

Indian chemistry's Camelot: looking back at the glory days of IIT Kanpur

P. Balaram

Institutional rankings of all kinds dominate discussions of educational institutions in India nowadays. Distressed as politicians usually are at the relatively low ranking of our institutions in international surveys, it is not surprising that a consensus emerged that India should have its own ranking system. In any game it is advisable to set one's own rules. Thus, the NIRF rankings were born, with much fanfare, in 2015. Every year institutions obsess about their ranking and plot strategies to improve their 'marks' under various parameters. Some are easier to game than others. Discussions that revolve around 'improving rankings' often involve paid consultants. The lesson that marketing may be more important than the quality and durability of a product is usually well learnt in business schools. For private institutions the NIRF ranks are an opportunity to advertise themselves on the front pages of newspapers and sometimes on television channels, paying advertising costs, which would horrify financial managers in publicly funded institutions. As one who watches the annual hoopla about the NIRF and other rankings, I have often wondered about my own alma mater, the Indian Institute of Technology, Kanpur (IITK), where I spent two wonderful years in the late 1960s, a period where I first experienced the excitement of research. IITK does not hit the top of the charts every year when the rankings are announced. Has the institution decayed or have others improved beyond measure? I do not think so. For an institution located in the heartland of Uttar Pradesh for over six decades, IITK has demonstrated a remarkable resilience, embedded as it is in an environment which is hardly conducive to scholarship and reflection. What determines the influence that an institution has on its students? It is undoubtedly the passion and commitment that the faculty convey in their teaching and research. Rarely, in our environment do inspiring teachers also inspire students towards careers in research. The 'best' researchers, often judged by the cold metrics of the quantity of their publications and even more dangerously by the 'impact factors' of the journals in which they publish, are most often not only poor teachers, but invariably those who fail to communicate

the excitement of their chosen fields to their students. Researchers forget that they are educators too, tasked with the responsibility of training a new generation of scientists, in the hope that they will do far better than their teachers.

Looking back over a period of more than half a century, I could not help wondering what it was about IITK's chemistry department that drew so many of my generation and the next to research, at a time when academic positions were neither well paid nor considered particularly attractive. It was undoubtedly the faculty. Young and relatively unknown at that time, they conveyed a collective energy and passion for the subject which was infectious. In 1967, I entered completely ignorant of research, with a vague idea that competitive examinations that open the door to the Civil Services may be an option. An adolescent ambition to be a journalist was short-lived. Making ends meet in that profession might have required talents that I did not possess. I left in 1969, convinced that I would do nothing but research. There is a metaphor for an idyllic place. It is Camelot. Lerner and Lowe immortalized the fictional court of King Arthur in a Broadway musical: *'Don't let it be forgot, that once there was a spot, for one brief shining moment that was known as Camelot.'* Famously, Jacqueline Kennedy used the quote in describing John Kennedy's brief and tragic presidency shortly after his assassination. If there ever was a Camelot for chemistry in India, a subject often in need of a marketing makeover, it would be in IIT Kanpur of the late 1960s and early 1970s.

My introduction to the campus of IITK was in the summer of 1967, when as a raw student just out of college I appeared for an interview seeking admission to a relatively new M.Sc. programme in chemistry. I knew little about the subject and almost nothing about the institution. Kanpur railway station, crowded and noisy, where passengers alighting from early morning trains would have to step over the dozens of people still fast asleep on the platform, was not a welcoming sight. Neither was the interminably long cycle rickshaw ride, past the villages of Rawatpur and Kalyanpur particularly encouraging, until sudden-

ly, in the midst of a dreary landscape, a new campus appeared. Even at first sight it seemed different from the venerable, over a century old, surroundings of Fergusson College, Poona (now Pune) where I had just spent three years acquiring a B.Sc. degree. There was a newness about the campus, still a work in progress. But, even more importantly, when I diffidently stood before an apparently formidable (to my eyes) panel of interviewers, I sensed they were different. They oozed confidence and seemed comfortable with the ignorance of the students who stood before them. They asked questions about topics I had not heard of and appeared amused by the lack of preparation of the student before them. In later years, I realized that the institution was still unknown and the best of students were not flocking there, desperate to get in. The faculty, I believe, chose to work enthusiastically with those who did indeed join. The undergraduates were presumably a smarter lot, both younger and having come through an examination, which was yet to become the flagship operation of the IITs in the decades to come.

