Rabindra Kumar Behera

Contact:

Associate Professor
Department of Chemistry
National Institute of Technology
Rourkela–769 008
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Lab: https://sites.google.com/view/rkb-bioinorganic-lab
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Research Interests: **Bio-inorganic Chemistry**
Structure-function Relationships in Iron Storage Protein, Ferritin and its Application in Health/Technology.

Education:

Ph.D. Chemistry (2011): Tata Institute of Fundamental Research (TIFR), Mumbai, INDIA.
Thesis Title: Studies of the Structure, Function and Stability of Cytochrome P450 and Analogous Heme-proteins.
(Advisor: Prof. Shyamalava Mazumdar)

M.Sc. Chemistry (2004): Utkal University, Bhubaneswar, Odisha, INDIA.

Training & Professional Experience:

Mar. 2023 – Present: Associate Professor; Dept. of Chemistry, NIT Rourkela, Odisha, INDIA.

Feb. 2014 – Mar. 2023: Assistant Professor; Dept. of Chemistry, NIT Rourkela, Odisha, INDIA.

Oct. 2013 – Feb. 2014: INSPIRE Faculty (Scientist); Institute of Life Sciences, Bhubaneswar, INDIA.

Sept. 2012 – Sept. 2013: Post-Doctoral Fellow; University of South Carolina, Columbia, USA
Project: Examining the role of mitochondrial sulfohydryl oxidase Erv1 and glutathione (GSH) in cytosolic Fe-S cluster biogenesis using Yeast as a model system. (Advisor: Prof. Caryn E. Outten)

Jan. 2010 – Aug. 2012: Post-Doctoral Fellow; Children's Hospital Oakland Research Institute, California, USA
Project: Fe^{2+} entry, transit and exit in iron storage protein, ferritin. (Advisor: Prof. Elizabeth C. Theil)

June. 2006 – Aug. 2006: 21st Century Center of Excellence Fellow; Nagoya University, Japan (During PhD)
Project: Designing of CO/NO sensor by engineering Cytochrome C_{552} and CuA proteins.
(Advisor: Prof. Yoshihito Watanabe)

Sponsored Projects:

1. **Title:** Iron Mobilization from Intact Ferritin Protein Nanocages: Implications in Iron Metabolism and Chelation Therapy.
   Funding Agency: Science & Technology Department, Govt. of Odisha
   Duration: Jan 2024 – Jan 2027; Amount: 10 Lakhs

2. **Title:** Formation and Dissolution of Iron Mineral in Ferritin Protein Nanocage: Impact of Oxoanions and Intrinsic Electron Relay Stations.
   Funding Agency: SERB
   Duration: Dec 2020 – March 2024; Amount: 50 Lakhs

3. **Title:** Exploiting the Potential Usage of Ferritin Cage as Nanosink, Nanoreactor and Nanocarrier for Biomedical Applications.
   Funding Agency: DBT
   Duration: July 2017 – Jan 2021; Amount: 46 Lakhs

4. **Title:** Unravelling the Role of Heme in Bacterioferritin.
   Funding Agency: SERB
   Duration: August. 2017 – Jan 2021; Amount: 45 Lakhs

5. **Title:** Engineering of the Ferritin Nanocage with Relevance to Health and Disease.
   Funding Agency: DST - INSPIRE Faculty Award
   Duration: Oct. 2013 – Jan 2019; Amount: 35 Lakhs

Publications:

Research Papers

[Pubmed: https://www.ncbi.nlm.nih.gov/pubmed/?term=Rabindra+Behera]
[Google Scholar: https://scholar.google.com/citations?user=teteDmsAAAAJ&hl=en&oi=ao]
***RKB as Corresponding Author.**

27. "Rational pore engineering reveals the relative contribution of enzymatic sites and self-assembly towards rapid ferroxidase activity and mineralization: Impact of electrostatic guiding and cage-confinement in bacterioferritin."
    Parida A., Bhattacharyya G., Mallik S., Behera, R. K*.
    Chemical Science; 2025, 16, 3978-3997. https://doi.org/10.1039/D4SC07021F

26. "Gastric stability of bare & chitosan-fabricated ferritin and its bio-mineral: Implication towards potential dietary iron supplement." (HOT article by RSC)
    Raut R. K., Bhattacharyya G., Behera, R. K*.
    Dalton Transactions; 2024, 53, 13815-13830. https://doi.org/10.1039/D4DT01839G

