath (2010). Trends in Chironomid Research. **Chironomus: Journal of Chironomidae Research** 23: 34-35.
20. Leena Thorat and B. B. Nath. (2010) Effects of water hyacinth *Eichhornia crassipes* root on midge *Chironomus ramosus* larvae: a preliminary note. **Physiological Entomology** 35: 391-393.
21. BB Nath, Leena Thorat, et al. (2009) Development of a new design of an insectary model and Environmental assessment studies on chironomid midges. **Chironomus: Journal of Chironomidae Research** 22: 11-13.

BOOK CHAPTERS, PATENTS & GENE SEQUENCE DEPOSITIONS

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| 2020
(Book chapter) | <u>Leena Thorat</u> and Nath BB. Insects with survival kits for desiccation tolerance under extreme water deficits. In: <i>Physiological Adaptations of Insects</i> . Tang, B., et al. eds. Lausanne: Frontiers. |
| 2019
(Patent) | RSarje, <u>Leena Thorat</u> , Nath BB, et al. Trehalosometer: an optics-based sensor for detection of trehalose by (filed in India, Nov 2019). |
| 2019
(Sequence) | Nath BB, <u>Leena Thorat</u> , Malka Halpern, et al. <i>Chironomus ramosus</i> cytochrome oxidase subunit 1 (CO1) gene (NCBI Accession No. PRJNA555776). |

BLOG POSTS

- 2021 **Leena Thorat.** "Amazing ways how insects survive without water!" *Science Writing Internship Blog* (Article accepted, publication due on 9th Sep 2021), <https://www.sciencewritinginternship.com/blog>.
- 2021 **Leena Thorat.** "Peace silk: an incredible aquatic insect to obtain cruelty-free form of silk" *Science Writing Internship Blog* (Article accepted, publication due on 10th Sep 2021), <https://www.sciencewritinginternship.com/blog>.

INVITED TALKS AT SCIENTIFIC MEETINGS

- 2021 Entomological Society of Canada Annual Meeting (scheduled for Nov).
- 2021 Annual meeting of the North American Society of Comparative Endocrinology.
(Won runner-up award for best presentation by Postdoctoral Fellow)
- 2019 Annual Meeting of the Society for Experimental Biology, Seville, Spain.
(Won runner-up award for best Young Scientist presentation)
- 2019 International Conference on Molecular Signaling, Pune, India.
(Won best Young Scientist presentation award)
- 2018 World Congress on Microscopy, India.
- 2017 20th International Symposium on Chironomidae, Trento, Italy.
- 2014 19th International Symposium on Chironomidae, Prague, Czech Republic.
- 2013 Journal Club Series, Philipps Universität Marburg, Germany.
- 2011 XXXVII All India Cell Biology Conference, IISc, India.
(Won best Oral Presentation award).

PRESENTATIONS AT SCIENTIFIC MEETINGS [*talk presented by co-author]

- 2021 Insect Biotechnology Conference, Toronto, Canada.
(Won best Young Scientist presentation award)
- 2021 Annual Meeting of the Society for Experimental Biology, UK.
- 2021 Canadian Fly Meeting.
- 2021 Annual Meeting of the Canadian Society of Zoologists, Canada.
- 2019 *8th Conference on the Biology of Vibrios, McGill University, Montreal, Canada.
- 2019 *The Annual Meeting of the Society for Experimental Biology, Seville, Spain.
- 2018 International Conference on Proteomics for Cell Biology and Molecular Medicine, NCCS, Pune, India *(Poster presentation)*.
- 2018 International Congress of Cell Biology, Hyderabad, India *(Poster presentation)*.
- 2017 Annual meeting of the Society for Free Radical Research India (SFRR-India), BARC Mumbai, India *(Poster presentation)*.
- 2014 19th International Symposium on Chironomidae, Prague, Czech Republic *(Poster presentation)*.
- 2014 *International Symposium on Molecular Signaling, VisvaBharati Central University, India.
- 2014 Life Sciences Symposium, BARC, India. **(Won best Poster Presentation award).**

