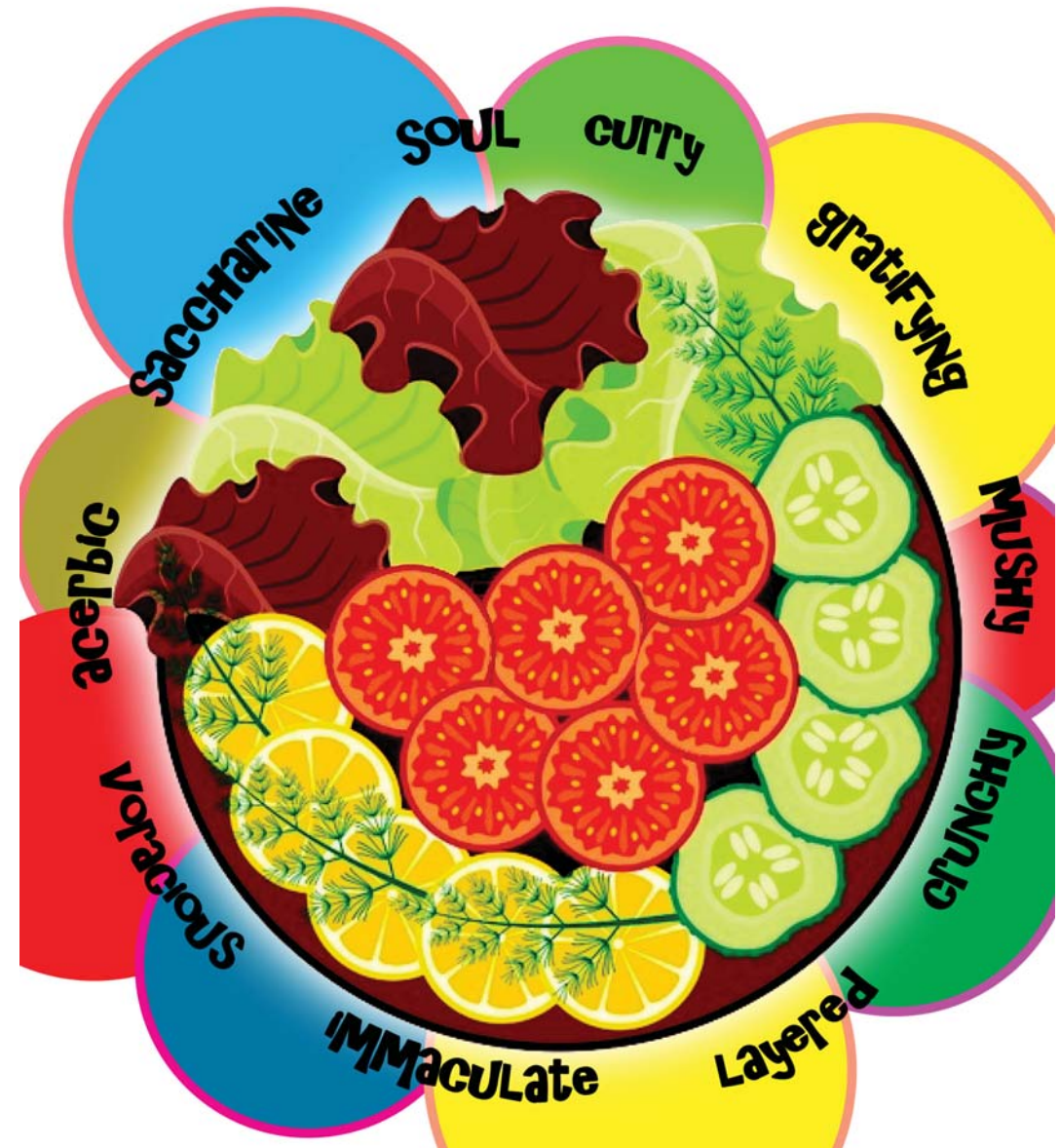
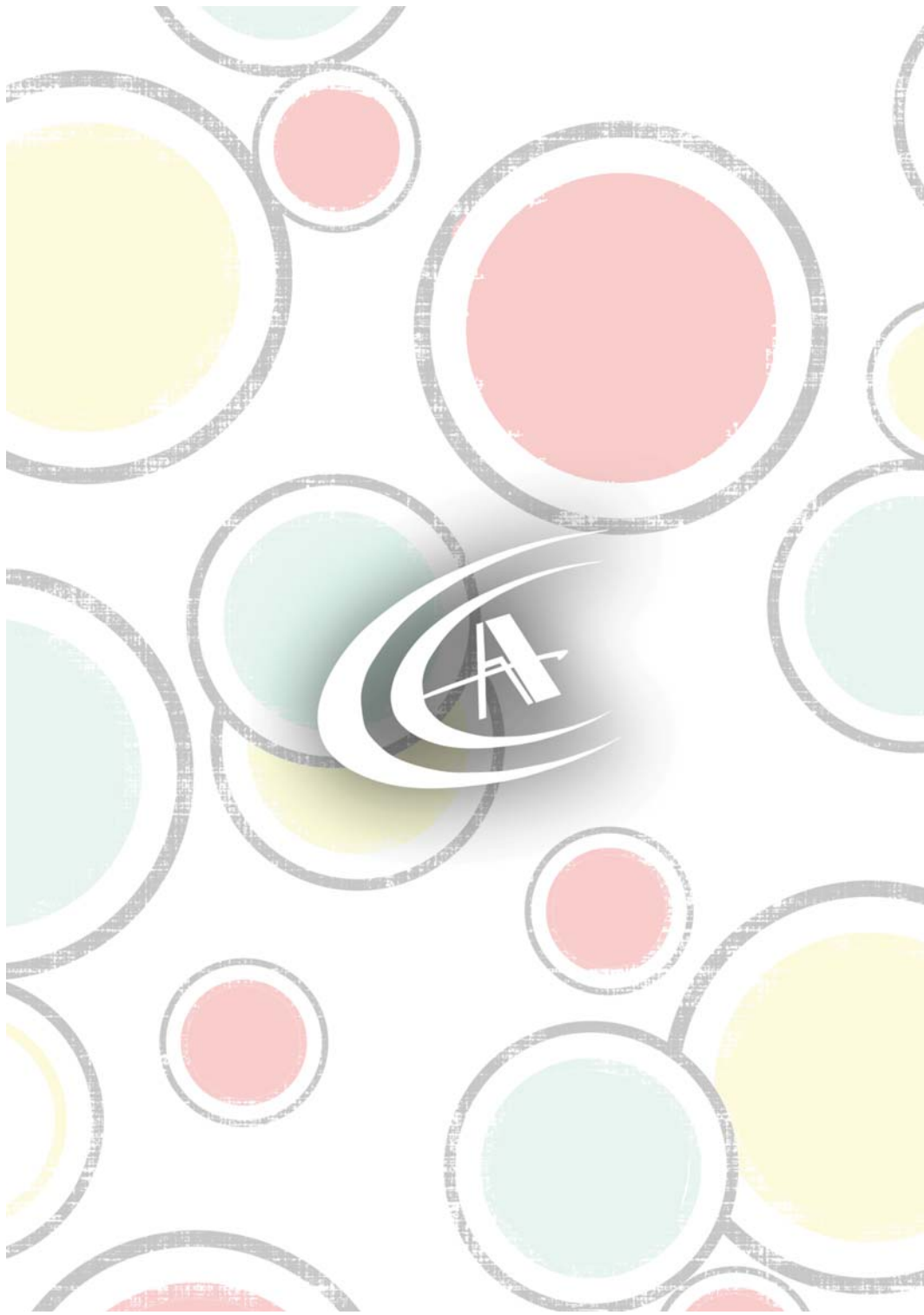


the **salad** bowl

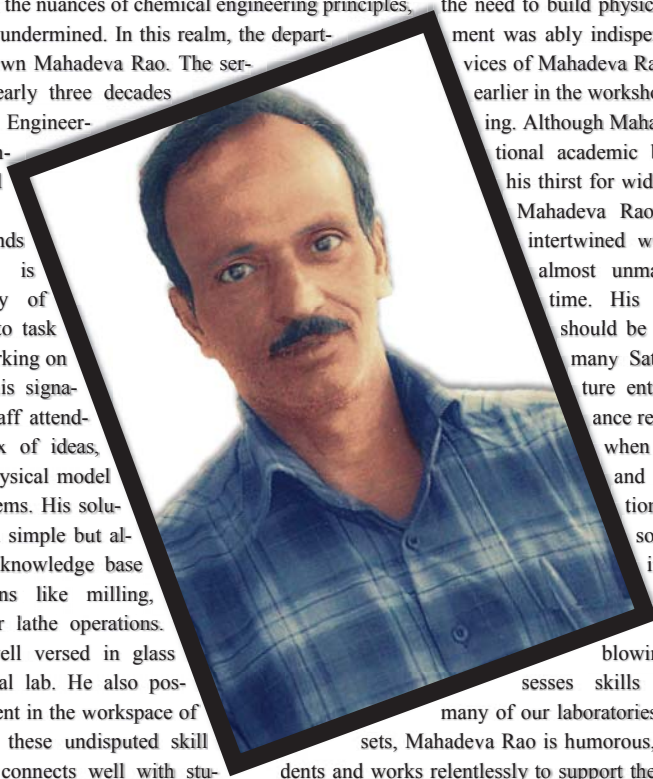
CEA Magazine 2014



A tribute to MAHADEVA RAO

"Whenever I went to Mahadeva Rao for any help, he never sent me back without offering a solution, be it with my setup or any other lab infra related issues. He manages to use any of the old scrap to use with fittings required for the setup. This greatly helps in reducing expenditure for the setup! Most of my setups were finished completely from scratch from the scrap of Workshop! All this reduced lot of time and efforts spent by research student in building a setup. His absence will create huge vacuum and I sincerely hope that we find a way to retain him."

"Experimental skills and design are an inevitable part of any core engineering science. In this backdrop of understanding the nuances of chemical engineering principles, the need to build physical working models cannot be undermined. In this realm, the department was ably indispensably supported by our very own Mahadeva Rao. The services of Mahadeva Rao has its humble beginnings nearly three decades earlier in the workshop of Department of Aerospace Engineering. Although Mahadeva Rao, did not have a conventional academic background, this did not quell his thirst for wide knowledge and application. Mahadeva Rao's dexterity and skill with hands intertwined with his immense concentration is almost unmatched bearing the testimony of time. His punctuality and commitment to task should be truly revered, as he is seen working on many Saturdays too. Going further, his signature entry is almost the first in the staff attendance register. Mahadeva Rao is a box of ideas when it comes to constructing a physical model and troubleshooting various problems. His solutions are not only ingenious and simple but also so cost effective. His working knowledge base includes mechanical operations like milling, turning, grinding and other lathe operations. Apart from this he also is well versed in glass blowing necessary in every chemical lab. He also possesses skills with carpentry which is evident in the workspace of many of our laboratories and some models. With all these undisputed skill sets, Mahadeva Rao is humorous, jovial and frank at heart. He connects well with students and works relentlessly to support them during crucial circumstances which saved them a lot of precious time and also kept them motivated."