25. "Iron Mobilization from Intact Ferritin: Effect of Differential Redox Activity of Quinone Derivatives with NADH/O2 and In Situ Generated ROS."
Behera N., Bhattacharyya G., Behera S., Behera, R. K*.
Journal of Biological Inorganic Chemistry; 2024, 29(4), 455-475.
https://doi.org/10.1007/s00775-024-02058-w

24. "Modification of 4-fold and B-pores in bacterioferritin from Mycobacterium tuberculosis reveals their role in Fe2+ entry and oxidoreductase activity."
Parida A., Mohanty A., Raut R. K., Padhy I., Behera, R. K*.
Inorganic Chemistry; 2023, 62(1), 178–191. https://doi.org/10.1021/acs.inorgchem.2c03156

23. Chapter Title – "Iron Accumulation in Ferritin." **(Invited)**
Parida A., and Behera, R. K*.
Book Title - Protein Cages; Edited by Takafumi Ueno, Seirin Lim, Kelin Xia
Methods in Molecular Biology (Chapter 7, volume 2671), 2023, 121-134.
https://doi.org/10.1007/978-1-0716-3222-2_7

22. "Ferritin: A Promising Nanoreactor & Nanocarrier for Bio-nanotechnology". **(Invited)**
Mohanty A., Parida A., Raut R. K., Behera R. K*.
ACS Bio & Med Chem Au; 2022, 2(3), 258-281. https://doi.org/10.1021/acsbiomedchemau.2c00003

21. "Alteration of Coaxial Heme Ligands Reveals the Role of Heme in Bacterioferritin from Mycobacterium tuberculosis".
Mohanty A., Parida A., Subhadarshanee B., Behera, N., Subudhi, T., Koochana P. K., Behera, R.K*.
Inorganic Chemistry; 2021, 60(22), 16937-16952. https://doi.org/10.1021/acs.inorgchem.1c01554

20. "Kinetics of Ferritin Self-assembly by Laser Light Scattering: Impact of Subunit Concentration, pH and Ionic Strength". Mohanty A., Mithra K., Jena SS, Behera, R.K*.
Biomacromolecules; 2021, 22(4), 1389-1398. https://doi.org/10.1021/acs.biomac.0c01562

19. "Flavin mediated Reductive Iron Mobilization from Frog M and Mycobacterial Ferritins: Impact of their Size, Charge and Reactivities with NADH/O_2"
Koochana P. K., Mohanty A., Parida A., Behera N., Behera P.M., Dixit A., Behera, R.K*.
Journal of Biological Inorganic Chemistry; 2021, 26(2-3), 265-281.
https://doi.org/10.1007/s00775-021-01850-2

18. "Impact of Phosphate on Iron Mineralization and Mobilization in Non-heme Bacterioferritin B from *Mycobacterium tuberculosis*"
Parida, A; Mohanty, A; Kansara, B; Behera, R.K*.
Inorganic Chemistry; 2020, 59(1), 629-641. https://doi.org/10.1021/acs.inorgchem.9b02894

17. "Iron Mineralizing Bacterioferritin A from *Mycobacterium tuberculosis* exhibits Unique Catalase-Dps like Dual Activities".
Mohanty, A; Subhadarshanee, B; Barman, P; Mahapatra, C; Aishwarya, B.; Behera, R.K*.
Inorganic Chemistry; 2019, 58(8), 4741-4752. https://doi.org/10.1021/acs.inorgchem.8b02758

16. "Phenthiazines and Phenoxazines: As Electron Transfer Mediators for Ferritin Iron Release."
Koochana PK, Mohanty A, Subhadarshanee B, Satpati S, Naskar R, Dixit A, Behera R.K*.
Dalton Transactions; 2019, 48(10), 3314-26. https://doi.org/10.1039/C8DT04383C

15. "Releasing Iron from Ferritin Protein Nanocage by Reductive Method: The Role of Electron Transfer Mediator."
Koochana PK, Mohanty A, Das S, Subhadarshanee B, Satpati S, Dixit A, Sabat SC, Behera R.K*.
Biochimica et Biophysica Acta (BBA) – General Subjects.; 2018, 1862, 1190-1198.
https://doi.org/10.1016/j.bbagen.2018.02.011

