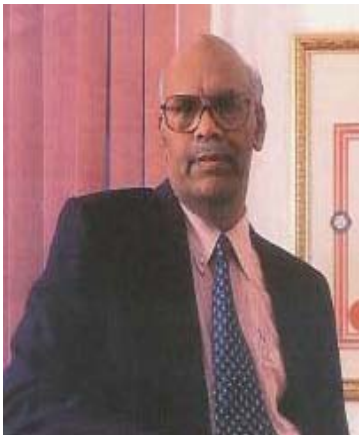
Padmashree Rama Rao - A man of distinction

A Tribute



Paying tribute to Dr.Rama Rao is, for me, much more than a professional or social obligation. It is almost a personal and moral duty. Right from the day I met him in 1973 at National Chemical Laboratory (NCL), Pune, and then on my return from USA in 1981 when I joined his group I have always considered him a role model, a perpetual source of inspiration and strength and a genuine asset to the profession. I have cherished my association with him throughout. If one is to enumerate his qualities, one may be overwhelmed by the feeling that no words could provide an adequate description. He is certainly a giant among present day scientists. However, I must briefly refer to some of the areas in which he has achieved rare distinction.

Born on the 2nd of April, 1935 in the city of Guntur, Andhra Pradesh, India Dr. Rama Rao obtained his basic degree in chemistry in 1956 from Andhra University and postgraduate degree in Chemical Technology from Bombay University in 1960. He obtained his Ph.D (Tech.) under the supervision of Prof.Venkataraman, the doyen of Organic Chemistry and the first Director of NCL and thereafter grew into a full-fledged researcher. As a Project leader at NCL (1965-1975), Dr.Rama Rao's research contributions were mainly focused on the isolation and structural elucidation of natural products derived from plants and insects. His work on lac dye, which was a commercial product in the early part of 20th century, was shown to be a mixture of four constituents, Laccaic acids A, B, C & D. His exploration of their biogenetic origin led him to the revision of other insect pigments such as Kermesic acid, Erythrolaccin, Ceroalbolinic acid, etc.

Dr. Rama Rao's incessant efforts to achieve academic excellence in organic chemistry took him to Prof.E.J.Corey (1991 Nobel Laureate) at Harvard University. After spending two years in E.J Corey's group (1975-'77) he returned to NCL and established a school of excellence for synthesis of biofunctional molecules in India. After 18 years Prof.E J Corey paid him this glowing tribute, "your superb role as a leader of chemical synthesis in India is well known and much admired"

Dr. Rama Rao's contribution to chemistry and medicine emerges from his studies on natural products and organic synthesis, and is spread over 250 research papers and several patents. His training of 109 graduate students for their Ph.D degrees and several post-doctoral fellows is evidence of his dedication and commitment to chemical education. He is responsible for initiating process chemistry in India and giving a fillip to the Indian Pharma industry in producing several life saving drugs at affordable prices. He remains as one of the most widely known and acknowledged scientists and technologists, both nationally and internationally.

Dr. Rama Rao's acceptance of the stewardship of the Indian Institute of Chemical Technology (IICT) (then known as RRL) made an excellent mark in his research career. Friends and colleagues were apprehensive that his unique genius would be diverted to administrative work. Fortunately however, these apprehensions were unfounded and once at the helm of IICT, synthetic organic chemistry in India and Dr. Rama Rao became synonymous. Within a short time several events unfolded at IICT. It was put on the world map as one of the top schools in organic chemistry and chemical technology. Here he also played the role of mentor for several

budding organic chemists and commanded an awesome respect and adulation from former students, colleagues and for that matter from everyone.

Dr.Rama Rao's brilliance is reflected in his contributions to organic synthesis. Taking off from the first step towards the target molecule, he proceeded using a simpler methods and cheaper strategies. His work on anti-tumor antibiotics such as Anthracyclines, Fredericamycin-A, Cervinomycins A1 and A2, Aronorosin, Lavendamycin, etc is well documented in books and reviews. He was the first to propose a novel methodology for the construction of the spiro[2,2]-nonane system present in Fredericamycin A and accomplished its total synthesis. His approach to the synthesis of FK-506k, a 23-membered macrolide with 14-asymmetric carbons and the methodology he adopted for the synthesis of MeBmt, an unusual amino acid present in cyclosporin-A, turned out to be a crucial contribution in the area of asymmetric synthesis.

Dr. Rama Rao opened up many new vistas in chemical synthesis. His contribution to the science of depsipeptides – Jaspamide and Geodiamolides clearly demonstrates his ability to successfully seize opportunities in new areas. His work on other macrolides such as Zearalenone, Rifamycin-S, Rhizoxin, Rapamycin, etc., is both creative and innovative.

Dr. Rama Rao was the first to establish in India the concept of chiral synthesis and technology. His work on Coriolic acid, Dimorphicolic acid, β-Lactam antibiotics, Azamacrolides, Camptothecin, Andrimid, Chrysanthemic acid, etc., demonstrates his ability to synthesize compounds of great structural diversity. He has made significant contributions to the total synthesis of complex naturally occurring biologically active compounds, investigating not only new synthetic strategies but also new synthetic methods. He led the way to establishing in India a school of excellence for the synthesis of bio-functional molecules. His group initiated work on K-13 and the methodology was extended to the synthesis of Vancomycin. They were successful in achieving the synthesis of vancomycinic acid and also the biphenyl segment of Vancomycin. Further, he was the first to demonstrate the ease with which a bromo or preferably a fluoro group adjacent to a nitro group can be displaced by OMe under mild conditions, which undoubtedly paved the way for the final synthesis of vancomycin achieved by Nicolaou and Evan's groups. He had the privilege of being invited to contribute an article on the synthesis of bio-functional molecules in a special issue published by Chemical Reviews (Sep.1995) that was edited by Sir D H R Barton.