"Instruments in Chemical Engineering are not used to down time - Mahadeva Rao ensured that they remain working for the past 30 years. From unloading heavy instruments to threading tiny screws - he has a solution for everything."

"I think he is one of the few supporting staffs in the Institute who is really student friendly. He is very hard working, committed and someone who has a strong will for students who come to him for their work. There are times clearly live in my memory when I have requested him, close to weekend, to do some machining work for me, and he has worked for me over weekends in spite of bad health. I thank him very much for his support and help. I wish him a very happy retirement."

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A few words before you begin...

Welcome to the all-new issue of the annual CEA magazine, imaginatively titled '*The salad bowl*'. The significance of the title may not be immediately apparent to the reader so I will spend a few moments detailing the thoughts that led to this selection. The 'salad bowl' is a metaphor used to describe the cultural milieu in countries where people from different backgrounds coexist and enrich the societal tapestry. It's much like a salad where several vegetables are tossed in a sauce and served on a plate; you can easily distinguish between the tastes and flavours of the vegetables used. The articles in this issue can be likened to the vegetables in the salad, each with its characteristic flavour or attribute, and the magazine to the salad itself, to be enjoyed as a chequered (and yet savoury) whole made of distinctly separate parts. Stretching it a little further, the ethos of our department can also be aptly described by the same metaphor: scores of students and faculty from all over India coming together for the purpose of research but retaining their distinctive cultural (and intellectual) identities. The interns who are here for the summer further add to the milieu creating a truly diverse setting here.

Coming to the contents, we have quite a few articles, poems, paintings and sketches jostling for space and representation in this offering. Dr. Gandhi's article on the contradictions in everyday life makes for entertaining and insightful reading. Other articles by Kapil, Rubesh, Balaaji and Subhasish serve to lighten the mood with their delightful essays and anecdotes while Srinivas has written a gripping thriller on terrorism. Anayat's plain-speaking article on Kashmir articulates the need for an honest initiative to dispel the deeply entrenched negativity by educating the masses. And probably for the first time ever, the magazine features a number of articles by summer interns and guests from across the shores, who have spent some time with us here. Helen's narrative of her experiences in India and Nathan's reminiscences of his brush with a hairdresser-turned-engineer glow with candour and warmth while articles by guests from closer home, Vemparala, Sourojeet, Shalini and Akshay, on a plethora of topics- classical Indian music, the onslaught of the social media, evolution, popular science books, existential questions- bubble with the fresh insights and enthusiasm of the young brigade of the country. A separate section on poems, '*lyrical musings*', offers us a glimpse into the latent poetic talents of the students and faculty. Dr. Gandhi raises a toast to Prof. Bird of the proverbial trio, Bird-Stewart-Lightfoot, with his ode to the evergreen nonagenarian while Jitendra weaves the hallmarks of our life here in the institute into a wonderfully jocular poem. Two other poems, a poignant one by summer intern Sagar and another defeatist by a student writing under the pseudonym 'Nemo', conclude this section. The next segment on paintings, '*the palette*', showcases Satyaghosh's works, and his knack for the art, while Ravi stupefies us with his inimitable pencil sketches in '*wonders with pencil*'. Photos by Rubesh and Satyaghosh taken in different parts of the campus fill up the last section '*through the lens*'. Finally, Dr. Rahul Roy sums up the year gone by as CEA president with vivid accounts of the events and activities organized by the association under his stewardship.

In addition to the above, we are running a feature article on the game-changers in chemical engineering, where we profile a few chemical engineers who revolutionised the field with their fresh insights, novel approaches and pioneering ideas/methods. No doubt, the list is not exhaustive and reflects only our opinion on the advances made in this discipline in the years since its inception.

Further, in keeping with the times (read: World Cup 2014) and the ensuing football frenzy among the youth and old alike, we attempted to satiate the appetite of the football-crazed by including a crossword on the game. Hope you enjoy working it out.

Before I wind up, I have to thank a few people whose untiring, unheralded efforts helped to make this edition more presentable. Heartfelt thanks to Rubesh did most of the designing (or dressing, if you may) and to Arjun, a summer intern here and a virtual Adobe Photoshop® pro for designing the cover, contents and a few other pages. Several others have given us their feedback on the layout and designs, and we are grateful to them for the improvements that have come about as a result. The biggest thanks, however, are due to the people who contributed articles, poems and photos for the magazine; they made it happen. This magazine is the result of weeks of toiling on the articles, the layout, and the features and we hope you would find it enjoyable. However, being the editor, I alone am responsible for any errors in the text, inadvertent or otherwise.

So, now, I will rest my pen, or rather, the keys of my keyboard, and let you indulge your senses to the spread on offer. *Bon appetit!*

Sayani Majumdar (Editor)

Message from the CHAIRMAN



Dr. K Ganapathy Ayappa

I welcome you read and enjoy the 2014 Chemical Engineering Association (CEA) magazine. The timing for the newsletter is very appropriate. We have our ME students who have just completed their project presentations and will leave the Institute to follow their career paths. We wish them success in their future endeavours. The highlight of the summer is the vibrant Summer Internship program. This year we have about 30 students from different parts of the country visiting us and spending time in our laboratories interacting with students and faculty. The newsletter gives everyone a chance to bring out their 'non-technical' writing skills and very appropriately, reflects the wide range of interests among the students and faculty of the department. I also noticed several of the contributions are from summer students as well as international visitors who have spend some time with us and we thank them for their efforts. The newsletter is entirely co-ordinated by the students and I hope you enjoy its contents.

reflection inner meaning meditative
 probing deep musings

Dialectics of Contradictions

Dr. K.S. Gandhi



life
pondering
soul-searching
crisis
thoughts

Life is full of polar opposites or contradictions. The opposites are inseparable, if you like, bi-continuous in nature. Logical study of the interplay between a pair is dialectics of contradictions. Now the very existence of contradictions is unsettling since they are an eternal source of tension. Several Utopian theories have promised hope of relief from contradictions. Look at one classic polar opposite pair: me versus others. Wouldn't it be great if others were not there to oppose me! 'Vedanta' offers a resolution of this problem: actually, me and you all are one and the same, part of an 'atma'. But this polar opposite is not so easily resolvable. Suppose others were not there to applaud me, and say 'wah' and wow, one can imagine the kind of dull life I would have! We need and don't need others. Conflict seems inevitable. Another ancient one is between continuity and change. Continuity offers security, and boredom, while change offers excitement but turmoil. Well, all of us have heard of one solution: if only we return to good old values, especially from parents! It is part of an eternal search for homogeneity and so a conflictless unity. I call the proponents of this no-changers. But there is a serious problem. The values parents want their children to return to are not the same as the values which their parents wanted them to return to. If we now trace this back and back, we will find that there are no 'the good values'. Good values are like the river of Siddhartha, ever changing and yet ever there! Therefore, it depends on which bank of the river and where one is sitting. Besides this, there is this practical problem of living in caves etc. No



change is no solution. Marxism has a different proposal. Conflict is 'fundamentally' economic, between the haves and have-nots, like some else taking away the only job you wanted. One might think that contradiction vanishes if have-nots simply eliminate haves. Not so simple. Marx pointed out a strange reversal of symmetry that occurs. Have-nots, after annihilating the haves, behave like haves and the very process of elimination gives birth to new have-nots! History repeats and the sequence continues. Where then is hope? Marx assured that the series is convergent, economic disparities are eventually removed, and a conflict-free 'classless' society will dawn. There could be objections to this resolution also. What about that lovely partner who chose one but 'shifted' to that competitor of the original one? That doesn't look economics based! But Marx would say: Look carefully, may be the competitor has a Ferrari or a penthouse apartment overlooking Raj Bhavan, although I would not know why anyone would ever want to overlook the Raj Bhavan. But one can still persist. What about the rich Ranbir marrying the down-trodden Deepika? Surely, it happens all the time in Bollywood. May be it does happen once in a blue moon in real life too. As is well known, scientific theories can never be proved, they can only be disproved. A 'once in a blue moon event' is then enough to sow doubts on this theory too.

It appears to me that conflicts, at least many, can never be resolved. I look closer to home to bolster my argument. Take for example the pair of learning versus passing exams. This one is well known and seems to have existed since eternity as it was there when I was a student too. You might think, well pass the exams, and the conflict is gone. Not quite. Suppose you end up in my profession, then, the contradiction will come back like a ghost, and stare in your face in the very first class you teach! Facing interviews is another place where you see the contradiction come alive. You can even think that you will junk ChE and join MBA. No, no, even that won't help. Employers seem to think that ex-engineers 'know' their analytics. Let us look at another one. Should one take a job based on the work one loves or on the fatness of the pay packet? You may think that the fat one wins hands down. Not really. Pay packets generally have big hidden pockets of boredom. Many a student has forsaken a hard won prize to return to studies, yes, to studies! An-

other great one, special to academic departments like ours, is learning versus doing. All students, and some faculty like me, find no end to learning and it follows of course that they find no time to do, research. 'But, honestly, can you do good research without learning!?' Prof. Narendra Dixit recently forwarded an article that refers to this issue. I have many more unresolvable conflicts, and I don't give them since I think I proved my point.

It looks like there is no alternative but to live with polar opposites. To live with those means to find a balance. Art of living a meaningful life is wholly dependent upon the continual practice of discovering one's own balance: not imitating others'. When asked about a contradiction, that ardent believer in Marxism, Mao Zedong famously said: One must walk on both legs.

way of life



Kapil Newar

The Girl who Married an Indoree

This is the story of a non-Indoree girl who married an Indoree boy. An Indoree is a person who lives in the city of Indore in the state of Madhya Pradesh. After marrying an Indoree, her life gets divided into two phases: 'before Indore' and 'after Indore'. She cooked *poha* in breakfast more often than she ever cooked anything in her whole life before Indore. *Poha* is a famous breakfast dish. In Bangalore, locals also try to make *poha* and call it *awlaki bhat*. She came to know that adding *senv*, a *namkeen* snack to any recipe was a perfectly legitimate way of cooking food. She also came to know that *chapati-senv* could also be a very lovely wholesome meal. She was surprised that we just didn't add *senv* in tea or water. She realized that every Indoree will tell you that everything is cheaper and better in Indore. She found that if you dare ask an Indoree what he loves in Indore, he would rattle off about 200 names of chats in a single breath. She learnt that Sarafa and Chappan are the religious places for

Indoree's. Chappan is a place where there were 56 big shops in a single line, all of them selling different variety of *chats*. Sarafa is a *chat-chaupati* night place. It opens at 12 am and closes at around 3 am. She also learnt that Indoree's are more proud of Rajwada than she could ever be of anything in her whole life. At Rajwada, there is a nice fort which no one really cares about. All the Indoree's care about are the shops selling food items near it. Even if you do not want to know, they will tell you about the two big shops which don't have the closing door. These are like 24 hrs "All Time *Chaat Service*". Sometimes ATMs can be down but these shops are never down and Indoree's are also never down. Now she had become a gourmand and hence a proper Indoree.