Indian universities, at that time, had well-established science departments, often performing extremely well in research. Delhi, Madras, Calcutta and Banaras, among others, were the places to go to. The IITs were still only a few years old engineering institutions, where the basic science departments were expected to teach and faculty were not compelled to undertake research. Each IIT had acquired the characteristics of the academic systems that prevailed in the countries which helped independent India set up the institutions. Madras had a German flavour, Bombay a whiff of the then powerful Soviet Union, and Delhi aided by the British seemed characterless, with English practices of hierarchy and formality, which were already ingrained in the universities with colonial origins. Kharagpur was an experiment that I had not heard of, neither had I heard of the much older Indian Institute of Science (IISc) in Bangalore. IITK was midwived into existence by a consortium of highly regarded American universities under the Kanpur Indo-American programme. Years later, I realized that a

visionary Director, P. K. Kelkar, knew well that an institution cannot be better than its faculty. Campuses, buildings and money are important ('infrastructure' was a word that entered everyday vocabulary much later), but recruiting the right faculty was the key to institutional success. The men (in those days women were scarce in the IITs) he brought in came mostly fresh from Ph.D.s in the US, educated during the post-war boom in federal science funding in the US, catalysed by the Vannevar Bush report. They spoke a different language of chemistry, far removed from the descriptive discourses that I had heard in college; it was no longer a subject that needed to be committed entirely to memory (although it did help, and still does, to remember facts). The different areas of the subject suddenly seemed interconnected. Inorganic, organic and physical chemistry were no longer subjects of the same religion, between which conversions were forbidden. Structure and mechanism, kinetics and thermodynamics and even quantum mechanics seemed to permeate chemistry. Surprise quizzes in class and seminars seemed part of normal routine. Organized laboratory classes, often the highlight of college chemistry decades ago, were less important. Projects and research formed the route to the laboratory. There was an air of ferment in the corridors and seminar halls, hard to describe, but still exciting for students in their late teens wondering about the future. Master's and Ph.D. students mixed easily taking the same courses, a feature almost non-existent in our universities; indeed the idea of having pre-Ph.D. courses was to be formalized in many institutions much later.

People make or break academic departments. IITK's chemistry department was dominated in the late 1960s and early 1970s by a triumvirate. C. N. R. Rao, M. V. George and P. T. Narasimhan (Figure 1). When I first saw them in the interview committee, in the summer of 1967, they were all young men in their prime, all three still below 40. Rao, short, stocky and amazingly energetic spoke with bubbling excitement of famous chemists, Pauling, Pitzer, Lewis and Eyring. He would in later years add to his repertoire of stories as he straddled chemistry's increasingly blurring borders with physics. Two qualities in a scientist which can never be underestimated are energy and enthusiasm. Both are infectious. Rao had these in abundance, propelling him to one of the most storied careers in science in India. George was a man with a serious visage (until he smiled,

eyes twinkling), methodical, a strict disciplinarian with a stern exterior, which masked a deep interest in students and their futures. He seemed to know everything about everyone and was invariably the most helpful to those in difficulty. He was the glue that held the department together. His organic chemistry lectures, perfectly prepared and impeccably illustrated on the blackboard, were marred only by his fondness for the 8 a.m. class; an hour which found students dragging themselves out of bed, struggling to avoid dozing, an act which would invariably result in a well-directed piece of chalk being flung in the direction of the offender. Narasimhan (PTN to his legion of admirers) was handsome, charming and often incomprehensible in class. He spoke of the Schrödinger equation and its solution for the hydrogen atom with an easy familiarity that left us novices dumbstruck. Hamiltonians and wave functions seemed to permeate his introduction to nuclear magnetic resonance (NMR). Much later I realized that I had never seen a real spectrum while the theory washed over me. PTN was a believer in the Dirac dictum that 'quantum mechanics explained much of physics and all of chemistry'. Not far behind, in the authority with which he spoke was A. Chakravorty, whose *Bible* was the inorganic chemistry textbook by Cotton and Wilkinson. Here too, atomic orbitals appeared with an alarming frequency, testimony to the extent that theory had penetrated American