PROFESSIONAL SERVICE

- 2021 **Virtual Ambassador & Session Host** (Annual Meeting of the Society for Experimental Biology, UK)
- 2020, 2021 **Session Chair, Insect Biotechnology Conference** (Hosted by York University, Canada).
- 2020, 2021 **Resource Person- Undergraduate Curriculum Development**
Summer Transition Program in Biology (York University, Canada).
- 2020, 2021 **Invited Judge** (York Region Science and Technology Fair, Canada).
- 2020 **Invited Visiting Expert** (Carleton University, Canada).
- 2019 **Invited Expert**, Competitive Exam Curriculum Development in Biology (RM College India).
- 2017-2018 **Hiring Committee-** Research Fellows & Project Assistants (SPPU, India).
- 2018 **STEM Mentor**, Skills Development for Female Undergraduates (SP College, India).
- 2012 **Invited Resource Person**, 'National-level workshop on Microscopy for Life Sciences'
(NCL Venture Centre, India)

TEACHING PORTFOLIO (18 years' teaching experience)

- 4 courses handled as Course Director
- 11 UG & Graduate courses taught
- 10 Invited public lectures
- 24 Students mentored
- 1 Book on science pedagogy
- 3 Book chapters
- STEM Mentor for Female Undergraduates
- 3 Invitations as judge at science competitions
- 6 Publications on science education
- 3 Co-coordinated workshops for UG Teachers

TEACHING COMPETENCIES

- Curriculum development**
- Developing beginner- and advanced-level undergraduate and graduate course content.
 - Designing hands-on scholarly research projects for all levels of undergraduate and graduate training.
- Technical skills**
- Developing innovative teaching tools and active student engagement such as self-designed lecture review games and interactive apps such as Kahoot for in-person, online/remote (synchronous and asynchronous), blended and flipped teaching formats.
 - Designing and developing laboratory exercises to suit traditional/ online learning formats.
 - Developing presentations in MS-PowerPoint and Google Slides and using them as a medium of imparting lectures / courses
 - Proficient user of online tools and platforms such as Zoom, Moodle, Google Classroom, Crowdmark and iClicker for teaching, assessment and immediate feedback.
- Teaching delivery and management**
- Preparing and delivering lectures (traditional and synchronous/ asynchronous formats) and creating and conducting exams for classroom/ online formats.
 - Developing laboratory exercises and managing laboratories including supervision of teaching assistants and liaising with technical staff.

TEACHING EXPERIENCE

Course Title	Role	Term	Course level
Science Summer Transition Program in Biology	Course Director	Summer 2020, 2021	Prospective 1 st year UG students at York University
Physiology of the Invertebrates	Course Director	Fall 2020	Undergraduate
Animal Physiology II	Course Director	Winter 2020	Undergraduate
Skills in Scientific Communication	Guest Lecturer	Fall 2015-2019	MSc
Research Methodology	Guest Lecturer	Summer 2015-2019	MSc
General Genetics	Guest Lecturer	Summer 2015-2019	BSc
Animal Biochemistry & Physiology	Guest Lecturer	Summer 2015-2019	BSc
Laboratory Exercises in genetics	Teaching Assistant	Summer 2009-2015	MSc

Laboratory Exercises in Microscopy Tools & Techniques	Teaching Assistant	Summer 2009-2015	MSc
Field Exercises in Biodiversity	Teaching Assistant	Summer 2009-2015	BSc
Biology and Chemistry	High school Coach	2003-2009	Grades 9-12

MENTORSHIP

2010-2019	Co-mentor: 9 MSc Dissertation Students
2011-2014	Pedagogical Mentor: International Biology Olympiad student finalists The Homi Bhabha Centre for Science Education (HBCSE) TIFR, India, invited me as a pedagogy trainer for student finalists who would go on to represent the country at the International Biology Olympiads held annually at various global venues [2011-Taiwan; 2012- Singapore; 2013- Switzerland; 2014- Indonesia].
2014-present	Collaborator & Co-mentor: 2 PhD Students
2017-2019	Mentor & PI: 2 Project Assistants
2018-2020	Collaborator & Co-mentor: 3 Project Fellows
2019-2020	Co-mentor: 1 Undergraduate Honours Thesis Student
2020-present	Lead Mentor: 6 Undergraduate Research Students