He demonstrated a keen intuition in identifying projects at an early stage, which later led to products of immense industrial importance. He initiated work on AZT (Azidothymidine), the first curative agent for AIDS, and came out with an innovative and cost-effective approach that was used by M/s. CIPLA in introducing the drug in India at a cost of $0.30 per capsule against the international price of $3.0. He also contributed to the synthesis of other HIV-inhibitors such as Betzalladines, Calanolides, Mischellamines and Abbot's protease inhibitors.

Dr. Rama Rao also has the distinction of being one of the first Indian Scientists to take a lead in nurturing and fostering integration amongst basic science, technology formulations and engineering design to provide complete packages for commercial investments. His knowledge of drugs and the drug industry put him at the confluence of academia and industry. Looking back on the numerous occasions of collaborating together to develop processes for drugs of vital importance in the country, Dr.Y. K. Hamied, chairman and Managing Director of M/s CIPLA cites various examples such as salbutamol, vinblastine, vincristine, Etoposide, AZT, etc as fruits of their joint labour. Dr. S. K. Joshi, former Director General, CSIR, states, "Today the drug industry has a firm base of indigenous production and has made a mark in export markets; much of credit directly or indirectly goes to Dr. Rama Rao. He is the man with the 'Midas touch' who transforms any drug process development project to a roaring commercial success"

Dr. Rama Rao brought a phenomenal change in the functioning of IICT and saw to it that a large number of projects were sponsored by private industry, national and international. He is probably the only director in the history of CSIR who has built a world-class organic chemistry laboratory entirely from funds obtained from industry. It is his unique insight, as Prof. Bert Fraser-Reid says, "along with his boundless energy, dynamism and optimism that have combined to propel IICT into a top ranking research institution - a veritable model for developing nations to emulate".

Dr. Rama Rao has proved to be an outstanding scientific administrator too. Under his leadership (1985-1995) IICT emerged as CSIR's most reputed institution in chemical sciences and technology. Sir John Madox, Editor, "Nature" (Nature 366,626, Dec. 16th 1993) wrote thus: ''the most improved laboratory in India must be the Indian Institute of Chemical Technology at Hyderabad. The difference is not so much the change of name, but the arrival as Director of Dr. Rama Rao, a vigorous no-nonsense organic chemist of distinction."

Dr. Rama Rao is the leading light of the Indian Scientific horizon. He is extremely honest, frank, naturally blunt and fearless. His career is an example of vision and creativity, culminating in scientific excellence, which has won for him many accolades. He is a fellow of all National Academies and the Third World Academy of Sciences. He holds memberships in several international bodies and committees. He has served the Government of India as Chairman and as a member of various policymaking bodies. Among other distinctions, he has received the P C Roy medal, the Dr. Y Nayudamma Gold medal, the UDCT Diamond, the Om Prakash Bhasin Foundation Award, the Durga Prasad Khaitan Memorial Medal (Asiatic Society), the Viswakarma Medal (INSA), the Ranbaxy Research Foundation Award, the FICCI award, the VASVIK Award, etc. He is the first Indian to receive the technology award from the Third World Academy of Sciences. In recognition of his contributions to organic chemistry, the Government of India honored him with a civilian award, the "Padma Shri".

Dr. Rama Rao's research program on Organic Synthesis has found worldwide recognition. A number of budding scientists were associated with him over the years and they have all greatly benefited by their association with him. I am proud to say that I am one such beneficiary. I therefore have first-hand experience of Dr Rama Rao's outstanding and remarkable mentoring. His priority has always been to place the academic interest of his students, science and the nation above his own. He has earned fullsome praise both in India and abroad for constantly producing scholars of the highest calibre.

Age has not subdued him. He is still full of life, energy, enthusiasm and ideas. He left IICT on superannuation in 1995, with a dream to not only continue his first love, research, but also to create an institution which can train scientists and chemical technologists. This dream of his did not take much time to materialize when he was invited by Dai-ichi Karkaria to do research for which they themselves provided the space and the necessary infrastructure. They also invested in all preliminary requirements of the laboratory. It also received a boost through a contract grant of $200,000/- from the US Drug major, G D Searle. CSIR too provided a research grant of Rs 1.5 million for the purchase of analytical equipment.

Dr.Rama Rao spurred on by his unending zest for research in science and technology and his keenness to cater to the needs of pharmaceutical companies, went on to utilize these facilities fruitfully and established AVRA Laboratories. However the real challenge came when Cytomed, a US company, assigned him the task of stabilizing a molecule with anti-asthmatic properties. Dr. Rama Rao succeeded in making 100gms of the compound and stabilizing it. He says with a note of triumph that this has proved that "Indian expertise in process technology is second to none". AVRA Lab was thus the first to demonstrate its capabilities in innovative contract research. He is probably the most outstanding 'technopreneur' India has produced in the post-independent era with the unusual combination of world class academic excellence, skills in developing globally competitive technologies and entrepreneurship in setting up a flourishing knowledge- based industry. His faith and confidence, his expertise, and his demonstrated excellence in technology management have made AVRA a preferred global partner for collaborative and contractual R & D projects with some of the best names the world over.

My tribute to him will remain incomplete if I do not mention Smt. Hymavathi Rama Rao, his wife, who stood behind him all throughout and sacrificed some of her own personal desires to fully support Dr. Rama Rao in his extraordinary career. With all my heart, I wish them a very healthy, fruitful and rewarding life ahead.

Dr. J S Yadav
Director of Indian Institute of Chemical Technology
Hyderabad – 500 007
Tel.No. 91-40-27193030 / 27193234
Email ID: yadav@iict.res.in / jsyadav@iict.res.in

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