14. "Surface Charge Dependent Separation of Modified and Hybrid Ferritin in Native PAGE: Impact of Lysine 104".
Subhadarshanee B, Mohanty A, Jagdev MK, Vasudevan D, Behera R.K*.
Biochimica et Biophysica Acta (BBA) - Proteins and Proteomics.; 2017, 1865, 1267-73.
https://doi.org/10.1016/j.bbapap.2017.07.012

13. "Solving Biology's Iron Chemistry Problem with Ferritin Protein Nanocages"
Theil EC, Tosha T, Behera R.K.
Accounts of Chemical Research.; 2016, 49, 784-91. https://doi.org/10.1021/ar500469e

12. "Fe^{2+} Substrate Transport through Ferritin Protein Cage Ion Channels Influences Enzyme Activity and Biomineralization".
Behera, R.K., Torres. R., Tosha, T., Bradley, J.M., Goulding, C.W., and Theil, E.C.
Journal of Biological Inorganic Chemistry.; 2015, 20(6), 957-69
https://doi.org/10.1007/s00775-015-1279-x

11. "Moving Fe^{2+} from Ferritin Ion Channels to Catalytic OH Centers Depends on Conserved Protein Cage Carboxylates."
Behera, R. K and Theil, E. C.
Proc Natl Acad Sci (PNAS) USA,; 2014, 111(22), 7925-30. https://doi.org/10.1073/pnas.1318417111

Before Joining NIT Rourkela:

10. "Spectroscopic studies of single and double variants of M ferritin: lack of conversion of a biferrous substrate site into a cofactor site for O_2 activation."
Kwak, Y, Schwartz J.K., Haldar,S., Behera, R.K., Tosha, T., Theil, E.C., and Solomon, E.I.
Biochemistry.; 2014, 53(3), 473-82. https://pubs.acs.org/doi/10.1021/bi4013726

9. "Thermodynamic effects of the alteration of the axial ligand on the unfolding of thermostable cytochrome c."
Behera, R. K*., Nakajima, H., Rajbongshi, J., Watanabe, Y., and Mazumdar, S*.
Biochemistry.; 2013, 52(8), 1373-84. ***Corresponding Author.** https://doi.org/10.1021/bi300982v

8. "Ferritins for Chemistry and for Life."
Theil, E. C., Behera, R. K., and Tosha, T
Coordination Chemistry Reviews.; 2013, 257, 579-86. https://doi.org/10.1016/j.ccr.2012.05.013

7. "Ferritin and ferrihydrite nanoparticles as iron sources for *Pseudomonas aeruginosa*."
Dehner, C., Soto, N.M., Behera, R. K., Theil, E. C., Maurice, P. A., and DuBois, J. L.
Journal of Biological Inorganic Chemistry.; 2013, 18(3), 371-81. https://doi.org/10.1007/s00775-013-0981-9

6. "Ferritin protein nanocage ion channels: gating by N-terminal extensions."
Tosha, T., Behera, R. K., Ng, H. L., Bhattasali, O., Alber, T., and Theil, E. C.
The Journal of Biological Chemistry.; 2012, 287, 13016-25. https://doi.org/10.1074/jbc.M111.332734

5. "Ferritin ion channel disorder inhibits Fe(II)/O_2 reactivity at distant sites."
Tosha, T., Behera, R. K., and Theil, E. C.
Inorganic Chemistry.; 2012, 51, 11406-11. https://doi.org/10.1021/ic3010135

4. "Modification of the heme active site to increase the peroxidase activity of thermophilic cytochrome P450: a rational approach."
Behera, R. K., Goyal, S., and Mazumdar, S.
Journal of Inorganic Biochemistry.; 2010, 104, 1185-1194. https://doi.org/10.1016/j.jinorgbio.2010.07.008

3. "Thermodynamic basis of the thermostability of CYP175A1 from *Thermus thermophilus*."
Behera, R. K., and Mazumdar, S.
International Journal of Biological Macromolecules.; 2010, 46, 412-418.
https://doi.org/10.1016/j.ijbiomac.2010.01.014

2. "Roles of two surface residues near the access channel in the substrate recognition by cytochrome P450cam."
Behera, R. K., and Mazumdar, S.
Biophysical chemistry. 2008, 135, 1-6. https://doi.org/10.1016/j.bpc.2008.02.016