Kapil is a 2nd Year M.E. student with Dr. Narendra Dixit.

heart-warming



Helen Alexander

Second Helping of Dosa

A Visitor's Experiences at IISc

I visited Bangalore for the first time in April 2013. The first thing that struck me, staring bleary-eyed out the window as my early morning flight approached the city, was the landscape: red earth, grey rock, green coconut trees. It was unlike anything I'd seen back home. An hour later, as our driver navigated with a generous amount of honking past temples, tea stands, and loaded motorbikes on the airport road, it was clear that I'd arrived somewhere completely new.

I grew up and studied in Canada before moving to Switzerland in September 2010 to start my PhD at the ETH Zurich. Since then, I have made several short trips within Western Europe, and have previously travelled alone for six weeks in New Zealand. But I'd never been anywhere as different – in landscape, climate, or above all culture – as India. As I prepared for my first trip, I couldn't decide what worried me more: that I would be overwhelmed by vast differences and struggle through the three week stay, or that globalization really had won out and it would be disappointingly similar to home. To my relief, it turned out to be neither.

The opportunity to visit Bangalore, specifically the IISc, came thanks to the Indo-Swiss Joint Research

"while our approaches to modelling differ in some aspects, our interests in applied biological problems share much overlap"

Programme. With support from both countries, paired research groups receive funding for exchange and scientific collaboration. Prof. Narendra Dixit and my PhD supervisor

Sebastian Bonhoeffer, professor of Theoretical Biology at the ETH, successfully applied together for a grant. The proposed research project involves developing a mathematical model of HIV replication within a person's body to help understand how recombination (the exchange of genetic material among viral variants) may accelerate viral adaptation to an immune response that varies from person

to person. As well as the two professors, Pradeep Nagaraja and I got on board to tackle this problem. The grant lasts two years and funds one visit per year in each direction. As many of you have probably also experienced in your research projects, whether within your own group or in external collaborations, personal interactions are invaluable. On each visit I have been pleasantly surprised by how much progress we can make in a short time when we put all our four heads together and focus on one task. I have certainly learned a lot about the biology of HIV "immune escape" as well as



View over Zurich's old town with the Limmat River flowing through. The main building of the ETH is in the top right corner (black dome just visible) and the Theoretical Biology group works just up the street from here.

technical skills like programming in C. But this exchange programme has meant much more to me than our specific scientific project.

During my two visits to Bangalore in April 2013 and May 2014, I was immersed for a few weeks in the academic and social life of a different lab in a different university setting. Through informal presentations and discussions with all the lab members, Sebastian and I got an overview of the various projects going on in Prof. Dixit's group and saw that, while our approaches to modelling

differ in some aspects, our interests in applied biological problems share much overlap. We quickly came to wish that the entire lab could come visit us! Our labs also have in common a friendly, collegial atmosphere, fostered by professors who see the value in interactions and a pleasant working environment. However, there are several differences in the group structure too. Our group in Zurich (www.tb.ethz.ch) is substantially larger: around 15 people, counting research associates and post-docs at various stages, as well as PhD students. This number is boosted by one or two Master's students at a time, who join the group for up to 6 months. Furthermore, we are embedded in a larger research community and share journal clubs, seminar series, and weekly meetings with several other groups (mainly in experimental biology). This network creates a dynamic academic environment, as well as a wide social circle. It is always possible to get enough people together for our annual lab trips or just a drink after work. But it's hard to keep in touch with everyone regularly and impossible to schedule dates that suit every lab member.

Prof. Dixit's group, meanwhile, is smaller and more close-knit. Simply being able to fit every student's working space into one office, with the professor's office adjoining, goes a long way toward boosting interactions and making it easy to turn to any colleague for help on a research problem, discussion of ideas, or just a coffee break. I was impressed by how well the students all seemed to know and support each other, and appreciated

"[At ETH] the PhD position is treated like a job with a contract and salary..[with] working hours from 9 am to 6 pm. Working at night, unlike in your department, is almost unheard of"

the possibility of getting the entire group together for lunch or dinner. The contained campus setting, where most students live as well as study, is familiar to me from my undergraduate studies in Canada, but contrasts with the situation in

Zurich, where university buildings are integrated into the city and most students go their separate ways after classes or work. The PhD program also follows a different structure at our respective universities. At the IISc, I learned, PhD students are selected on the department level in a yearly application process and most receive their own stipends from the government. At the ETH, individual professors make the choice to take on individual students at any time of year, and the students are paid through the professor's university funding or grants. Furthermore, PhD



Me with Kabil, Chaitanya, and Vipul at the Rangancabüttu Bird Sanctuary on a day trip to Mysore. (Inset) Enjoying lunch at the Faculty Club with Vipul, Pradeep, Prof. Dixit, Sebastian, and Pranesh.

students at the ETH have fewer and more flexible course requirements than at the IISc. Research begins immediately and remains the focus, while a few credit points need to be picked up along the way. Like the "hiring" process, the selection of lectures, seminars, or workshops to attend is left to the individual student and his or her supervisor, with no compulsory courses set by the department. The entire PhD tends to be shorter here: as little as three years, if the project is well-defined and grant funding is limited; and rarely more than five years. As

PhD students with Sebastian we are given substantial freedom to follow problems that interest us, though less open-ended PhDs are more typical in Swiss groups. The PhD position is treated much like a job with a contract and salary. Working hours – though in principle flexible – tend to fall in line with standard working days: most students are in the lab/office from roughly 9 a.m. to 6 p.m., while working at night, unlike in your department, is almost unheard of.

Beyond this insight into the similarities and differences of academic life between our universities, fascinating discussions over meals allowed us to exchange our perspectives on politics, religion, societal structure, education, and career opportunities in our respective countries. From these conversations, sometimes serious and sometimes lighthearted, I learned so much about Indian culture that I could not have picked up without interactions with local hosts. The members of Prof. Dixit's

it's lab, and several other members of the Chemical Engineering department whom I had the pleasure to meet, indeed went above and beyond what I ever would have expected of our hosts. I was blown away by the warm welcome and generosity that they showed me. In response to my enthusiasm, the students took it upon themselves to make sure I experienced something of the local culture first-hand, and rapidly accumulated a list of foods to make sure I tried and places to take me to see. It soon became apparent that I'd need to come back again to make more than a small dent in the list! Visiting IISc, moreover, put me in contact with students from all over the country, who told me about their local customs and helped me gain a greater sense of India's regional diversity. There are many Indian immigrants in Canada (mainly from northern states), so certain foods and customs were not completely new to me. But there is nothing like experiencing the real thing at its source.



Cows of the world...on the Bangalore highway and in the Swiss Alps.



In Bangalore, I made my first foray into southern Indian cuisine: dosa, idly, Maddur vada, chow chow bath, curd rice, ... Then there were the miniature bananas, young green coconuts sold on the roadside, and amazing juicy fresh mangoes – what a happy coincidence to arrive in mango season! Such tropical fruits, when available at all, are not half as good at home. We managed to cover a vast range of eateries, from the hostel mess and Faculty Club on campus, to Paratha Plaza off New BEL Road and the CTR (where along with the famous dosa, I tried my first Indian-style filter coffee). To answer a frequent question: yes, I eat curry at home, but no, it's not as spicy! Eating spicy cooked dishes at every meal, including breakfast, was new for me. Occasionally we visited a “Western”-style eatery and it was interesting to see which global chains had reached the Indian market or not – and how they had adapted their menu to local tastes, for instance with the spicy paneer pizza from Dominoes, definitely not to be found at the branch across from our office building in Zurich! I quickly established my favourites, and my standard order of lime soda at Nesara soon became a stand-

ing joke in the lab.

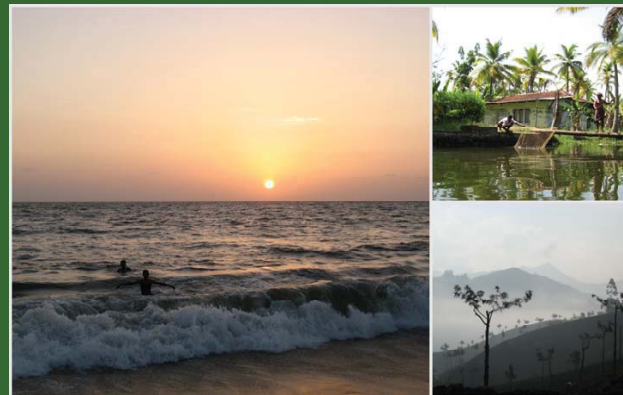
Thanks to my local hosts, I had the kind of insider experience of Bangalore that I never would have had as an independent tourist. I attended a concert of South Indian classical music thanks to the organization of Prof. Dixit; roamed the shelves of Vipul's favourite downtown bookshop (Blossoms); marvelled at the sprawling “ecology tree” on campus; and went with several lab mates to see a Bollywood movie. I also will never forget my first visit to a Hindu temple, where my three “guides” simultaneously tried to explain Hinduism to me (interrupted by sidelines to debate amongst themselves over the variable details), and I meanwhile tried to take in all the unfamiliar sights and sounds, while hoping that I did not inadvertently do anything offensive. Hinduism, I realized, is difficult if not impossible to explain in a nutshell!

The weekends offered an opportunity to travel out of the city. One of the greatest excitements of my first stay was a day trip to Nandi Hills, where I marvelled at the rocky landscape from ground level this time and was excited to see monkeys roaming freely. This trip was essentially my first taste of life off campus, including riding the public bus, passing through small town markets, and seeing ordinary homes of rural Karnataka. I took it all in with wide eyes. It was both fascinating and sometimes difficult to see the realities of life outside the campus gates.

