Yamuna Krishnan
Reader 'F'
National Centre for Biological Sciences,TIFR,
UAS-GKVK, Bellary Road, Bangalore 560 065, India
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Date of Birth : 25/05/1974
Sex : Female
Nationality : Indian

Education

Ph.D (Organic Chemistry):	Jan '02, Department of Organic Chemistry, Indian Institute of Science, Bangalore, India.
M.S. (Chemical Sciences):	Sept '97, Chemical Sciences Division, Indian Institute of Science, Bangalore, India.
B.Sc. (Chemistry):	Jun '94, Women's Christian College (An Autonomous Institution affiliated to University of Madras).

Professional Experience

Jan 09- current :	Reader 'F' (Tenured) National Centre for Biological Sciences, TIFR, Bangalore, India.
Feb 05 – Jan 09 :	Fellow 'E' (Jr Assistant Professor equivalent), National Centre for Biological Sciences, TIFR, Bangalore, India.
Oct 02 – Oct 04 :	1851 Research Fellow, Department of Chemistry, University of Cambridge, UK.
Apr 01 – Oct 02 :	Postdoctoral Research Fellow, Department of Chemistry, University of Cambridge, UK.
Sept 97 – Feb 01 :	Graduate student, Department of Chemistry, Indian Institute of Science, Bangalore, India.

Current Research Interests

Structure and Dynamics of Nucleic Acids, Nucleic Acid Nanotechnology, Cellular and Subcellular Technologies.

Recognitions

Dec 12:	Member, Guha Research Conference, India.
May 12:	Track Chair ("Nucleic acid nanostructures in vivo"), FNANO Meeting Series.
May 12:	Editorial Board Member, IPSS, IISc Press (invited)
April 12:	DNA-18, Program Committee Member (invited)
Aug 11:	Executive Committee, Electron Microscopy Society of India (invited).
Sept 11-16:	Jury of Merck-Millipore India Innovation Award (Invited)
Oct 10:	Editorial Advisory Board Member of ChemBioChem (invited)
May 10:	Member, Global Young Academy (International Academy of Young Scientists)
Sept 08:	Invited by the Inter Academy Panel on International Issues (IAP) and the World Economic Forum for The Summer Davos 2008 at Tianjin, China.
Aug 08:	Joint Faculty member at the International Centre for Theoretical Sciences, Tata Institute of Fundamental Research (invited).
Nov 07:	Member, Asia-Pacific International Molecular Biology Network (invited)

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Jun 07:	Invited by the Nature Publishing Group as one of 25 prominent Young Scientists in Asia Pacific, for its 25th year celebration in Asia-Pacific.
Jun 05- 09:	Associate, Indian Academy of Sciences (by invitation).
Oct 03- 05:	Fellow of Wolfson College, University of Cambridge, UK.

Awards

Oct 12:	YIM-Boston Young Scientist Award
Sept 12:	RNA Society Fellowship
Apr 10:	Wellcome-Trust-DBT Alliance Senior Research Fellowship
Jan 10:	BK Bachhawat International Grant for Young Scientists.
May 09:	Indian National Science Academy (INSA) Young Scientist Medal.
Feb 07:	Innovative Young Biotechnologist Award from the Dept. of Biotechnology, Govt. of India. IYBA, 2006.
Oct 02:	1851 Research Fellowship** from the Royal Commission for the Exhibition of 1851.
Aug 95-96:	SK Ranganathan Scholarship for the topper in M.S., (Int PhD) Chemical Sciences, IISc, Bangalore.
Aug 94-95 & 95-96:	Freeship Awards instituted by IISc, Bangalore
Aug 94:	Helen Miller Award for the Best Outgoing Student of Women's Christian College, Madras. Mrs Kamakshi Award for Best Student in Chemistry Year III
Aug 93:	Mrs Ratna Rao Senior Prize for the Best Student in Chemistry Year II
Aug 92:	Mrs Ratna Rao Junior Prize for the Best Student in Chemistry Year I

*** More about the **1851 Research Fellowship** (An extract from the Commission's mandate)*
"…intended to give a few young scientists or engineers of exceptional promise the opportunity to conduct research for a period of two years. Approximately 6 awards are made to applicants from 53 countries. Most former awardees have achieved distinction in their own fields, and include 7 holders of the Order of Merit, 12 Nobel Laureates, 4 Presidents of the Royal Society and over 130 Fellows of the Royal Society.