chemistry teaching by the 1960s. He was a formidable figure, whose passion for metal ions was engaging. If I had any intention of continuing in chemistry it was still dormant in my mind, until I encountered S. Ranganathan (Ranga). He was always dressed in blue, with an obsessive love for organic chemistry. He had worked for several years with the legendary chemist R. B. Woodward, and had copied some Woodwardian traits. One of these was to use long words, which were unfamiliar to most of us; the other was to draw the most complex organic structures on the blackboard with great artistry and precision, using coloured chalk that he carried around. He never seemed to refer to any notes in class, although he once told me that he had them stuffed in his bulging pocket. The neurologist, Oliver Sacks described his childhood fascination for chemistry in the book *Uncle Tungsten: Memories of a Chemical Boyhood*. Here he narrates a tale of a love affair with the periodic table, calling it 'the enchanted garden of Mendeleev'. Ranga led our class into the rich garden of organic structures and mechanisms. I was so taken by his style that I spent my first summer vacation at Kanpur, working in his laboratory learning the techniques of organic chemistry and research from senior Ph.D. students. The hot Kanpur summer ensured that most work was done at night. It was during these long nights, often interrupted by breaks for nourishment, that I was seduced by chemistry.



Figure 1. The triumvirate in 1964 at IIT Kanpur. (From left) M. V. George, P. T. Narasimhan, C. N. R. Rao and G. K. Raut (who left in 1965 and moved to the USA). The photograph provided by N. Sathyamurthy. Source: <http://infolab.stanford.edu/pub/gio/personal/1965-India/IrvR/IITkanpur016.jpg>. Taken by Prof. Irving and Sandie Rabinowitz, 1963 and after, and scanned in August 2009 by Gio Wiederhold. The 'fourth man' was identified by C. N. R. Rao.

HISTORICAL NOTES

The second half of 1968 was memorable. There appeared in the library a copy of *The Atlantic*, a magazine which serialized James Watson's *The Double Helix* (Figure 2). The first part left me transfixed. Research was exciting; it was about real people and all the characters were hoping to change the world. In my impressionable years, a book that began with the throwaway sentence, 'I have never seen Francis Crick in a modest mood,' must surely be read. I waited breathlessly for the next issue of the magazine to arrive in the library. It did not disappoint. The final sentence of the famous paper on the DNA double helix by Watson and Crick ends with another classic throwaway sentence, 'It has not escaped our attention...', as the authors assure readers that they are fully aware of the implications of their structure for the mechanism of information transfer in biology. Around the same time, I attended a seminar by an Indian scientist, whose name I had not heard before. It was G. N. Ramachandran (GNR). He lectured on the structure of collagen and biopolymer conformations. His reputation had preceded him, presumably by the senior faculty telling their students about him. By the time the rumours about the speaker percolated down to us, we knew this was a seminar not to be missed. Seminars in the chemistry department were raucous affairs. Students, faculty and visitors were questioned mercilessly by the front row of senior faculty. They were sometimes gladiatorial contests, which brought welcome relief to students, especially the most junior ones, who were grateful that they were not the sacrificial lambs. GNR's seminar was different. The front row was subdued. There was a faintly forbidding air about the speaker. He sometimes paused and stood in silence. The disconcerted hosts rushed to produce glasses of water, which he ignored. He would suddenly smoothly resume the flow of his talk, which revealed that organic chemistry as we were taught had ignored the most important molecules of nature, the life-blood of biochemistry. October 1968 brought news of Hargobind Khorana's Nobel Prize. We basked in the reflected glory of his Indian origins. He was an organic chemist who developed the chemistry of nucleotide synthesis; yet his work was critical in establishing the genetic code, which we had not heard of at that time. This unexpected intrusion of biology into chemistry prompted Ranga and a young man whom I encountered for the first time, D. Balasubramanian (Balu), to

informally introduce a new subject to those who were interested. Gregarious, articulate, confident and friendly, Balu threw himself into the task of introducing biopolymers to the students in evening classes, while Ranga educated us on purines, pyrimidines and phosphodiester groups suddenly thrust into prominence by the new found importance of DNA. This was the first incursion of biology into IITK.