I also took some extra time on my visits to travel further afield on my own. Last year I spent nine days in Kerala, while this year I spent a weekend in Coorg. My adventures there would fill another whole article. But suffice it to say that this was, to me, what travel is meant to be: an enriching experience... not always comfortable, but always interesting. I certainly took extra precautions as a woman travel-

“I attended a concert of South Indian classical music, roamed Vipul's favourite downtown bookshop, Blossoms, marveled at the 'Ecology tree' on campus, and went to see a Bollywood movie”

Travelling in Kerala



(Clockwise from left) Sunset over the Arabian Sea on Alappuzha Beach; Fishermen in the Backwaters near Alappuzha; Early morning on the tea plantations near Munnar

ling alone, but more often than I encountered any questionable characters, I encountered people whose warmth and hospitality amazed me. Strangers went out of their way to point me in the right direction and make sure I was okay. Without travel companions, I was also more open to interacting with local people, who in return were typically friendly and more willing to chat than strangers at home. Some of the best experiences were the unplanned ones. On the beach in Alappuzha I learned a few words of Malayalam and within half an hour had been invited to a yet-to-be-arranged wedding the following year, while in Kumily a family welcomed me into their home for traditional food and henna, warm smiles making up for the language barrier. My experiences in these few days opened my mind and fuelled my desire to explore the wider world.

“...best experiences were unplanned... in Alappuzha, I learnt a few words of Malayalam and..[was].. invited to a yet-to-be-arranged wedding. In Kumily, a family welcomed me into their home for traditional food and henna.”

It is hard to capture in words the array of sensory experiences in India that struck me, fascinated me, delighted me, confused me... and sometimes all of the above at once. From the orderly chaos of Indian traffic to the skill of the coconut seller in hacking open the fruit without self-injury, there was always something interesting around the corner. The old and the new collided with every turn of the road. I have the feeling that I have visited India,

and particularly Bangalore, at an exciting time in its history, as a new government comes into power, Bangalore's population grows explosively, and global brands exist side-by-side with small family-owned shops. The people I met conveyed both the progress and the challenges facing modern Indian society, as well as their sense of optimism. I think we will look back on this phase 20 years from now and marvel at what has changed, and I feel privileged to have had a glimpse along the way. Then again, maybe I'll be back before so long. After all, I still haven't made it to the Bull Temple, and one week after returning home I already miss the lime soda, not to mention the friends I made at IISc! If any of you find yourselves in Switzerland, I hope I can return the hospitality you showed me. *Phir milenge!*

Helen is a PhD student at ETH Zurich, with Prof. Sebastian Boenhoeffer, who is collaborating with Dr. Narendra Dixit's Lab. She came down to Bangalore twice in the past two years.



humour

KBC...A Computer Game

Almost all of us have heard of the game show "Kaun Banega Crorepati". A lesser-known fact is that a computer game was later developed based on the TV format. This story relates an amusing incident revolving around the computer version of the game.

She was studying in the first standard and very busy learning the Thirukkural¹, adding numbers and also attending music lessons. She was also very talkative and friendly. Her elder brother had recently been allowed to use their father's old PC. The two were very good friends and she used to spend her few free hours with her brother playing games on the PC. While her brother would play complex games like "Super Mario", "Road Rash", and "PacMan", she used to play games like "Pinball", etc.

One fine Sunday evening, she returned home from her music class to find her brother playing this new game "Kaun Banega Crorepati". She recollected having seen her father watching this game show before and asked her brother how he would get the prize amount if he won. Her brother pointed towards the floppy disk drive and told her that the notes will issue through the opening. Delighted to know she could get money this easily without having to ask her parents or brother, who would anyhow rule it unnecessary for her, she thought of all the things she could now do with the money she wins by answering questions on the game.

The next day in the afternoon, while her brother was in school, she switched on the PC and started playing the KBC game after praying to her favourite God, Lord Ganesha, for lots of money. She understood the rules and workings of the game quite easily, having seen the show on countless evenings on television, but the

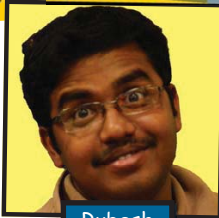
questions were all Greek to her. But she kept trying and several attempts at the game later, she was able to win Rs. 5000 (because of a limited question bank, the same questions appeared after a few attempts). But she was disappointed when no cash came out of the magic portal.

In the evening when her brother came back from school, she told him everything that had happened. Her brother then told her that the cash must have got stuck somewhere inside and told her he would get it out later. Later that night, her brother tried to install "NFS" game on the old PC. A few moments into the installation, the screen went blue and then the computer stopped working.



One afternoon, a few days later, her father brought home a guy who looked like Dexter with his thick-rimmed spectacles. This man was a computer mechanic and had come to repair the PC. Soon after, her father got a call from his office and rushed back to work after asking the computer mechanic to get started. The computer mechanic got to work immediately and started by opening the box (CPU) of the PC. Seeing this, the little girl went to him expectantly, and asked him to get the money out of the box. The poor fellow showed her the open box and told her there was no money inside. But the little girl, expecting to find the cash safely stashed inside, suspected foul play and shouted at the mechanic, "You thief!" and ran to her mother, with all her hopes dashed and crying miserably. The computer mechanic did not know how to react and fled from the house.

Rubesh is a 1st year M.E. student, working in Dr. Narendra Dixit's Lab.



Rubesh

happy encounter

Merci!



Nathan Pretescille

Recommended by a friend of IISc, I am going to share with you my encounter with a person around 2 years ago. I hope you would find it interesting and I would like, by the way, to thank everyone in the Chemical Engineering Department for this wonderful semester. I have already related this story during one of the weekly short talks in Narendra's Lab, where I found a great environment to study and enjoy the last 6 months.

After I completed my first year of engineering school in France (INSA Toulouse), I had to do an internship as a worker for a month. I got the chance to join the Pfizer Company in one of its plants, in Sandwich, Kent, England. Close by Sandwich was a small hamlet called "Ham", and a road sign would show the 2 places in the same direction. This signboard had to be replaced every 2 weeks (The reason? Some people liked to have a sign that read, "Ham-Sandwich", in their kitchen), so the authorities had it removed.

For this internship, I had to arrange for my accommodation and got in touch with Ronald, the owner of a house in Sandwich where he would frequently receive foreigners for short-term stays. When I reached the place, he showed me around the house. Gesturing towards a chair in one of the rooms, he said:



The chair made by Ronald Thompson of human hair

"Have a seat, and see how comfortable it is."

I obliged, and as soon as I was seated, he continued: "This is my creation; this is made of human hair."

I did not remain seated for a long time on the chair and began to wonder about his sanity and whether I would be able to stay at his place for the following weeks. But I was completely wrong; after a few days, he showed me all his work to

prove that human hairs could easily replace glass fibers in composite materials, as it was almost as strong as carbon fiber, and could be collected from hair salons. He called this new material: Pilius X.

However, the most impressive part was when I found out about his career and background. He started working at the age of 16, as a hair dresser in London. This was his job until 29 years later when luckily he landed the opportunity to work as a hair dresser for the movie, "Batman Begins".

Some of the costumes were made of composite materials, and glass fibers were used as a substitute for human hair. Finding a few glass fibers on the ground, he took them and broke them easily with his fingers but saw that he couldn't do the same with hairs. It was then that he was struck by the tremendous potential of human hair for use in applications requiring both strength and flexibility.

This was how he was prompted to go to university where he managed to adapt to his batch-mates, who were almost 30 years younger than him, and got a first-class degree in Environmental Product Design.

In Europe it is sometimes seen that engineers, "bored" with their work, switch to more practical jobs. In this case, surprisingly, it was the other way round.

Ronald's example also proved that we cannot rigidly divide the population into the "thinkers" and the "workers". Everyone has the potential to discover and realize great things with the help of opportunities and motivation.

I could see this kind of motivation in all the students and faculty members at IISc, who, I am sure, will make many discoveries useful for the world. Therefore I wish everyone all the best for their future projects.

Nathan is doing his Masters in INSA, Toulouse. He spent a semester in IISc last year, working with Dr. Narendra Dixit

The Enigma of Indian Classical Ragas

Sourojeet Chakraborty



In the domain of Indian Classical Music, one frequently comes across musical compositions known as ragas. And that's about all that most of us are aware of. Well, that's exactly why I am writing the present article. As a student of Classical Music myself, I have often been mesmerized by the intricacies of music. Here I would like to enlighten such aspects that have amazed me over time.

Firstly, there are seven tunes in the common octave. They can be modified, chosen by pure permutation and combination to give virtually limitless possibilities of ragas. Each raga is backed by an intense theoretical description, which dictates how each note (or *swara*) should be used. Some pitches shall get more emphasis than others; some will be used in an ascending melody and another few in a descending melody; yet some others will be used in certain ornamentations. And these rules vary from one raga to the next. The number of possible ragas is possibly limitless and there are hundreds in common use. Moreover, scope exists for improvisation within the defined framework of each raga.

Music is primarily divided into 10 "Thaats" or categories. Each such *thaat* is governed by specific rules which are common to each raga that emanates from it (the mother *thaat*). Other than "sa" and "pa", all the remaining notes have two forms—the "komal" or milder form (in case of "ma" it is called the "teevra" or extreme form) and the "shuddha" or pure form. The rules of Hindustani classical music state that "Two forms of the same *swara* cannot be simultaneously used in the same raga". The only exception to this rule is the raga *Lalit*. This is the main feature that distinguishes this genre of music from Carnatic Classical music, where both forms of a same *swara* may be used. With more complex ragas, the rules become even

more complex and intricate as two ragas may have the same rules, however, the way in which they are sung are different. "Parmel Praveshak" ragas are the ragas which sound very similar to the parent raga. Sometimes, what happens is that while singing one raga, one may unknowingly enter into another raga, due to the similarities between the two. One must be very careful to avoid such situations. For instance, raga *Miya Malhaar* and raga *Darbaari Kanada* are *Parmel Praveshak* to each other and it is the manner in which they are sung that helps in distinguishing them. While the singing of the former is energetic and vivacious, the latter is typically sung in a more idyllic mood.

Each raga comes with a prescription for the appropriate time of singing it. The entire day being divided into 4 *prahars*, each raga is typically associated with a specific *prahar*. This "singing time" is inherently bound to the overall effect of the raga on the listener. Early morning ragas like "Bhairav", upon singing, result in more "active" minds, while ragas like "Pooriyadhanashree" are sung in the evening, for they typically produce a "soporific and relaxing" effect on us, exactly what we need at the end of a strenuous day! Romantic ragas are typically sung at nightfall. It is noteworthy that our Indian ragas are defined by typical moods that one goes through in a day, something that is unique to Indian music and is also a reason for its mass-scale global appeal. Added to this are also "emotions" that ragas convey to the listener. While some inspire "bravery", some make us feel "mystified" while some make us feel "melancholic and pensive". I am not going into the terminology because this is not a terrain many

"Endless ragas are possible by permuting and combining the basic octave tones, swaras.."

