Darshan Ranganathan – A tribute

Death, be not proud, though some have called thee
Mighty and dreadful, for thou art not so;
For those whom thou think'st thou dost overthrow
Die not, poor Death,....

(John Donne (1572–1631); Holy Sonnets: Death, be not proud)

What is the most appropriate way to write a tribute to Darshan Ranganathan, who was so unfairly snatched away from our midst on 4 June 2001? Should one concentrate on her creativity, her enviable publications, her gentleness and dignity, her self-confident strides in overcoming the frosted glass ceiling which the establishment offered her throughout her career? The truth is that she was all this and more. She was devoted to her Ranga (her husband Subramania Ranganathan) and their Anand (only child), and her chemistry. She was totally absorbed in them, and other things were secondary. She never raised her voice, treated all as friends, bore no grudges, and collaborated readily with colleagues near and far. When she left us, she was already the most creative organic chemist of India, and was rising further. True, she was by no means prolific, but who amongst us can match her record of 11 papers in Journal of the American Chemical Society and 6 papers in the Journal of Organic Chemistry during the last five years? And even as we was leaving us, she was busy giving final touches to a review that she was writing for Accounts of Chemical Research.

Darshan was born to Shanti Swarup and Vidyawati Markan in Delhi, where she went to school and college. After her Ph D in organic chemistry in T. R. Seshadri’s group at Delhi University in 1966, she won the Senior Research Scholarship of the Royal Commission for the Exhibition of 1851 to go and work with Derek Barton at the Imperial College, London. Her work there was on organic natural products, and in particular on the structural elucidation of cycloartenol from jackfruit and on photochemical reactions of steroids. Barton was keen on clarifying the confusion that existed at that time on the actual structure and stereochemistry of cycloartenol, and Darshan’s involvement in the project helped solve the problem. Jackfruit, not being easily available in London, Darshan solved that problem too, in a manner typical of her. She had her mother ship it to her from Delhi by the bagful, in dry form.

Upon her return to Delhi in 1969, she took on a teaching job at one of the colleges of Delhi University and continued her work in natural product chemistry. It was at the Indo-Soviet Binational Conference on Natural Products held in Delhi in 1970 that she met Subramania Ranganathan. She asked him a question at the end of his talk there and, after answering it, he popped her the question that led them to become man and wife later that year. She moved to join him at the Indian Institute of Technology, Kanpur (IITK), and worked with him as his research associate.

This was the start of a legendary period in their twin careers, each supporting and enhancing the other to reach greater levels of creativity and achievement. Together they published papers, wrote scholarly books in organic chemistry, produced a monthly journal called Current Highlights in Organic Chemistry, which proved to be popular across the globe, a problem book in organic reaction mechanisms, and devised courses and lecture series in bio-organic chemistry. Their lives became so intertwined that to think of one without the other became impossible. She indulged him to indulge in art – origami and painting – while he indulged her with trips to town for the occasional movie or an eat-out. But she was a person self-contained, with little wants and no distractions. She was popular with students and was close to some of the faculty families; my wife and I count ourselves as among the closest friends she had, with whom she would discuss anything.

Bio-organic chemistry was her favourite area of activity. She was intrigued with the strategies that living systems have adopted to metabolize, replicate and transact with their environment, and wanted to simulate them in the organic chemical laboratory. She did so successfully in two instances.

The first was the chemical simulation of the ‘ATP-Imidazole Cycle’, wherein a daughter imidazole molecule was created from a parent imidazole template via a cyclic operation running parallel to Nature’s strategy (Ranganathan, D., Farooqui, F., Bhattacharyya, D., Mehrotra, S. and Kesavan, K., Tetrahedron, 1986, 42, 4481–4492; Ranganathan, D., Rathi, R. and Sharma, S., J. Org. Chem., 1990, 55, 4000–4010). The second was the synthetic organic chemical simulation of the ‘urea cycle’, wherein an appropriately protected ornithine was transformed into citrulline via a novel amide transfer reagent. The citrulline, in turn, was converted into argininosuccinate through a novel activation method that she devised, and the latter compound was fragmented to produce urea and regenerate the carrier molecule ornithine (Ranganathan, D. and Rathi, R., J. Org. Chem., 1990, 55, 2351–2354). She was thus able to mimic and use in the chemical laboratory what nature does in biological cells, namely utilize template and carrier molecules for the continuous and regenerative synthesis of molecules.