Former 1851 Research Fellows (Year of Fellowship)
Ernest Rutherford (1895-98), Charles Glover Barkla (1899-02), Robert Robinson (1907-9), Walter Norman Haworth (1909-11), James Chadwick (1913-15), John Douglas Cockroft (1920-22), Paul Adrien Maurice Dirac (1925-28), Ernest Thomas Stinton Walton (1931-34), Alexander Robertus Todd (1931-34), John Warcup Cornforth (1939-42), Aaron Klug (1949-52), Sydney Brenner (1952-55), Sivaramakrishna Chandrasekhar (1954-1956).

Additional Duties at NCBS

Jan 10 – current:	Radiation Safety Officer of NCBS.
Jan 09 – current:	Setting up and running the TEM Facility at NCBS
Jan 09 – current:	Management team of the Central Imaging and Flow Facility at NCBS
Jan 07 – current:	Course teacher "Concepts in Chemical Biology" offered every alternate year.

Grants:

May 12:	Indo French Center for Promotion of Advanced Research (INR 10 mio over 3 years).
May 10:	IYBA Award Extension (INR 3 mio for 2 years)
May 10-15:	Wellcome Trust-DBT India Alliance SRF (INR 48 mio over 5 years).
Feb 08:	International Grant from the Company of Biologists towards organizing a conference on Impact of Nucleic Acid Nanostructure on Function. (6000 UKP)

	Grant from the NanoScience and Technology Initiative of the Dept of Science and Technology, Govt. of India for the same (Rs 5 mio). Dept of Biotechnology, Govt. of India for the same (Rs 1 mio).
Dec 06:	Travel Grant from the British Council, Building Futures - Indo-UK Nanotechnology initiative.
Sept 05-10:	Grant from the NanoScience and Technology Initiative of the Dept of Science and Technology, Govt. of India. (PIs: S. Mayor, G. V. Shivashankar and Y. Krishnan, NCBS, INR 90 mio).
Jan 05-07:	Travel Grant from the Interdisciplinary Research Collaboration in Nanotechnology (IRC Nanotech), UK to foster links following success of Exploratory grant.
Jan 03-05:	Exploratory grant from the IRC Nanotech, UK. (PIs: Y. Krishnan-Ghosh & S. Balasubramanian, Functional Nanostructures using G-Quadruplexes)

Mentorship:

List of National and International Awards given to PhD students and Postdocs for work at YK lab.

Dhiraj Bhatia:	Charpak Fellowship (Sept 2012),
Souvik Modi:	EMBO Long term Fellowship (Sept 2012)
Souvik Modi:	First Prize, Eli Lilly Asia Outstanding Thesis Award (2012)
Sunaina Surana:	EMBO conference fellowship, EMBL, Heidelberg, 2012
Sonali Saha:	First Prize, Best Poster Award, NCBS Annual Reviews (2012)
Dhiraj Bhatia:	International Travel Award, DNA-17, Caltech (2011)
Sunaina Surana:	First Prize, Best Poster Award, Society of Biological Chemists (India) (2011)
Justin Yeoman:	Leverhulme Trust Study Abroad Studentship (2010)
Souvik Modi:	International Travel Award, Biophysical Society (2009)
Dhiraj Bhatia & Shabana Mehtab:	First Prize, Best Poster Award, NCBS Annual Reviews (2009)

Archival Journal Referee for:

Angewandte Chemie, Biochimie, ChemBioChem, Chemical Communications, Chemistry a European Journal, Chemical Science, Chemical Society Reviews, Current Opinion in Biotechnology, Nature Chemistry, Nature Communications, Nature Nanotechnology, Nucleic Acids Research, Organic and Biomolecular Chemistry, Plos ONE, RNA Journal, Small