"[some] ragas result in...active minds, [while others]...induce soporific effects.."

are familiar with. But I literally feel amazed by the extent of description that goes into defining each classical raga. The "Sama Veda" gives explicit descriptions about all the ancient ragas. Also,

"[A] rich heritage lies in Indian texts... If we [can] use half the knowledge in the Sama Veda, we can redefine Indian music...and... change the global perception of our music."

some ragas have been created by maestros through the ages. Common examples include *Priyadarshini* and *Jayjayanti*.

I end by observing that Indian classical music is very intricate and more deterministic than it actually seems to appear on the surface. Of-

ten, when we are at the crossroads or are confused, music comes to the rescue, acting as a vial of anti-

dote against the depression of life. It is indeed very painful to see that we Indians constantly need to look for favourites and musical choices from the Western world, whereas a rich heritage lies in plain sight, in Indian texts. If we are able to use even half of the knowledge in the *Sama Veda*, we can redefine Indian music, not necessarily Classical genre exclusively, and gift the Western world with something which would redefine the global perception of our music.

Sourojeet is a 3rd year UG student of chemical engineering, in Jadavpur University. He interned in Prof. Jayant Modak's Lab in the summer of 2014.

tongue-in-cheek

IISc is a peaceful green place. If 50% reservation is allotted to women in engineering disciplines, then it can also become a charming place. Mechanical Engineering students will dance like the villagers in the movie *Lagaan* (2001) did in the rains. There won't be such dramatic scenes in our department because of the fear of faculty, but certainly the department will be transformed from a dead flower to an immortal pink rose. The lifestyles of our boys will also change. Our chairman won't have to worry about latecomers as boys will become regular and punctual to impress the girls. Our department will also smell great not because of girls, but because boys will be using some severe AXE effects. Due to the high energy distraction, some of the boys will barely be able to complete their degrees. The culture of High Teas will be replaced by Kitty Parties, which will at least improve students' attendance in the many Colloquiums and Thesis Defence. To protect the makeup of the girls, we will require Air Conditioners in our department. As it is hard to say 'no' to girls, faculty will also agree to install A.C.'s. This reservation will also benefit our good-looking professors. Girls would prefer handsome professors for their guides and boys will just be following them. Our new chairman will be the one to get most of the benefits. In the future we might also have some female faculty in our department. Life in IISc will be as colourful as a lotus blossoming in the dull, lifeless waters of a pond, as girls will rock IISc.

Kapil Newar

Women's Reservation in IISc

GAME CHANGERS IN CHEMICAL ENGINEERING

From changing the world to heralding a new way of life, chemical engineers have been there, done that. Here we profile a few chemical engineers who have made seminal contributions to this field and others like metabolic engineering, drug delivery, regenerative medicine etc., in terms of industrial innovations or advances in research.

George E Davis (1850-1907)



Founding father of the chemical engineering discipline, he saw the urgent need for “chemists with a thorough knowledge of physics combined with a fair knowledge of mechanics” as an inspector of an alkali plant and passionately argued for an institution of ‘chemical engineers’ which took shape only after his death (Institute of Chemical Engineers, 1919). He is also the author of the seminal “*A Handbook of Chemical Engineering*”, published in 1901.

Carl Bosch (1874-1940)



Well-known for the Haber-Bosch process, the first commercially feasible process to synthesize ammonia from hydrogen and nitrogen. Although Fritz Haber, an industrial chemist, developed the high-temperature, high-pressure process for converting the raw materials to ammonia, Bosch played the central role in scale-up of the operation by solving many of the critical problems encountered like building a reactor that could withstand high temperatures and pressures, finding a replacement for hydrogen, for which no viable manufacturing processes existed then, with water-gas, and using iron-oxide catalyst instead of the prohibitively expensive osmium-uranium cata-

Eric Fawcett
(1927-2000)



Reginald Gibson
(1902-1983)



Dermot Manning



The discovery of polyethylene in 1933 by Reginald Gibson, Eric Fawcett and Dermot Manning in one of ICI's (Imperial Chemical Industries) labs for investigating high-temperature reactions was a happy accident. Years later, a world without the now-ubiquitous PE is almost unimaginable: the versatile material finds use everywhere—from pipes, shopping bags, containers and toys to medical implants like knee joints.

Donald Campbell



Homer Martin



Eger Murphree



Charles Tyson



Donald Campbell, Homer Martin, Eger Murphree and Charles Tyson at Stanford oil, invented the fluid catalytic cracking process in 1942 to avoid the patented Houdry process of cracking longer-chain hydrocarbons into shorter and more useable fractions. Today this process is widely hailed as the most revolutionary chemical engineering achievement of the early 20th century.

Waldo Semon (1898-1999)



Second only to PE in terms of plastics production today, the commercial success of PVC had to wait for the genius of Waldo Semon, a fresh BFGoodrich recruit in 1926, who recognized its potential and kept tinkering with it although it was regarded as ‘trash’ back then. His experiments with the ‘undesirable waste’ that polymerized vinyl chloride was, showed that it turned into a flexible and chemically resistant polymer on treatment with a solvent, and paved the way for its widespread use in industry.

Csaba Horváth (1930-2004)



A Hungarian chemical engineer, he devised a faster, effective and more efficient variant of chromatography. The life sciences benefited the most, because lower volumes of chemicals were required for the same results.

John McKeen



Working at Pfizer, he perfected the deep-tank fermentation process for large-scale manufacture of penicillin and helped to make the ‘wonder drug’ available to the general public.

Robert S. Langer (1948-Present)



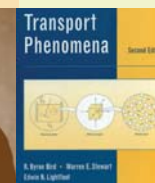
His invention of the polymer for delivery of macromolecular angiogenesis inhibitors to the tumour sites is considered to lay the foundation for much of today's drug delivery technology. He is also regarded as the father of tissue engineering in regenerative medicine for his extensive research on engineered blood vessels and vascularized engineered muscle tissue, which have won him several awards from the US and abroad.

Jay Bailey (1944-2001)



One of the key figures in the development of the field of prokaryotic metabolic engineering (using simple cells for production of desired chemicals). He realised early on that he could apply his knowledge of chemical engineering to biochemical engineering and tried to understand metabolic pathways and identify bottlenecks in the processes using mathematical models, borrowing from chemical reaction engineering.

R. Byron Bird
(1924-Present)



Few luminaries in the chemical engineering discipline have had a more lasting and indelible effect on the pedagogical methods employed than the trio, Bird, Stewart and Lightfoot. In the 1950s, R. Byron Bird, Warren E. Stewart and Edwin N. Lightfoot stepped forward to develop an undergraduate course at the University of Wisconsin–Madison to integrate the teaching of fluid flow, heat transfer, and diffusion. From this beginning, they prepared their landmark textbook *Transport Phenomena* which defined the framework for teaching transport phenomena to students world-wide.

Warren E. Stewart
(1924-2006)



Edwin Lightfoot
(1926-Present)



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THE FINAL ACT OF A GREAT CEO

BALAAJI MAHADEVAN



‘Thy necessity is yet greater than mine’ – Sir Philip Sidney said so, passed on the bottle of water to a fellow soldier and died with a smile on his parched lips. It was expected of a knight to give up everything for public good. But today it’d be unrealistic to even hope that a leader – here a CEO for our reference – would readily surrender his accumulated knowledge to his successor, asked or unasked. That is why the responsibility is divided – the outgoing CEO is compensated financially during the transition, the concerned organization stimulates interaction between outgoing and incoming CEOs and the incoming CEO is encouraged to extract the best of information from his predecessor.

The last act of a great CEO should also be the first act of another great CEO. One ought to provide knowledge while the other ought to receive it. Here both stand on an equal platform; the provider can’t feel superior; the receiver needn’t feel inferior. But human nature and emotions are complicated and elude definition or classification. That is why, over the years, this topic is often discussed, analyzed and doubts raised in multicultural and multinational contexts. In some countries selfishness is justified, in some tolerated, in some accepted with a whimper and in some considered outrageous. Sacrifice for their country comes naturally for the Japanese. Take the workers who literally jumped to their death to stop the nuclear radiation after the devastating Fukushima disaster. Take the Japanese commoner who returned one of the two blankets, he received mistakenly. For Indians everything is destiny. If they get it is good luck, if they don’t get it is bad luck. For Americans and other capitalists amassing wealth is a virtuous sign. In an-

other country it is a sin. So, when we look at the issue of one CEO helping another CEO or one CEO accepting the help of another CEO, we get puzzled. Is it to be told that being human, one has to help another even in deathbed? OR Shouldn’t it be part of the service rules that an outgoing officer has to leave behind his knowledge and experience as they belong to the company on whose payroll he has been?

A good starting point would be to capture the predecessor’s knowledge by taking advantage of the formal succession process of the company and by initiating meetings with the outgoing executive to know about the challenges, people and pitfalls. Empathizing with the predecessor, soliciting input, extracting useful information, sharing plans for the future etc. are some of the ideas thrown to the newcomer. Sharing vital information without prejudice, without ego and without fear of losing importance is an essential attribute of a great CEO. The new CEOs, in some cases want a complete break or don’t believe in the coloured picture presented to them by the predecessor; they don’t want to work in the shadows of somebody else; they think that they are replacing somebody who has not delivered as per expectations; they don’t have time; or simply because they are confident that they can do it on their own.

Here is where the organization can step in to keep the shareholders and employees happy by spelling out a formula for a smooth transition. It has worked well with Intel where the baton was passed from Gordon Moore to Andy Grove to Craig Barrett to Paul Ottellini. Mentoring is a cultural norm there. Giving the process the force of law, arranging the

meetings, publicly articulating the contribution of the outgoing executive, giving freedom of choice to the newcomer and endorsing the changes proposed



Intel has seen a succession of exemplary CEO's who have graciously made way for their successors. The smooth transition was largely the result of the company's policies of arranging for the two to meet and exchange ideas and visions. (Clockwise from left) Gordon Moore, Andy Grove, Craig Barrett, Paul Ottellini

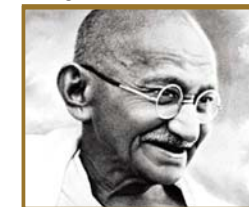
are some of the things the company can do. Giving a good financial package to the senior will make him morally obliged to reveal the secrets of his success. The outgoing CEO must be ready to share the stage with the successor leaving his ego behind. Turning a deaf ear to the complaints about the successor, he has to be willing to leave some sure-to-succeed projects for the newcomer. He has to offer sensitive advice discreetly. Whereas the new CEO must be smart enough to get the maximum and then make a judicious choice of what fits in his agenda.