PEDAGOGICAL INNOVATIONS & CREATIVE WRITING

2021 Book Chapter	Designed experiential training module for undergraduate and graduate students. Leena Thorat and BB Nath. Demonstration of the hormonal control of metamorphosis using <i>Drosophila</i> as a model. In: <i>Experiments with Drosophila for Biology Courses</i> released by the Indian Academy of Sciences (http://flybase.org/commentaries/2021_04/LakhotiaRanganathEBook.html)
2021 Book Chapter	Designed experiential training module for undergraduate and graduate students. BB Nath and Leena Thorat . Visualization of Nucleolus in the larval salivary gland polytene nuclei in <i>Drosophila melanogaster</i> using light microscopy. In: <i>Experiments with Drosophila for Biology Courses</i> released by the Indian Academy of Sciences (http://flybase.org/commentaries/2021_04/LakhotiaRanganathEBook.html)
2021 Book Chapter	Designed experiential training module for undergraduate and graduate students. BB Nath and Leena Thorat . Allozyme variation in natural populations of <i>Drosophila melanogaster</i> . In: <i>Experiments with Drosophila for Biology Courses</i> released by the Indian Academy of Sciences (http://flybase.org/commentaries/2021_04/LakhotiaRanganathEBook.html)
2019 Book	Created a unique collection of crossword puzzles covering all major topics in Biology for undergraduate and graduate students and instructors. Leena Thorat and BB Nath. <i>Classroom Unplugged: Crossword Biology</i> . (https://www.amazon.in/s?k=leena+thorat&ref=nb_sb_noss)
2020 Activity worksheet	Developed an active student engagement worksheet for undergraduate students. Leena Thorat . Where did Animals come from? Teacher Plus- A Magazine for the Contemporary Teacher, November'20 issue, pg. 27-34.

- 2016 Developed an active student engagement worksheet for high school and undergraduate students.
 Activity **Leena Thorat.** Leena Thorat. What's alive? What's not? Teacher Plus- A Magazine for the
 worksheet Contemporary Teacher, April'18 issue, pg. 27-34.

PUBLICATIONS ON SCIENCE EDUCATION

- 2018 **Leena Thorat.** Nucleic Acids: The Genetic Material. Resonance-Journal of Science Education (Springer) November'18 issue. 23 (11): 1313-1316.
- 2018 **Leena Thorat.** Basic unit of life: Cell. Resonance-Journal of Science Education (Springer) October'18 issue. 23 (10): 1147-1151.
- 2018 **Leena Thorat.** Dangerous living things: venomous animals. *Resonance-Journal of Science Education (Springer)* September'18 issue. 23 (9): 27-34.
- 2017 **Leena Thorat.** Fun ways of building word power. *Teacher Plus- A Magazine for the Contemporary Teacher*, February'17 issue, pg. 6-8.

SCIENCE OUTREACH RESOURCES DEVELOPED

- 2021-present **Invited Contributor for Science Outreach, Equity and Diversity**
 (Society for Experimental Biology, UK)
- 2012 **Invited Resource Person to design and develop competitive exams for the Biology Olympiad Team** (Govt. of India National Standard Examination in Biology and the Indian Biology Olympiad)

WORKSHOPS & PROFESSIONAL DEVELOPMENT PROGRAMS LED

- 2020 **Opportunities and Challenges in Science Education in the 'New Normal' COVID-19 Scenario**
 Online Teaching Training Workshop for University Instructors (SPPU, Pune, India).
- 2019 **National Skills Development and Entrepreneurship Training Program**
 Microscopy Training Workshop for Biology Teacher (National Chemical Laboratory, Pune, India).
- 2016 **State-level Training Workshop for Biology Teachers: Teaching and Research Methodology**
 (HV Desai College, Pune, India).
- 2010 **National-level workshop on Modern techniques in Biology for Biology Teachers** (SPPU, Pune, India).