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List of Publications

1. Nature of linkage between the cationic headgroup and cholesteryl skeleton controls gene transfection efficiency. Ghosh Y. K.; Visweswariah S. S.; Bhattacharya, S.* *FEBS Lett.* 2000, *473*, 341-344.
2. First report of phase selective gelation of oil from oil/water mixtures. Possible implications toward containing oil spills. Bhattacharya, S.*; Krishnan-Ghosh, Y. *Chem Commun* 2001, 185-186.
3. Vesicle formation from oligo(oxyethylene)-bearing cholesteryl amphiphiles: Site-selective effects of oxyethylene units on the membrane order and thickness. Bhattacharya, S.*; Krishnan-Ghosh, Y. *Langmuir* 2001, *17*, 2067-2075.
4. Structure of cholest-5-en-3 beta-oxy-5-bromopentane by single-crystal X-ray diffraction at 130 K. Krishnan-Ghosh, Y.; Gopalan, R. S.; Kulkarni, G. U.; Bhattacharya, S.* *J. Mol. Structure* 2001, *560*, 345-355.
5. Membrane formation from oxyethylene bearing cationic cholesterol derivatives. Krishnan-Ghosh, Y., Bhattacharya, S.* *Ind. J. Chem. B* 2001, *40*, 891-894.
6. Thermal lipid order-disorder transitions in mixtures of cationic cholesteryl lipid analogues and dipalmitoyl phosphatidylcholine membranes. Krishnan-Ghosh, Y.; Indi, S. S.; Bhattacharya, S.* *J. Phys. Chem. B* 2001, *105*, 10257-10265.
7. Advantage of the ether linkage between the positive charge and the cholesteryl skeleton in cholesterol-based amphiphiles as vectors for gene delivery Ghosh Y. K.; Visweswariah, S. S.; Bhattacharya, S.* *Bioconjugate Chem.* 2002, *13*, 378-384.
8. 2-Halooxyethylene ethers of cholesterol as novel single component, room temperature cholesteric LC materials. Bhattacharya, S.*; Krishnan-Ghosh, Y. *Mol. Cryst. Liq. Cryst.* 2002, 381, 33-41.
9. Synthesis of a polymer-supported oxazolidine aldehyde for asymmetric chemistry. Wills, A. J.; Krishnan-Ghosh, Y.; Balasubramanian S.* *J. Org. Chem.* 2002, *67*, 6646-6652.
10. Enhanced cooperative binding of oligonucleotides to form DNA duplexes mediated by metal ion chelation. Horsey, I.; Krishnan-Ghosh, Y.; Balasubramanian, S.* *Chem. Commun.* 2002, 1950-1951.
11. Dynamic covalent chemistry on self-templating peptides: Formation of a disulfide-linked beta-hairpin mimic. Krishnan-Ghosh, Y.; Balasubramanian, S.* *Angew. Chem. Int. Ed.* 2003, *42*, 2171-2173
12. Formation of an interlocked quadruplex dimer by d(GGGT). Krishnan-Ghosh, Y.; Liu, D.; Balasubramanian, S.* *J. Am. Chem. Soc.* 2004, *126*, 11009-11016.
13. A PNA_4 quadruplex. Krishnan-Ghosh, Y.; Stephens, E.; Balasubramanian, S.* *J. Am. Chem. Soc.* 2004, *126*, 5944-5945.
14. Dynamic covalent chemistry on self-templating PNA oligomers: Formation of a bimolecular PNA quadruplex. Krishnan-Ghosh, Y.; Whitney, A. M.; Balasubramanian, S.* *Chem. Commun.* 2005, 3068-3070.
15. PNA forms an I-motif. Krishnan-Ghosh, Y.; Stephens, E.; Balasubramanian, S.* *Chem. Commun.* 2005, 5278-5280.
16. The PNA-DNA hybrid I-motif: Implications for sugar-sugar contacts in i-motif tetramerization. Modi, S., Wani, A. H., Krishnan, Y.* *Nucleic Acids Res.,* 2006, *34*, 4354-4363.
17. First Blueprint, Now Bricks: DNA as construction material on the nanoscale. Pitchiaya, S.; Krishnan, Y.*; *Chem. Soc. Rev.*, 2006, *35*, 1111-1121.
18. Structural Analysis of the Catalytic Core of Human Telomerase RNA by FRET and Molecular Modeling. Gavory, G.; Symmons, M. F.; Krishnan-Ghosh, Y.; Klenerman, D.; Balasubramanian, S.*, *Biochemistry*, 2006, *45*, 13304-13311.