If norms could be written in black and white, why is it that we have only a handful of great CEOs? A great CEO is marked by integrity and love for humanity. Leave aside financial compensation and rewards. Mohandas Karamchand Gandhi was the greatest CEO – CEO of Congress party – only be-

cause he publicly confessed his mistakes, stood for truth, loved the Britishers though hated the British rule, possessed the moral courage to defy the guns and above all gave away the glory to his successors who celebrated August 15th 1947 in Delhi while he was in Naokali on that day amidst bloodshed and tears. The half-naked man did not get any reward in material terms but the billionaire CEOs have a lot to learn from him.

Acknowledging failures and sharing reasons for such failures objectively is also an important factor. There can’t be 100% successful CEOs in the world. Somewhere, they might not have produced desired results, which nobody but them know of. This insight will assist the new CEO either to chart out new strategies or rectify the existing ones. In some cases, the CEO could have been struck by a better option after the job was done; here he must be generous enough to impart this newly acquired wisdom to the successor. Good communication skills of an extrovert accentuate one’s generosity and benevolence.

If the successor is from within the hierarchy, he will be familiar with the ambience of the organization. For him mentoring is possible over a long period of time and aligning of motives and resources takes less time. Once the transition is smooth, the new CEO is free to explore avenues of change as the system is strong. The organization can withstand a few jerks while turning to a new direction. The former Soviet Premier Gorbachev would have been an excellent CEO of the organization called USSR, had the country been strongly united. He had all the attributes of a great CEO, yet his genuine attempts to bring about resurgence failed because the organizational struc-



Mohandas Karamchand Gandhi was a selfless CEO of the country. He gave his all for the good of the nation but did not live to enjoy the fruit of his labours as he was assassinated soon after India's independence.

ture was weak and it collapsed unable to withstand the jerk brought out by perestroika / reformation. If

the successor is an outsider, there is bound to be a delay in imbibing the culture of the company. He may be quick to identify the tangible sources of support but what about the intangible beneficiaries, contributors and sources? He needs intuition to find them out. He must initiate positive rapport with all employees to sort out individual shortcomings and collective shortcomings which in turn can be solved by holding a few brainstorming sessions. To enable the new CEO to succeed, the company or the predecessor should expose the weak and defective links in the organization. This transparency is another vital requirement.

“A great CEO is one who makes himself dispensable”

The outgoing CEO should prepare himself to make his exit gracefully. He can play the role of the greatest mentor Lord Krishna, motivating Arjun to perform beyond belief, or the role of Bhishma, another mentor, who cherished his defeat at the hands of his

mentee.

A great CEO is one who makes himself dispensable.

To everything there is a season

A time to every purpose under heaven

A time to rule, a time to sway,

A time to earn, a time to cast away,

A time to love, a time to rend,

A time to give, a time to lend.....

The last great act is to give away one's wisdom with a smile. It makes him a great CEO and an even greater HUMAN BEING.

Balaaji is a 1st year M.E student, working in Prof. V. Kumaran's Lab.

social menace

Ver art thou, privacy?



Shalini Suresh Kumar

Many of us can secretly claim we are not tech savvy, but there is no denying that we are living in the world of technology. And we (better learn to) breathe, eat and live with it. Flashing your newest phone seems passé now; the only question is what is better than the best? And the urge to own it before one's peers is still a widespread feeling.

Technology has indeed become a status symbol. Although the hype around 'affordable Nano' died down eventually, it did create quite a spur in the market. Motorola has gone ahead and released the affordable smart phone. Why do you think you hear Moto E/G everywhere? It is *the* best android phone at its price.

As I Googled why Moto G is so popular, I was hit by two facts. One, we are Indians, we like things cheap. Two, it's a technocratic world. Like everything that has seen the face of the earth, advent of technology has its pros and cons. The pros are galore and I would rather not waste my words elaborating them. What I do want to do is to shift your attention to things which you see every day and are somehow okay with it.

As India woke up to General Elections 2014 and witnessed record voting, what caught my eye was how many people put their inked finger as their display pictures on various social platforms. It is rather strange how a headline on an established newspaper daily read '*Ab ki baar, Internet ki Raj*' in response to Narendra Modi's pulsating victory. That goes on to show how pivotal the social media was in connecting the political leader(s) with the denizens. From every mood swing to mammoth announcements, the social media has taken over. We like live tweets, status updates, live streaming of IPL and keep an eye out for every move of our beloved celebrities. We *like* sharing what encompasses our life and we *want* to know about every minute detail of our next door neighbor. Phew! The need for this is something my mind cannot fathom.

Exactly what are we trying to achieve when we say "I am feeling low" as a status update on Facebook? This is in no way to ridicule that, but isn't it more pragmatic to pick up a phone and speak to someone who can clear your mind? What is the burning need to tell the world what pajamas you wear when you go to bed? Doesn't anyone feel invaded? Or is that lost in the paradise of technology? There is a myriad of things which we so proudly acknowledge and even frown upon on being questioned. It might sound farfetched but a host of people are engrossed in proclaiming to the world that they are having a

good time rather than actually enjoying the moment. How else would you explain Kim Kardashian voraciously updating us about every miniscule wedding shop she did? I will assure you, we can survive without knowing what her wedding plans are.

Some of us might still continue to argue that social media is innocuous. Is it still not stifling when our employers stalk our photo album or single us for what we have *liked* on social media? Umpteen numbers of cases have shown up where novices to the social media have been preyed on by creeps who used the profiles of imaginary people to befriend them. Thus finding everything about us, from where we shop to what we wore the other night to where we will be having your dinner tonight. A recent report by *On Device Research* states that 1 in 10 people between ages 16 and 34 have been turned down for a new job because of photos or comments on Facebook, Twitter, Pinterest and a host of other social networking sites. Does it seem like ghastly injustice to you? Are you outraged how a seemingly harmless picture cost you your dream job? Indeed you might get the sympathy vote, but it is rather disturbing to realize how much of yourself you are leaking willingly and unwittingly. The privacy settings are not often user-friendly, making it plausible for an unlimited global audience to view your 'personal information', photos and statuses. And let us says even if your settings are tight, the wider your friend circle the more impractical privacy becomes.

Now you may wonder-how you can avoid being victimized by the social media which we all so passionately love. The answer (un)fortunately lies in our hands and it isn't so difficult. It would be foolhardy to shun social networking altogether; presence on the social media is vital in building your career, establishing a presence and still remains the easiest way to keep in touch. All I ask is for you to exert some level of control and a second of thought before you post something oin the spur of the moment.

Let us enjoy the boon of social networking, with caution. Happy social networking!

Shalini is a 3rd year UG student of Chemical Engineering in NIT Surathkal. She interned in Dr. Narendra Dixit's lab in the summer of 2014.

FOOTBALL— CROSSWORD

ACROSS

- Which African team was the first to reach a World Cup quarter-final?
- The only person to have played both the men's World Cup Football and World Cup Cricket
- Who is the only person that has won a World Cup medal 4 times?

DOWN

- Which player has managed to score 4 consecutive goals in one game and in the shortest possible time?
- What player, in the World Cup of Mexico 1986, scored a goal 'with his head and hand of God'?
- The first world cup soccer match kicked off on July 13th 1930 with France beating _____.
- Which team enjoyed the longest span between victories in a World Cup Final?
- Which of the World Cup winners have never won the title when hosting the tournament?

CONFLICTS AND EDUCATION



It took John Milton ten books to write 'Paradise Lost', one of the greatest literary works of our times and we, the people of Kashmir, took exactly twice the amount of time to lose our Paradise. 'Paradise Lost' is about the fall of man, about how Satan lured Adam and Eve to commit one sin, a sin that lead them being thrown out of Paradise. Kashmir has a lot in common with John Milton's epic poem. It too is about the fall of man and more importantly, the fall of humanity and how a selfish few lured the people of Kashmir towards a state of perpetually simmering conflict.

Here I am going to draft a few facts about all the countries of the world which have been suffering from the menace of terrorism and other conflicts in one form or the other taking Kashmir as a reference because being a Kashmiri it is easy for me to comprehend the scenario on ground. A look at what we have gained and lost in the last two decades will reveal that we lost some hundred thousand people, most of them dead and some still missing, an inherent part of our civilization in the form of Kashmiri Pandits, tourists, good infrastructure and may be scores of industries. We live with this fact every day. What hurts more is what we got instead: countless number of widows, orphans, hundreds of broken dreams and diminishing hopes, unemployment, corruption, no infrastructure, poor education system and political instability. Clearly, the losses outweigh the gains.

A quick look at the education system of our state: one can't but pity the students – the future of our nation, and the building blocks of our society. Schools and Universities are meant to build your character, broaden your vision and generate for you endless possibilities to excel in your life. For reasons, both obvious and uncertain, this is not the case with the education system in Kashmir. Worthwhile quality education still remains a distant dream. The gap in the quality of education, teachers and facilities provided is so wide that a modern day Titanic can sink in it without a trace.

It is not enough to make primary education free in public schools but more importantly what we need is good infrastructure, better opportunities and even better extra-curricular activities. Higher education and research have suffered the most. Research is distantly associated with institutions such as Sher-e-Kashmir Institute of Medical Sciences (SKIMS), Indian Institute of Integrative Medicine, University of Kashmir, Jammu University, National Institute of Technology (NIT), and Sher-e-Kashmir University of Agricultural Sciences and Technology. What goes on in these institutions is highly

questionable as the results do not meet the desired outcomes. There is hardly any good scientific article in any of the reputed international peer-reviewed journals. It is disheartening for the youth as they have to (often) venture out to other states of India or foreign countries to get quality education. This is a problem with serious consequences and the effects can already be felt. No wonder we don't have Albert Einstein's and Isaac Newton's in our labs. And those who

show signs of being someone tomorrow, leave for foreign lands that offer better infrastructure and career growth, better standard of living and peace, never to return. This all is despite the fact that ancient Kashmir was considered as the centre of art and literature in Asia and many literary festivals were organized in Kashmir, mostly during the Vedic era, in which scholars from all over the world used to participate, and despite the fact that people from Kashmir have proven their mettle in every field all over the world, may it be science, law, business, literature, medicine or politics.

To add to the woes of our education system are frequent 'strikes' and the 'bandhs' that have



Anayat Ullah Bhat

become something of a norm. 1990 is still infamous as the year when no exams were held and everyone was passed just because there was no way any exams could be held. These circumstances often lead to even shorter academic years as if three-month winter breaks, two-week summer breaks and numerous national and regional holidays were not already enough. "An idle brain is the devil's workshop", and when you have nothing to do, you have time for everything else.