MEDIA OUTREACH

- 2019 **"Spotlight on Leena Thorat"- Interview with the Society for Experimental Biology (UK)**
[\[http://www.sebiology.org/digital-magazine/Spring-2019/#p=34\]](http://www.sebiology.org/digital-magazine/Spring-2019/#p=34).
- 2019 **"Our Winning Proposals: EMBO fellowships"- Interview with the Research Professional (UK).**

INVITED PUBLIC LECTURES

- 2021 **Women in Science: then, now, and what next?** at the Women's Day Celebration Week
 (Society for Experimental Biology, UK).
- 2020 **The secret life of insects in the current scenario of global warming!** at the Soapbox Science Event
 hosted by SciXchange, Ryerson University, Canada.
- 2019 **Classroom unplugged: importance of science pedagogy for learning with fun!** at the Science
 Education & Popularization Forum (SPPU, India).
- 2019 **Seeing is believing applications of fluorophores in Biology!** at the Microscopy Workshop for
 Biologists (SPPU, India).
- 2016 **Impact of effective language skills in scientific publishing,** at the Teaching & Research Training

- Program for University Biology Teacher (Desai College, Pune, India).
- 2016 **Importance of effective English communication skills for Nutritionists** at the Dietetics and Nutrition Training Workshop (Solaris Gym, Pune, India).
- 2016 **Drosophila: a model for Biotechnological and Biomedical Research** at the You're your Research Model Week (Sinhgad College of Science, Pune, India).
- 2016 **The art of Scientific Writing & Publishing** at the State level Teachers Training Workshop Teaching and Research Methodology (Desai College, Pune, India).

AWARDS, HONORS & DISTINCTIONS

- 2021 **Mitacs Canadian Science Policy Fellowship** (Regulatory Science Policy Analyst Environment and Climate Change Canada, Government of Canada).
- 2021 **Award for Best Oral Presentation by Young Scientist** (Insect Biotechnology Conference, hosted by York University, Toronto, Canada).
- 2019 **Award for Oral Presentation** (Annual Meeting of the Society for Experimental Biology, Spain).
- 2019 **Overseas Travel grant award** (Department of Science & Technology, Govt. of India).
- 2019 **Best Oral Presentation by Young Scientist Award** (7th International Conference on Molecular Signaling, SPPU-NCCS, Pune, India)
- 2017 **EMBO-Visiting Fellow Award** (Freie Universität Berlin, Germany).
- 2017 **BioCARE Scientist Award- Principal Investigator** (Department of Biotechnology, Govt. of India).
- 2016 **Postdoctoral Fellow Award** (University Grants Commission, India)
- 2014 **Overseas Travel grant award** (SPPU, India).
- 2013 **DAAD Fellow Award** (Philipps Universität Marburg, Germany).
- 2013 **Award for Best Oral Presentation by Young Scientist** (Cell Biology Conference, IISc, India).
- 2011 **Award for Best Poster Presentation** (Life Sciences Symposium, BARC, Mumbai, India).
- 2010 **Senior Research Fellow Award** (CSIR-NET India).
- 2008 **Junior Research Fellow Award** (CSIR-NET India).

PROFESSIONAL MEMBERSHIPS

- 2021-present oCUBE (Open Consortium of Undergraduate Biology Educators, Canada).
- 2021-present The North American Society for Comparative Endocrinology.
- 2021-present The Canadian Society of Zoologists
- 2018 Indian Society of Cell Biologists, Life Member.
- 2015-present The Society for Experimental Biology (UK).
- 2010 The Association of Teachers in Biological Sciences, Life Member (India).

TEACHING DEVELOPMENT WORKSHOPS ATTENDED

- 2021 **Online Assignments: Deep Learning through Engaging Assignments**, York University, Canada.
- 2021 **Instructional Skills for Remote Delivery Course**, York University, Canada.
- 2019 **STEM Teaching Essentials Workshop**, SPPU, Pune, India.
- 2018 **Practical Pedagogy of E-learning**, Educational Media Research Center (EMRC), SPPU, India.
- 2016 **The Engaged Learner: applications of technology-enhanced teaching**, Association of Teachers in Biological Sciences, India.

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