

Dr. Jacinta S. D'Souza



Position: Adjunct Faculty

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Jacinta D'Souza received her Master's and doctoral degrees from TIFR, Mumbai in Molecular Biology. She worked as a Scientific Officer at TIFR from 1985 until January, 2009. She has been teaching Molecular Biology to CBS undergraduates since September 2007 and carrying out Research on the topic entitled, "Towards understanding the stress-induced interactome in the green chlorophyte *Chlamydomonas reinhardtii*" since June, 2008. Since then, two PhD and recently added four project students have been working on this topic. She joined DBT-ICT-Centre for Energy Biosciences, Matunga in February, 2009 as a Reader (Molecular Biology) where 8 students have been registered for carrying out their PhD dissertation in Biotechnological Sciences. Her areas of expertise include Molecular Biology, Biophysical Sciences, Macromolecular Interactions and Algal Sciences.

The flagellar interactome in *Chlamydomonas reinhardtii*

Chlamydomonas reinhardtii, a unicellular green alga, is attracting increasing attention as an evolutionary cousin of yeast and features that make it a popular and powerful model system for dissecting biological processes are its ability to grow rapidly in axenic cultures, a well-defined cell cycle, a single set of chromosomes, genetically and molecularly easily tractable and a plethora of mutants with aberrations in structural, metabolic and regulatory genes, therefore offering a complete toolset for genetic manipulation. Though not as well known as the *E. coli*, *C. elegans*, yeast, fruitflies and mice, *C. reinhardtii* are getting popular in laboratory science for varied purposes. The flagellum, an organelle present on the cell (two in number) is considered as a cell's antenna (more aptly called as the watchtower of a cell). Besides helping the cell to move, it is believed to operate as a sensory device by interacting with the environment through signalling and gene-expression networks.

The biologically relevant area being studied at the Life Sciences division of CBS using *C. reinhardtii*, include the understanding of the architecture of the flagellum, the biophysical basis of its movement and characterizing the sensory molecules involved in stress transduction; all these using an 'interactome-based approach'. Derivatives of these studies relevant to nano- and bio-technological purposes include the production of a synthetic nanomachine, scientifically tractable hypotheses (evolutionary) for the loss of motility by some cells thereby using *Chlamydomonas* flagella to make them motile, and importantly, the implications in ciliopathies and remedies sought for the ciliary disorders.

Selected Publications and GenBank Submissions:

- 1) M. Gudipati, J. S. D'Souza, J. A. Dharmadhikari, A. K. Dharmadhikari, B. J. Rao and D. Mathur, (2005) Optically-controllable, micron-sized motor based on live cells. *Optics Express* 13: 1555-1560.
- 2) J. A. Dharmadhikari, J. S. D'Souza, M. Gudipati, A. K. Dharmadhikari, B. J. Rao and D. Mathur, (2006) Sensitive, real-time monitoring of UV-induced stress in a single, live plant cell using an optical trap. *Sensors and Actuators, Chemical*, 115: 439-443.
- 3) J. S. D'Souza, M. Gudipati, J. A. Dharmadhikari, A. K. Dharmadhikari, *A. Kashyap, *M. Aiyer, U. Rao, D. Mathur and B. J. Rao, Flagella-generated forces reveal gear-type motor in single cells of the green alga, *Chlamydomonas reinhardtii*. (2009) BBRC 380: 266-270 (*Equal contribution).
- 4) Rao V. G., Khona D. K. and D'Souza J. S. (03-NOV-2008) Cloning of *fap144* (CBS-1), a flagellar gene from *Chlamydomonas reinhardtii*. (Accession no. FJ377311).
- 5) Khona D. K., Rao V. G. and D'Souza J. S. (31-MAR-2009) Cloning of *fap255* (CBS-2), a flagellar gene from *Chlamydomonas reinhardtii*. (Accession no. FJ808743).
- 6) Ruhi Sarafdar, Rao V. G., Khona D. K. and D'Souza J. S. Cloning of *fap174* (CBS-3), a flagellar gene from *Chlamydomonas reinhardtii*. (Awaiting accession no.).
- 7) Shaunak Dongre, Khona D. K., Rao V. G. and D'Souza J. S. Cloning of *bolA-like* (CBS-4) gene from *Chlamydomonas reinhardtii*. (Submitted in GenBank).