Book Chapter

1. "The Chemistry of Nature's Iron BioMinerals In Ferritin Protein Nanocages."
Theil, E. C., and Behera, R. K.
Book title - *Coordination Chemistry in Protein Cages: Principles, Design, and Applications*.
First edition, Edited by Takafumi Ueno and Yoshihito Watanabe.
John Wiley & Sons, Inc.; 2013, Chapter 1, page 3-24. https://doi.org/10.1002/9781118571811.ch1

Conference Abstracts Published in Journal

5. "How ferritin protein cage link ion channels Fe^{2+} transport to the active site: More sophistication in ferritin function".
Theil, E.C., and Behera, R.K.
American Journal of Hematology.; 2013, 88, 5 (Podium 12). https://doi.org/10.1002/ajh.23453

4. "Ion channels in ferritin nanocages: Moving iron and nucleating minerals".
Theil, E.C., Tosha, T., Haldar, S., and Behera, R.K.
American Journal of Hematology.; 2011, 86, 9 (Podium 24). https://doi.org/10.1002/ajh.22083

3. "Fe(II) exit pore gates in ferritin are the N-termini of the polypeptide subunits.".
   Behera, R.K., Tosha, T., Ng, H., Bhattasali, O., Alber, T., and Theil, E.C.
   ***Journal of Biological Inorganic Chemistry*.;** 2011, 16 (Suppl 1): S1- S711.
   https://doi.org/10.1007/s00775-011-0862-z
2. "The effect of axial ligand mutation on conformational stability and unfolding profiles of thermostable cytochrome c"
   Behera, R.K., Nakajima, H., Watanabe, Y and Mazumdar, S.
   ***Journal of Biological Inorganic Chemistry*.;** 2009, 14 (Suppl 1) S216.
   https://doi.org/10.1007/s00775-009-0542-4

1. "Substrate recognition and conformational stability of the active site in cytochrome P450cam*".*
   Behera, R.K., Manna, S.K., and Mazumdar, S.
   ***Journal of Biological Inorganic Chemistry*.;** 2009, 14 (Suppl 1) S38.
   https://doi.org/10.1007/s00775-009-0542-4

Research & Teaching Guidance:

Research: PhD – 10 (3 awarded*, 7 continuing); **PG** – 23 (21 completed, 2 continuing); **UG** – 15 (completed)

PhD Thesis:

* *Akankshika Parida (November 2022)* on "Iron Mineralization in Mycobacterial Ferritins: Impact of Protein Cage, Pores, And Phosphate." **Best PhD Thesis Award – 2023 by Orissa Chemical Society.**

* *Abhinav Mohanty (March 2022)* on "Unravelling the Role of Heme in Bacterioferritin and Regulating Ferritin Self-Assembly: Implication towards Health and Diseases." **Best PhD Thesis Award – 2022 by Orissa Chemical Society.**

* *Prashanth Kumar Koochana (December 2019)* on "Facilitating Iron Acquisition from Ferritin Protein Nanocage by Reductive Pathway: Role of Electron Transfer Mediators and Chelators".

Teaching:

- CY101/CY1101 (Chemistry, B.Tech);
- CY521/CY5201 (Bio-inorganic Chemistry, M.Sc.; Part of A.N. Khosla Center of **Technology Enabled Learning;** https://ankctel.nitrkl.ac.in/lecture/13
  Prepared 35 video lectures during autumn 2016-17.
- CY5204 (Analytical Chemistry; M.Sc.);
- CY3201 (Chemistry of Elements, Int. M.Sc);
- CY232 (Chemical Kinetics, Open Elective);
- CY611 (Advanced Analytical Chemistry; PhD Coursework);
- CY624 (Special Topics in Inorganic Chemistry, PhD Coursework);
- CY273 (Chemical Biology Lab as Founder, Int. M.Sc.);
- CY170 (Chemistry Lab, B.Tech); Physical Chemistry Lab (Int. M.Sc.).

Review and Editorial Activities:

- Invited as Expert Reviewer for the Journals: **JACS**, Biochemistry, Nanoscale, Metallomics, Protein Chemistry, Journal of Applied Microbiology, Journal of Inorganic Biochemistry, Dalton Trans, FEBS Letters, RSC Advances, and Polyhedron.
- Invited as Review Editor for the Editorial Board of Supramolecular Chemistry, part of the journal Frontiers in Chemistry.
- Invited as **Expert Reviewer** for Online Research Competition (for N-PDF) jointly organized by SERB and American Chemical Society.