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19. The I-tetraplex building block: Rational Design and Controlled Fabrication of robust 1D DNA Scaffolds via non-Watson Crick self assembly. Ghodke, H. B., Krishnan, R., Vignesh, K., Kumar, G. V. P., Narayana, C., Krishnan, Y.* *Angew. Chem. Int. Ed*. 2007, *46*, 2646-2649.
20. The RNA_2-PNA_2 Hybrid I-motif - A novel RNA-based building block. Chakraborty, S., Modi, S., Krishnan, Y.*, *Chem. Commun*., 2008, 70-72.
21. Kinetic Hybrid I-motifs: Intercepting DNA with RNA to form a DNA_2RNA_2 hybrid i-motif. Chakraborty, S., Krishnan, Y.* *Biochimie*, 2008, *90*, 1088-1095.
22. Combining G-quadruplex targeting motifs on a single PNA scaffold: A hybrid (3+1) PNA-DNA bimolecular quadruplex. Paul, A., Sengupta, P., Krishnan, Y., Ladame, S.* *Chem. Eur. J.*, 2008, *14*, 8682-8689.
23. Icosahedral DNA nanocapsules via modular assembly. Bhatia, D., Mehtab, S., Krishnan, R., Indi, S.S., Basu, A., Krishnan, Y.* *Angew. Chem. Int. Ed*., 2009, *48*, 4134 - 4137.
Featured on journal frontispiece.
24. A DNA nanomachine that maps spatial and temporal pH changes in living cells. Modi, S., Swetha, M. G., Goswami, D., Gupta, G. D., Mayor, S., Krishnan, Y.* *Nature Nanotechnology*, 2009, *4*, 325-330.
25. The poly dA helix: A new structural motif for high-performance DNA-based molecular switches. Chakraborty, S., Sharma, S., Maiti, P.K., Krishnan, Y.* *Nucleic Acids Res.*, 2009, *37*, 2810-2817.
26. pH Toggled DNA Architectures: Reversible Assembly of 3WJs into Extended 1D Architectures through A-motif Formation. Saha, S., Bhatia, D., Krishnan, Y.* *Small*, 2010, *6*, 1288-1292.
27. Structural DNA Nanotechnology: From bases to bricks, from structure to function. Modi, S., Bhatia, D., Simmel, F. C., Krishnan, Y.* *J. Phys. Chem. Lett.,* 2010, *1*,1999-2005.
28. Nucleic Acid Based Molecular Devices. Krishnan, Y., Simmel. F. C. *Angew. Chem. Int. Ed*., 2011, *50*, 3124 – 3156.
Featured on journal frontispiece.
29. A synthetic icosahedral DNA-based host-cargo complex for functional *in vivo* imaging. Bhatia, D., Surana, S., Chakraborty, S., Koushika, S. P., Krishnan, Y.* *Nature Communications*, 2011, *2*, 340.
30. A DNA nanomachine maps spatial and temporal pH changes in a multicellular living organism. Surana, S., Bhatt, J. M., Koushika, S.P.*, Krishnan, Y.* *Nature Communications,* 2011, *2*, 339.
31. Synthetic, biofunctional nucleic acid based molecular devices. Bhatia, D., Sharma, S., Krishnan, Y.* *Curr. Opin. Biotechnol*. 2011, *22*, 475-484.
Journal cover page.
32. A Method to Map Spatiotemporal pH Changes Inside Living Cells using a pH Triggered DNA Nanoswitch. Modi, S., Krishnan, Y.* *Methods Mol. Biol*. 2011, *749*, 61-77.
33. Tunable, colorimetric DNA based pH sensors mediated by A-motif formation. Saha, S., Chakraborty, K., Krishnan, Y.* *Chem*. *Commun*. 2012, *48*, 2513-2515.
34. Chakraborty, S., Mehtab, S., Patwardhan, A.R., Krishnan, Y.* Pri-miR-17-92a transcript folds into a tertiary structure and autoregulates its processing. *RNA*, 2012, *18*, 1014-1028.
35. Bhatia, D., Chakraborty, S., Krishnan, Y.* Designer DNA give RNAi more spine. *Nature Nanotechnology*, 2012, *7*, 344-346.
36. Krishnan, Y., Bathe, M. Designer Nucleic Acids to probe and program the Cell. *Trends in Cell Biol.* 2012, *22*, 624-633.
37. Surana, S., Krishnan, Y.* A method to map spatiotemporal pH changes in a multicellular living organism using a DNA nanosensor. *Methods Mol. Biol.* 2013, *991*, in press.
38. Bhatia, D., Chakraborty, S., Mehtab, S., Krishnan, Y.* A method to encapsulate molecular cargo within DNA icosahedra. *Methods Mol. Biol.* 2013, *991*, in press.

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39. Modi, S., Nizak, C., Surana, S., Krishnan, Y.* Simultaneous pH mapping of intersecting endocytic pathways enabled by programmed DNA nanomachines. 2013, under revision.

Patents:

1. Modular assembly of novel icosahedral DNA nanocapsules with encapsulating ability. Yamuna Krishnan. Under prosecution at USPTO.

2. The A-motif: A pH trigger for hybridization of DNA strands
   Saikat Chakraborty and Yamuna Krishnan.
   US Patent granted July 10, 2012. USPTO no: 8216850.

3. FRET based pH Sensor using nucleic acid assemblies.
   Yamuna Krishnan, Satyajit Mayor and Souvik Modi. Under prosecution at USPTO.

4. An engineered nucleic acid assembly, vector, cell, methods and kit thereof
   Souvik Modi and Yamuna Krishnan. Complete IN and PCT filed.