My last few months in 1969 were to be largely spent on a research project. I was by now hooked to organic chemistry. I wanted to continue my work with Ranga. However, the department had its own mechanisms and I was allotted to work with Balu. He was a young, dashing bachelor then, with many interests, movies and music amongst them. He even whizzed around campus in a car, a rarity then (memories of a Morris Minor are hazy). He had no laboratory, but suggested that I synthesize amides in order to study their protonation by absorption spectroscopy. I had little difficulty with the synthetic work. The previous summer had ensured that I had many friends in different laboratories. A senior faculty member, D. Devaprabhakar (Deva), an organic chemist, was most helpful. He was a kindly, gentle person, somewhat different from his more boisterous colleagues. Some years later he was a visiting professor at IISc. I was hugely encouraged by his reassuring and calming presence, even as I was establishing my own path in academia. Sadly, Deva died prematurely in 1978. At IITK in 1968–69, borrowing chemicals, apparatus and even a

little bench space was relatively easy, experiences that would help me a few years later when I began my own research at IISc. IITK taught me how valuable friendships are, even in the pursuit of research. Balu introduced me to peptides, a class of molecules which I studied later in my own career. There were others on the faculty who from their commitment to their teaching commanded respect, sometimes in subjects that seemed removed from one's own interests. J. C. Ahluwalia was a meticulous teacher of physical chemistry, a subject that I found dry then and only began to appreciate as I matured. P. K. Ghosh taught us thermodynamics, a subject which at the best of times most students would rather avoid, little realizing that it is central to science. In retrospect, it was the faculty who made the chemistry department at IITK such an exciting place. All of those whom I have mentioned, and some whom I have left out went on to influence the progress of chemistry and related disciplines in the years that followed. So too did the students they trained and the younger faculty who were recruited in subsequent years. But inevitably, as the years go by the environment changes, institutions and departments transform, their youthful energy sapped by the weight of middle age.

Nostalgia is common as one ages. But it helps sometimes to remember the good things of years gone by. In my title I have used the metaphor of Camelot. Were there other academic Camelots in post-independence India? I am sure there were many. G. N. Ramachandran's department in the



Figure 2. The January and February 1968 issues of *The Atlantic*, from the IIT Kanpur Central Library, which serialize James Watson's *The Double Helix* before the publication of the book.

1950s and 1960s at Madras University; physics, chemistry, botany and economics among others at Delhi in the early years after independence; metallurgy in Banaras and IISc; aeronautical and mechanical engineering at IISc; physics and chemistry at Kolkata University and so many others too numerous to mention. As we approach the 75th anniversary of independence, in an environment where we are often, sharply and jarringly, reminded of many wasted decades, a whiff of nostalgia maybe therapeutic.

I began with an allusion to Camelot and I must end with a memory. In musing

about places that appeared academically idyllic, I was reminded of Richard Burton's unforgettable rendition of the lyrics of the famous musical:

*'Think back on all the tales that you remember of Camelot,
Ask every person if he has heard the story,
and tell it strongly if he has not,
That once there was a fleeting wisp of glory,
For one brief shining moment, there was Camelot.'*

ACKNOWLEDGEMENTS. I thank Professors N. Sathyamurthy, K. J. Rao, G. Nagen-

drappa and M. S. Hegde for reading the manuscript and for their valuable inputs. I am grateful to Professor R. Gurunath for providing photographs of the 1968 issues of *The Atlantic*, from the IIT Kanpur library. This article is dedicated to the memory of Professors S. Ranganathan, M. V. George and P. T. Narasimhan, who inspired so many students to pursue careers in research.

P. Balaram is in the National Centre for Biological Sciences, Bengaluru 560 065, India.

e-mail: pb@iisc.ac.in