Fellowships, Awards and Honors:

- 2023 – Received **CRSI Young Scientist Award** in 31st CRSI-NSC at NIT Rourkela.
- 2018 & 2019 - Deputy Presiding Officer (NIT Rourkela Center), GATE – 2018 and GATE- 2019.
- 2017 – **Prof. R.C. Tripathy Young Scientist Award** by Orissa Chemical Society.
- 2017 – Regional Coordinator (Rourkela and Ranchi) for KVPY Exam organized by IISc Bangalore.
- 2016 – Selected as Mentor by Indian Academy of Sciences for SRF Programme.
- 2013 July - **DST-Inspire Faculty Award**, Govt. of India.
- 2010 Jan - 2013 Sept - Fellowship from NIH for post-doctoral work at CHORI and USC.
- 2009 - Student Travel Grant from **SBIC** and **DST** for presenting poster in ICBIC 14, Japan.
- 2006 Jun-Aug - 21st Century **Center of Excellence (COE) Fellowship**, Govt. of Japan.
- 2004-05 - Kanwal S. Rekhi Career Development Award from TIFR endowment fund.
- 2004 - Qualified Graduate Aptitude Test in Engineering (**GATE**) in Chemical Sciences.
- 2003 Dec - Qualified Lectureship (LS) - CSIR-UGC–**NET** in Chemical Sciences.
- 2003 - Dr. Radhanath Rath Scholarship, Govt. of India.
- 2002-04 - **National Scholarship**, Govt. of India.
- 2002 - Best Chemistry Graduate, Bhadrak College Bhadrak, Orissa, India.

Participation in Conferences & Symposia:

- 2025 Mar – Delivered Invited talk in Faculty Memorial Lectures at Utkal University, Bhubaneswar.
- 2025 Feb – Delivered invited talk in IABSCON-2025 at AIIMS Bhopal.
- 2025 Jan – Delivered invited talk in QUAD-5 at IISER Berhampur.
- 2024 Dec – Delivered invited talk in MTIC-XXI at IIT Kharagpur.
- 2024 Nov – Delivered invited talk in GM University Sambalpur.
- 2024 April - Delivered invited talk in RDFMSA-2024 at GIET University, Gunupur.
- 2024 Jan – Delivered invited talk in SABIC-2024 at Kolkata, organized by TIFR and IACS.
- 2023 Dec – Delivered invited talk in MTIC-XX at IISc Bangalore.
- 2023 Dec – Delivered invited talk in TACC-23 at TIFR, Mumbai.
- 2023 Nov – Delivered invited talk in RCSRT-23 (OCS) at Dhenkanal Autonomous College, Odisha.
- 2023 April – Delivered invited talk in NTCS at Bhadrak Autonomous College, Odisha.
- 2022 Dec – Delivered invited talk in the 10th Asian Biological Inorganic Chemistry (**AsBIC-10)** Conference held in Kobe, Japan.
- 2022 Aug – Delivered invited talk in the International Conference “FIMTA-2022” organized by CSIR-IMMT, Bhubaneswar.