5. A process for encapsulating functional biomolecules and encapsulated product thereof.
   Dhiraj Bhatia and Yamuna Krishnan. Complete IN and PCT filed.
   Winner of the Amulya 2012 award from the Karnataka State Innovation Council.

Book Chapters:

1. pH sensitive DNA Devices. Saha, S., Krishnan, Y. *Nucleic Acids Conjugates and Sensors*, Eds. Fox, K. R., Brown, T. 2012, p. RSC Biomolecular Sciences series © 2012.
2. An Autonomous DNA nanodevice Captures pH maps of Living Cells in Culture and *in Vivo*. Surana, S., Modi, S., Krishnan, Y.* DNA 17, *Lecture Notes in Computer Science*, 2011, *6937*, 22-31. Eds Cardelli, L., Shih, W. Springer-Verlag, Berlin Heidelberg © 2011.
3. Designer nucleic acid based devices in nanomedicine. Bhatia, D., Krishnan, Y. DNA and RNA Nanotechnologies in Medicine, Diagnosis and Treatment of Diseases, Ed. Jan Barciszewski. Springer-Verlag, Berlin Heidelberg © 2013.

Press Reports

1. The game-changers. Sharma, K., *LiveMint & The Wall Street Journal*, Sept 2012.
2. Women in Chemistry — Interview with Yamuna Krishnan, Koester V., *Chemistry Views*, 2011 10.1002/chemv.201000073. (Most viewed of the series)
3. DNA nanomachines: Finding their way into worms. *Nature Nanotechnology*, 2011, doi:10.1038/nnano.2011.91.
   http://www.nature.com/nnano/reshigh/2011/0611/full/nnano.2011.91.html
4. Monitoring pH changes in vivo using a DNA sensor. Bhatnagar, J.
   http://www.indiabioscience.org/node/305
5. Giving DNA Nanodevices a New Role inside Living Systems. Sukumaran, A. *The Financial Express*, Nov 14th 2011, New Delhi.
6. Science News: DNA designs for Biology. Priyadarshini, S., *Nature India*, 29th June, 2011
   http://www.nature.com/nindia/2011/110629/full/nindia.2011.99.html
7. Featured Highlights: Nanomachines: Acid Test. Sandhu, A., *NPG Asia Materials*, 14th July, 2009.
8. Research Highlights: Nature's pH meter. Peng, W., *Nature Methods*, 2009, *6*, 404.

9. Spotlight: Self-assembled DNA nanocapsules for drug delivery. M. Berger., Apr 24th 2009, http://www.nanowerk.com/spotlight/spotid=10243.php.
10. Fritz Eckstein: *Faculty of 1000 Biology*, Apr 21st 2009, (F1000 factor: 8.0) http://www.f1000biology.com/article/id/1159106/evaluation
11. Research Highlight: Nanotrap cargo delivery. *Nature Asia-Pacific*, Apr 16th, 2009. http://www.nature.com/nindia/2009/090416/full/nindia.2009.104.html
12. Research Highlights: Acid-Base boogie. *Nature*, 2009, 458, 810.
13. A tiny litmus test for cells. Sanderson, K., 6th Apr, 2009, *Nature*, doi:10.1038/news.2009.340 http://www.nature.com/news/2009/090406/full/news.2009.340.html
14. 'I-switch' to detect acidity in cells. *The Hindu*, 11th Apr, 2009, page 2.
15. Spotlight: Synthetic DNA nanomachines go to work inside living cells. M. Berger., Apr 9th 2009, http://www.nanowerk.com/spotlight/spotid=10028.php
16. Indian scientists develop machine to measure cell acidity, track diseases. Apr 12th, 2009. http://english.sina.com/technology/2009/0412/233202.html (Chinese news)
17. Building more than Blocks of Life: Ahuja, S. featured in *The Deccan Herald*, Jun 5th 2007.
18. India's Young Blood: Yarnell, A. featured in *Chemical and Engineering News*, 2006, *84*, 12 online version only. See: pubs.acs.org/cen/multimedia/84/india/india.swf
19. Getting the Oil out: Bradley, M. Article 2 (*Chem Commun* 2001) featured in *Chemical and Engineering News*, 2001 Jan 29th, p 12.
20. Gels on Oily Waters. Featured on Chemweb. http://www.chemweb.com/alchem/articles/985883678635.html

Conferences

Feb 2008: Impact of Nucleic Acid Nanostructure on Function. Role: Sole Organizer
July 2012: Electron Microscopy Society of India 33rd Annual Meeting. Role: Organizing Committee
Jan 2013: International Symposium on Challenges in Chemical Biology: Role: Organizing Committee