The young people have no reference or recollection of co-existence, communal harmony, and the diversity of people in the region and their histories. Their reference is the current external reality of polarised communities, social apathy, decadence of values, a divisive polity, anger and aggressiveness. It becomes a vicious cycle of ignorance, violence, anger, hatred, despair and response that impacts relationships, both politically and socially. This creates an opportunity for the exploitation of certain groups and individuals for political purposes. A growing number of young people in the conflict-ridden areas like Kashmir are suffering from emotional despair, low self-esteem, a lack of cultural connectivity and a loss of values. They are angry at their situation and susceptible to the overtures of political groups that hope to profit from their situation. If the current negative attitudes that pervade these societies are not dealt with and brought to the foreground to be explored and mitigated, many fear the situation will worsen. One answer to this turmoil may lie in the education system, where current teaching methods can be supplemented with peace-driven initiatives.

The goal of increasing public awareness is extremely important in any conflict. Because prejudices are so deeply ingrained in the societies in question, problems will persist unless changes are done to identify issues that lie at the heart of this conflict. For this purpose, research, training and education play important roles. Education is an essential tool in the process of reconciliation because it is a truly long-term investment. Educational material and practices have long been used to perpetuate misconstrued notions of the 'other', teaching people to believe that the 'other' is their enemy. But they can just as easily be used to spread realistic and positive images of the 'other'. Hence, ensuring that history and civics textbooks, for instance, present accurate information - not just in terms of history but also in terms of introducing students to the ordinary aspects of life in the other countries so that the people become more relatable - and improving teacher training, so that teachers

can encourage critical thinking rather than mere rote learning, are integral to any peace process. These efforts will ensure that children are socialized to approach conflicts with a more nuanced idea of what the issues are and the ability to see the resolution of conflicts arising from more than mere ceasefires and a winner-take-all scenario. Moreover, education raises consciousness and exposes people to different points of view in a constructive manner. Simply providing people with alternative perspectives, though difficult for some to accept at first, can create a space for re-evaluating ingrained beliefs. We must show potential terrorists that there is a better way to engage with the world. This is the new struggle of the 21st century. We will not win it unless we fight its root causes as well as its ghastly consequences.

Today, in an arc that stretches from the Far East through the Middle East to the streets of cities in Europe and the U.S., we face a scourge that has taken innocent lives, scarred communities and destabilized countries. It is a threat that is constantly evolving, growing and mutating to counter our fight against it. The extremists propagating this violence have networks to reach out to young people and know the power of education, whether formal or informal. The debate over security has understandably often focused on the consequences. After an attack, states consider immediate security measures. Terrorists are hunted down. Then we get back to our daily lives, until the next time it happens. But lasting change is contingent on dealing with the root causes of extremism. Politics, of course, plays its part. And the extremists are good at jumping on the back of political grievances. But the soil in which they plant the seeds of hate is fertilized with ignorance. That is why we need to start thinking of education as a security issue.

Globalization is intensifying and multiplying this extremism. Not limited by borders, it can spring up anywhere. We are more connected now than at any point in human history, and more people come into contact with those who are different from them. So the need to respect a neighbour who is not like you is much greater. At the same time, however, the scope to identify him or her as an enemy is also greater. That is why education in the 21st century is a security issue for all of us. The challenge is to show young people who are vulnerable to appeals from terrorists that there is a better path to having their voice heard, a more meaning-

"Education is an essential tool in the process of reconciliation. Educational material [has] long been used to...teach people...that the 'other' is their enemy. But they can...be used to spread realistic and positive images of the 'other' [as well]."

"...what we need is good infrastructure, better opportunities and extra-curricular activities. Higher education and research have suffered most."

"...youth often...leave for foreign lands [in search of] better infrastructure and career growth... [often] never to return..."

ful way to engage with the world. We need to mobilize to defeat extremism. And we need to act globally. All governments must take their responsibility to educate young people to accept and respect people of different faiths and cultures, seriously. It is up to all of us to show people that we have a better idea than the extremists have: to learn from each other and live with each other. And this needs to be a core part of young people's education.

It is time to rise above politics, religion and petty differences and work toward building a better world. It is time for social and moral awakening, time to make amends for all previous mis-

steps. It is time to learn and educate ourselves and others around us about how to be good human beings and responsible citizens. It is time to say no to violence. It is time for building peace. It is time to stop blaming each other and start taking responsibilities for our actions. It is time for inculcating scientific mindsets and human values. It is time to take that first step we always wanted to but waited for others to make the first move. It is time to be the change we all have been hoping for. IT IS TIME!

Anayat is a Junior Research Fellow in Dr. Rahul Roy's Lab.

campus nationalism

The Nava-Swatantra revolution

With the results of general elections out, I believe, the time is apt for explaining my reasons for obsessing with this change. I would use the CEA Magazine as a platform for expressing my jubilation, happiness and relief after the results were announced. I will explain why we, the "active campus nationalists", took this opportunity for change so seriously and why this opportunity was so crucial that we took it as a "do or die" situation. The reasons are as follows:

The ruling coalition had so irrevocably infused corruption into the society that everyone started believing that bribing was a governmental protocol and no work was possible without corruption.

Owing primarily to this corruption, the wealth came to be unequally distributed among the population. This resulted in high purchasing power in the hands of a few and this in turn pushed the retail inflation index up and the vicious cycle continued. Even the RBI failed to stem the rising inflation. Now we realize why the beneficiaries of corruption were never worried when the price of tur dal price shot up from Rs 25 /kg to Rs 80 /kg: because they scaled their "corruption pay" up by the same extent. E.g. if a government clerk used to take say Rs 500 to process a file, now he takes Rs 1000 to do the same.

The last and most important reason lies in India's ongoing economic phase. Currently, the majority of India's population is in the productive age group. This period is referred to as the demographic dividend, lasts only for a few decades and recurs only after a hiatus of many decades. This is the period in which any economy can propel itself with an accelerated growth rate by putting appropriate policies in place. E.g. the US experienced this phase in the 1960s, Japan in the 1980s and, Singapore and Indonesia in the 1990s. All of these countries seized upon the opportunity and have now reached the hall of prosperity. If we lose this crucial time to corruption, inflation, and policy paralysis, a growth spurt will not be possible for many decades until the next cycle of demographic dividend kicks in.

I hope I was able to bring out how crucial the timing for change was! There is always the risk that "position & power" may corrupt the figures we look up to now, but looking at the impact of the model presented by the man-of-the-moment in Gujarat, the risk was worth taking. Having accomplished this mission, we the "active campus nationalists" will plunge into our work to fulfill our individual dreams and now if we fail, we cannot blame it on a poor system.

Chaiwallah



Srinivas D.Y.

The story of a killer

OR

a killer story ?

thriller

On the busy streets of Kukatpally, there is a theater which is much busier when a new movie is being shown on its large silver screen. Although Brahmaramba theater is not a multiplex, it is surely crowded by the standards of a movie theater. Super Star Mahesh Babu's Pokkiri is making colossal profits at every box office. But something crazy and eerie happened on that day at this particular theater.

The hot and raging sun is tormenting the people outside but the breeze from the air conditioners is helping people inside the theater to be at calm.

On the screen, the hero kills the villain by driving a bullet into his lower abdomen. Following this spectacular and stupendous scene, the hero spurted out his words in a heroic accent.

'Epu du vachamanadi kadannaya.....bullet diginda leda!!!'

The crowd which was silent till then started screaming out of sheer joy when the hero was performing at his best in this particular scene. The crowd which was cheering over the demise of the villain did not notice the sound that came from the corner of the balcony. If at all they had noticed what was happening around them, they would have gone dumbstruck.

The crowd was busy watching the film. A person stood up with his phone in his right hand and started walking towards the exit. He opened the door, when suddenly a ray of light fell through the gaps of the opening. A person, who was sitting diagonally opposite the door, reluctantly covered his eyes with his fingers. Through the gaps between his fingers, he could see something shiny tucked between his trousers and his lower back. He ignored it and got back to watching the movie. He would have been terrified had he noticed that it was a brand new GP-35 hi power revolver.

The person walked to his Royal Enfield and started it and fled from the place in seconds, creat-

ing utmost noise to the public outside the theater.

At Leelavati Hospital, Bombay

Second floor, fourth ward third room

Ajay Bharadwaj's 18 year-old daughter said 'ye juice le lo pappa' and handed the glass to him. Ajay Bharadwaj who was deep in thought, came to his senses when he saw his daughter giving him the glass. With the morning glare of sun rays settling on her, she was shining like an aureate leaf. Her innocent looks which embedded with love made him glad and comfortable. Her mother passed away when she was an infant, and from that time her father was her world and so does the father feels. She was unable to see her father in that state.

"abhi aunga pappa.. Juice peekey soo jaana..."

She kissed her father's forehead lovingly and went outside. He thought to himself "How will I stay alone after she gets married??"

That was the bond shared by her father and her. He felt proud seeing her speak to him gently like a grown-up girl.

"How are you feeling now, officer??" asked a doctor who just stepped in with his surgical mask tied to his face, which probably says that he came directly from an operation theater.

"Feeling somewhat better today, doctor." said Ajay bringing the glass of juice closer to his mouth.

While Ajay was drinking his juice, the doctor injected 2 ml of a liquid in the saline bottle.

"It is a sedative. Take some rest. You can leave tomorrow." said the doctor and left. The doctor removed his white coat as his duty for the day was over and walked towards the exit. On the way down the passage, he took out his phone and called someone. He started the bike and was about

down the passage, he got his phone out and called someone. He started the bike and was about to leave when suddenly a guard from behind came running.

“*Sir apka ye bottle gir gaya*” shouted the guard from behind. The doctor did not pay any heed to the shouts nor did he look back. He sped away on his bike... the six feet-tall figure wearing the same black jacket and sunglasses on. The guard was in a state of confusion looking at the bottle.

‘Tetrodotoxin’ was written on it. Tetrodotoxin - a poison which is ten times more hazardous than the poison of the snake venom. When injected into a body, it would trigger paralysis of the body and if not treated immediately, the person is sure to die.

The two murders occurred within a span of 15 days and this startled the officers of the police department. The victims of the two incidents were not civilians; instead, they were top-ranking police officers. They were the most senior and sincere officers in the department. This case was transferred to the CBI for investigation. The head of the team was Arvind Kumar. He was diligent and consistent in his work and did not rest until the case was resolved. He was an inspiration for every officer in the department. He requested his senior officers and took up the case with interest. The two officers who got murdered were very close to Arvind and so Arvind felt great responsibility and was determined to find the guilty. He readied himself for the operation. This time Arvind kumar took up the case more seriously than ever. He was strongly determined to catch the culprit and convict him in the court.