I will always harbour the sore point in me that Darshan was not given the credit and the position that she truly deserved early enough. Despite her track record of achievements and ongoing activities, she was never considered...
for a faculty position, while lesser colleagues rose to become Professors and Vice-Chancellors. There is no written rule that one should not appoint spouses in the same department or division; yet this is implicitly followed in several academic and research institutions in our country. The apprehensions cited are possible conflict of interest, interpersonal transactional difficulties and suchlike. When such practice gives no room for considering the merits of individual cases, it becomes counterproductive. (Of course, those who impose this practice can do nothing when two unmarried colleagues in the same department decide to tie the knot.) I am left with the wistful feeling that Darshan would have flowered more, much earlier, had she been offered a faculty position at IITK.

This feeling gains strength when one looks at the type of research ideas that Darshan initiated and published on, once she joined as a regular staff scientist at the Regional Research Laboratory, Thiruvananthapuram (RRLT) (which occurred along with Ranganathan’s retirement from IITK and move to RRLT as an Emeritus Scientist). It is appropriate here to record our appreciation to its directors A. D. Damodaran and G. Vijay Nair, and its Research Professor M. V. George for their foresight and generosity in offering her all the facilities during her stay and work there in the period 1993–1997. Given a full laboratory, research funds and students who flocked to work with her, Darshan blossomed forth. While template and carrier biomimetics were her earlier introductions to organic chemistry, it was the design of self-assembling molecular systems that she chose to concentrate on at Thiruvananthapuram and later. Ideas rushed forth, each more attractive than the other, and each one of them worked. She introduced rigidity into these molecular systems using norbornene and adamantane as building blocks, fixed their topology through the use of cyclic peptides, making them particularly with cystine and serine, played with depsipeptides so as to grant the structure some variation and breathing, used the oxalo dicarbonyl unit to turn the molecule in the desired direction and orientation, and chose residues with amphiphilicity and hydrogen-bonding abilities so that self-assembly of the resultant molecules into a supramolecular structure became automatic. She built peptide supramolecules that are hairpins, double helices, Janus-shaped two-helix bundles, parallel sheets, figure-eight shapes, channel-formers, bangle-stands and nanotubes.

Once having made them, she needed to ensure that their structures are what they are designed to be, and that they do what they are capable of doing—be it complexing ions and molecules, transferring them from one phase into another, channeling them across membranes, and so forth. This led her to seek out collaborators, notably K. P. Madhusudanan of the Central Drug Research Institute, Lucknow, A. C. Kunwar, A. V. S. Sarma and M. Vairamani of the Indian Institute of Chemical Technology (IICT), Hyderabad, and R. K. Mishra, R. Nagaraj, C. Sivakama Sundari, V. Srinivas, Dipankar Chatterji and myself at the neighbouring Centre for Cellular and Molecular Biology (CCMB). It was also my pleasure to have had the Ranganathas as Summer Visiting Scientists at the CCMB for three consecutive years.

It was during the course of this very active period that they made the move in 1998 from RRLT to IICT, she on transfer as a scientist and he as a Distinguished Scientist. With the ready availability of high resolution, high field NMR, mass and other analytical spectral facilities in-house and with eager collaborators at the IICT and CCMB available next door, Darshan’s programme in bio-organic chemistry progressed with greater strength and speed. The unstinted help offered by K. V. Raghavan, Director, and colleagues at the IICT, as well as some colleagues at the CCMB is worthy of appreciative mention. Each of us gave liberally of our time and expertise, and shone in collaborative glory.

But the most important of her collaborators over the last eight years has been Isabella L. Karle of the Laboratory for the Structure of Matter, Naval Research Laboratory of USA at Washington DC. It is a matter of true sorrow that these two remarkable ladies, who collaborated for over 7 years and published two dozen papers together, never got around to meet one another face to face! So alike in their dedication, gentleness, quiet dignity and winning smiles, the two would have enjoyed each other’s personal chemistry even more than the electronically exchanged one.