- 2022 Feb – Invited as Guest Speaker on the occasion of National Science Day celebration by Centurion University (CUTM), Paralakhemundi.
- 2021 Mar - Oral Presentation in the International Conference "RDC-2021" organized by NIT Durgapur.
- 2021 Jan - Invited talk in "OCS Extended Lecture Series and RAIMS 2021" organized by VSSUT Burla, Odisha.
- 2020 Dec - Invited talk in "International Conference-RAEM" organized by CUTM, Bhubaneswar.
- 2020 Aug - Invited talk in "ESMAC-2020" organized by KIIT, Bhubaneswar.
- 2020 Aug - Oral Presentation in the NREHA-2020, organized by IMMT Bhubaneswar, UCL UK, and AIIMS Bhubaneswar.
- 2020 Jan - Invited talk in "National Seminar" at Midnapur City College.
- 2019 Mar – Attended "Emerging Trends in Biology Research" organized by ILS Bhubaneswar.
- 2019 Jan - Invited talk in "National Seminar" at Govt. Auto. College Rourkela.
- 2018 Dec- Presented at 9th Asian Biological Inorganic Chemistry (**AsBIC-9**) Conference held in Singapore from 9th-14th December 2018 jointly organized by NUS and NTU, Singapore.
- 2018 Oct - Invited participant for "Panel Discussion as Discussant" in NANOBIOTECK-2018.
- 2018 Mar - Invited talk at "**RAIMS 2018**" VSSUT Burla, Odisha.
- 2018 Feb – Invited talk at TEQIP-III Sponsored Workshop (RTCSIBR -2018) at NIT Rourkela.
- 2017 Dec – Award talk at "Orissa Chemical Society Annual Meeting" in CUTM Paralakhemundi.
- 2017 Dec - Invited participant for "Panel Discussion as Discussant" in NANOBIOTECK – 2017.
- 2017 Jan – Invited (Oral) talk at "**SABIC 2017**" in Calcutta Organized by TIFR and IACS.
- 2015 Dec - Presented Poster in "Modern Trends in Inorganic Chemistry (MTIC-2015)", at Jadavpur University, Calcutta, India.
- 2015 Mar – Invited talk in "Utkal University Alumni Meeting" at Bhubaneswar.
- 2015 Feb - Invited talk in "Innovative Applications of Chemistry in Pharmacology & Technology" at Berhampur University, India.
- 2014 Mar – Oral (Invited) presentation in **Indo-French Seminar** on "Bio-inorganic Approaches to Current Health Problems" at Pondicherry Univ, India.
- 2013 Dec – Invited talk in Orissa Chemical Society Annual Meeting at MEMS, Balasore.
- 2013 May – Poster presented in **Fe-S Cluster** Conference at USC, Columbia, USA.
- 2013 April – Work presented in International BioIron Society (**IBIS**) at UCL London, UK.
- 2012 Aug – Invited talk in SPAC lecture series at CHORI, California, USA.
- 2012 June – Invited talk in Dept of Chemistry and Biochemistry at USC, Columbia, USA.
- 2012 May – Invited talk in Dept of Chemistry and Biochemistry at UC Irvine, California, USA.
- 2012 Feb – Presented poster in **SPAC** symposium at CHORI, California, USA.
- 2012 Jan - Presented poster in **GRS**-Bioinorganic Chemistry at Ventura, California, USA.
- 2011 Aug - Presented poster in **ICBIC 15** at UBC, Vancouver, Canada.
- 2010 May – Invited talk in SPAC meeting at CHORI, California.
- 2010 Mar - Participated in 239th ACS National Meeting at San Francisco, California, USA.
- 2009 Nov - Member of logistics committee of **SABIC-2009** at TIFR, Mumbai.
- 2009 Nov - Presented poster in **SABIC-2009** at TIFR, Mumbai.
- 2009 July - Presented poster in **ICBIC 14** at Nagoya, Japan.
- 2009 Mar- Participated in "International Conference on Fluorescence in Biology" at TIFR.
- 2008 Nov - **Oral** presentation in **AsBIC – IV** at Jeju Island, Korea.
- 2007 Dec - Presented poster in MTIC-XII at IIT Madras.

- 2005 Oct - Participated in **DST workshop** on "*Bio-inorganic Chemistry"* at IISc Bangalore.

Workshop Organized:

2022 October – A five-day workshop on "Bio-Chemical and Bio-Physical Characterization of Proteins".

Memberships:

2009 – Present: - Society of Biological Inorganic Chemistry (**SBIC**).
2010 – 11: - American Chemical Society (**ACS**).
2013 - : Patron Member, Orissa Chemical Society (**OCS**).
2017 – Present: Founder Life Member, Indian Society of Nanomedicine (**ISNM**).
2021 – Life Member (Regular), Chemical Research Society of India (**CRSI**)

Referees:

Prof. Shyamalava Mazumdar (PhD Supervisor)
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Department of Chemical Sciences
Tata Institute of Fundamental Research
1, Homi Bhabha Road, Colaba,
Mumbai-400005, India
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Prof. Elizabeth C. Theil (Post-doc advisor)
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Children's Hospital Oakland Research Institute
Emeritus Prof. UC-Berkeley and NCSU
5700 Martin Luther King, Jr. Way
Oakland, CA 94609, USA
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Institute of Life Sciences, Bhubaneswar,
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