Honours and awards came her way, though somewhat late in life. She was elected to the fellowship of the Indian Academy of Sciences in 1991 and of the Indian National Science Academy in 1996. She was awarded the Jawaharlal Nehru Birth Centenary Visiting Fellowship of the latter in 2000, which she used for a lecture tour of England and Western Europe. She was honoured with the Third World Academy of Sciences Award (TWAS) in Chemistry in 1999, ‘for her outstanding contributions to bio-organic chemistry, particularly in supramolecular assemblies, molecular design and chemical simulations of key biological processes, as well as for designing hybrid peptides leading to a new class of cyclic receptors and membrane ion carriers’. The award was given to her at the meeting of TWAS in Tehran, Iran in October 2000.

Those of us who were in Tehran to listen to her elegant Award Lecture witnessed the discomfort that she was feeling, and took it to be due to allergy or an infection of her respiratory tract. Upon returning to Hyderabad, she went for a check-up and discovered that it was actually secondary metastasis of the breast cancer that she had fought and won over in 1997–1998. She was given the best of medical treatment at the Indo-American Cancer Hospital at Hyderabad by a team of dedicated and able doctors. Equally importantly, Professor Ranganathan and Anand were constantly with her, cheering her up and sparing no efforts at all. Despite these, she suffered much and breathed her last on the morning of June 4. One is led to wonder if there is something uncanny or premonitory about the date, since this was the very day that she was born sixty years ago; this was also the day that she married her partner in her joys and sorrows, Ranganathan, 31 years ago.

Darshan was an outstanding chemist, who moved the field with her ideas and achievements. She showed how versatile peptides are, and how they can be put together so easily, even in a not-so-well-endowed laboratory, to make assemblies that are objects of great beauty. Some of them will surely find interesting applications and uses. She
was an outstanding person too, one with great warmth, true innocence to the point of naïveté, quiet dignity, humility, equanimity and fortitude. She knew no pride, no bitterness, no envy and no anger. Indeed, never in the 31 years that we had known her as a close family friend did we see her lose her temper. Such was her nobility. We are much poorer in having lost her from our midst, but heaven will be richer.

D. BALASUBRAMANIAN
Hyderabad Eye Research Foundation,
LV Prasad Eye Institute,
Hyderabad 500 034, India
e-mail: dbala@lvpeye.stph.net

Environmental Chemist

People’s Science Institute (PSI) is a non-profit public interest research organization supporting processes of citizens’ empowerment and self-reliant economic development. It is looking for a person to lead its Environmental Quality Monitoring (EQM) Group.

Responsibilities include: Initiating and undertaking public interest research projects in EQM *Preparing research programmes, grants proposals and reports *Fund-raising *Carrying out chemical analyses and research on low-cost testing methods *Organizing training programmes for rural and urban communities *Guiding younger colleagues in EQM, EIA, and other research methods.

Essential Qualifications & Experiences: Age 30–35 years *Doctoral degree in Environmental Chemistry/Sciences from a reputed university *Minimum three years experience in independent research and operating analytical instruments like spectrophotometers, AAS, GC, etc. *Publications in reputed journals *Fluency in Hindi and English* *Demonstrated aptitude for public interest causes.

Additional Experiences: Work experience in EQM and knowledge of EIA methods desirable.

Salary: Consolidated monthly salary Rs 12,500 to Rs 15,000 (including employer’s PF contribution), depending on qualifications and experience.

Please send an application in your own handwriting with your C.V. and the names plus full contact details of two referees with whom you have worked. Your complete application should reach the Institute within 20 days of publication of this advertisement.

People’s Science Institute
252 Vasant Vihar-I
Dehra Doon 248 006, India
Tel: 0135-773849, 763649
Fax: 0135-780334

Typeset by WINTECS Typesetters (Ph: 3327311), Bangalore 560 021 and Printed at Printek Printers, Bangalore (Ph: 3287763)