One day during the investigation, Arvind received a phone call. “*Abhi aa raha hu*” said Arvind and started.

CBI secret-meeting place... 11:30 in the night

It was raining cats and dogs. Water had accumulated on the roads to a height of 1 foot. A bike came through the gates into the compound. The place had a garden with beautiful flowers. The interior design of the building looked robust. It looked like a resort from outside but it was a secret place for CBI.

The security guards open the gates and saluted as the bike passed through. The person got off his bike and walked inside. The hall was a vacuous space and the person who just walked inside threw himself heavily on the sofa. The name-plate on his uniform shone under the scintillating light of the chandelier. The letters ‘Arvind Kumar’ were written on it. Meanwhile, his colleague came into the hall.

“He didn't take anything since morning, he is listless and also showing signs of fever” said Arvind's colleague.

Arvind went to the room and saw through the glass plate. A very lean person with long hair was sitting in a corner of the room. He is Yasin Bathkal who is the founder of al-Gama'a al-Islamiyya. He planned a trail of bomb blasts throughout India targeting the crowds congregating in Ramzan and Dasara festivals. He was caught 2 days back near the Nepal border trying to enter India in disguise. He was a dangerous terrorist trying to destroy the entire of India and capture it.

Arvind called the doctor. In half an hour the doctor arrived, fully drenched in the rains. Jaydev Sinha placed his medical kit on a stool and was checking the patient Yasin. Arvind thanked the doctor for coming inspite of the heavy rains. “Sir, I have created a lot of inconvenience to you” said Arvind in a low voice.

“No problem, sir. Compared to you, what is the amount of service I am doing to the country?” said Simha respectfully. After examining the patient, he remarked that Yasin was quite well and there was no reason to worry. He gave two tablets to Arvind and asked him to administer them to Yasin. He said everything would be fine by the next morning.

“Thanks doctor.. I will drop you” said Arvind.

“It's OK, sir. I have got my vehicle. I will go by my own.” Replied the doctor and waved a good bye.

Arvind gazed at Yasin angrily. He kept the 2 tablets in Yasin's right palm and asked him to take them. Yasin was taken aback by Arvind's firm attitude and confidence and immediately ingested the tablets and gulped them down with a glass of water.

“*Sona math...Dhyan se pahara karna...!.. Samjhe..?*” Arvind said to the guard in charge of the cell. Arvind got his phone out and started walking away. A black jacket over his uniform, sunglasses on his eyes and 6 feet...Arvind kumar went off thinking everything was normal.

CBI office...Delhi

“According to the evidences available till now, the 2 murders were committed by a single person”. There was pin-drop silence in the hall. All the lights were switched off. The room was pitch-dark except for the light of the projector falling on the white screen. A round table was placed in the middle of the room and highly experienced officers who had solved difficult cases were sitting around the table. Arvind, who was the youngest of all, was explaining the details of the case to the remaining officers.

“From the eye-witness accounts and evidences in the 2 cases, we know that the murderer was wearing a black jacket and cooling glasses. After the murder, the convict fled from the scene on his bike. He is approximately 6 feet high. The victims in both the cases were top-ranking police officers, but they were from different regions. They were not even colleagues.”

“The first victim was Vikram Patnaik. He was murdered on May 23rd at 12:40 in the afternoon when he was watching a movie in a theater. He was shot exactly at the same time the hero shot the villain in the movie, which indicates that he had probably watched the movie before. The movie being in Telugu, he could be Telugu as well.”

“The second murder occurred in Mumbai at Leelavati hospital in the morning of June 5th around 6 o'clock. The victim was Ajay Bharadwaj. The convict injected a poison named Tetrodotoxin into the saline bottle and killed Ajay. Tetrodotoxin is a poison which is extracted from the adrenaline of the ring-shaped blue octopus, which is potent enough to kill 26 people at a time. This toxin is banned in almost all the countries. The only evidence we have is the small Quran which might have fallen out of his coat pocket. So, maybe he is a Muslim.”

The others hung on to Kumar's every words.

“Apart from these two murders, Yasin was also attacked in our custody. Yasin Bathkal is the most wanted criminal in almost 30 countries. His network is bigger than that of the Interpol. Almost 10 islands are under his control by now. His self-designed missiles are more advanced and powerful than the missiles in development in our country. After the death of Bin Laden, Yasin Bathkal from Al-Qaeda established his own network. Weapons invention, armor production, diamond supply, drug smuggling are some of the illegal acts of Yasin Bathkal. He is now in the process of expanding his business and become even more powerful. He has captured the small islands surrounding India. Now he is aiming at India. He wants to conquer India by creating religious riots, by bomb blasts. Unfortunately, countries like China and Pakistan are giving him assistance in his immoral acts. Our department lost 4 of its most sincere officers in a bid to catch him. But, from yesterday onwards he started behaving like a lunatic. According to the medical report, he is being drugged. But, what is the use of attacking him. Who wants him.???.....”

“This is not an attack...” said a voice from the other side of the table one side before Arvind completed his talk.

Everyone turned their heads to where the voice was coming from. Under the reflected light of the screen, the old man's white hair was illuminated by the lights. He remained in the same posture. He was Viswas Kulkarni, a retired CBI chief with 40 years of experience in the organization. He lifted up his head slowly and started talking.

“I have seen his medical report. The reason for his madness is the result of a drug named propanolol. According to the words of the inspector, Yasin didn't take anything from the morning. Due to his illness a doctor was invited to check him. The doctor examined him and advised him to take 2 tablets, which he administered to himself. And also from the report, he was given exactly 1.5 mg of the drug. Because of the low dosage administered, there was no danger to his life. But, he might develop Alzheimer's and won't remember anything that happened in the last few days. What we are observing in him now are its symptoms. This can also be called part-time memory loss. This was a perfectly planned plot to

render him useless to us. We cannot extract any information from him, as of now.” said Kulkarni displaying his brilliance and experience.

“Why was he not killed?? Why was he given a drug which induces only part-time memory loss??” asked Arvind with frustration.

“According to us, Bathkal is only a terrorist. But, more than that, he is a scientist. He is the designer of the missiles they have invented. He is the only person who knows how to operate them. He turned into a terrorist because of the surroundings in which he grew. He would have been a Nobel Laureate, if only he was groomed well. His missile technology is far beyond our reach and India would take at least 20 years to reach his level. In my opinion, they will make an attempt to free him from our custody while we are treating him.” For an instant, they all forgot that he was a terrorist and showed respect towards him for being one of the greatest minds.

“Why will the doctor do that?? He worked with us for many years and he is a trustworthy person. He is very patriotic and worked in the army for many years rendering his services to the needy. He has no family and lives alone. He is the kind of person who is ready to sacrifice his life for the sake of his country.”, said Arvind kumar with pride in his voice.

“True!! You are correct in every aspect. I know that too. Moreover he is a very good friend of mine. But still, I am saying that he is responsible.”, said Kulkarni.

Everyone was puzzled by what Kulkarni was saying. But the officers present understood that all this was not accomplished in one day. It was planned to perfection for days and then implemented. There was a great deal happening behind the scenes.

“He was hypnotized”. Everyone was appalled by what Kulkarni had just said. “The doctor was hypnotized in a strategic way. I went to the doctor and met him after the day he treated Yasin Bathkal. I went to him to enquire about last night and amidst the casual and friendly talks, I dropped the question. He said that he didn't go out the other night, as he was totally tired. He said he went straight to his home after his duty at hospital and

and crashed in his bed the moment he reached home. Which meant that he did not know that he'd been to jail in the night. Hypnotized people do not know what they are doing. A doubt nagged me, so I asked him whether any strange cases had come to him recently. He said that he was seeing a patient who was mentally ill and who constantly imagined himself to be a psychiatrist. He said that he used to come frequently and give commands like “*you are sleeping now... you are sleeping now...*”. Initially Kulkarni thought that it was a case of mental imbalance, but eventually, doctor Kulkarni got hypnotized. And when the time came, the criminal executed his plan successfully.”

“As a matter of fact, he was the one who committed those murders too.” Hearing this, the officers were stupefied and did not know what to utter. Arvind himself stood as a statue not uttering a single word.

“I asked the doctor about his appearance. From the doctor's recollection, he was 6 feet tall; he wore a black jacket and had sunglasses on. The bike he rode also matched with the description of the convict.” said Kulkarni.

Arvind started becoming restless listening to all this. He registered every bit of what was transpiring but could not believe his ears. He was seized by a strong desire to nab the convict.

“How do we catch him??” shouted Arvind furiously.

“Go to all the temples and historical monuments... he believed in God...!”

Arvind was overcome by a fit of fury and was behaving like a lunatic. “If he is a Muslim, why should we wait around temples??” Arvind was wondering whether Kulkarni had gone mad.

“I have seen the forms which he filled near Simha. He used to start every form with ‘Sri’.” replied Kulkarni smiling slightly.

“Perhaps he did it intentionally to throw us off his scent!?!?” asked Arvind

“I was not the one who caught the wrong scent, it was you! There is no chance that he is a Muslim. He perpetrated his first murder on June 15th, at 12:40 pm and the second murder on July 22nd at 6:00 a.m. Those are prayer-times for Muslims. So,

every terrorist need not be a Muslim, Arvin .” “Moreover, according to my deductions, another murder is yet to happen. On May 11, 2008 in Hyderabad, ISI agent Aksar was killed in a police encounter. The chief of the operation was Vikram Patnaik. Exactly after 2 years in the same week, he was murdered. On 7th of July, 2007, Shamim Pasha was arrested and taken into police custody. Exactly after 3 years in the same week, Ajay was murdered who was the chief of that operation. And 1 year back on August 12th, we arrested Ya-sin's right-hand man, Waheed Pathan.”

“The chief of the operation was.....” Arvind stopped with a horrendous expression on his face.

“You...” replied Kulkarni pointing his index finger towards Arvind.

Arvind was horrified. His face which was full of anguish and a sense of atonement till then, turned pale. He started sweating heavily. The beads of sweat fell over the table and that drops became smaller as they touched the surface of the table. Slowly, the drops coalesced to form some alphabets. There was light everywhere and brighter now. Slowly the people started speaking. The alphabets formed on the table with that sweat drops made some sense. Arvind who was filled with fear stood still. With fear, his eyes got widened and he placed his trembling hands on the table. On the table, the drops came together forming a beautiful word,

“Intermission”

“Baby, does anyone take his wife to this kind of a movie? You could have taken me to a romantic movie, naa.. In addition to that, the theater is also full.” whispered the lady to her husband.

“Why did I marry this police guy??” laughed off the lady good-naturedly mocking his better half.

“What's wrong with this movie, darling?? I am very eager to watch the next half also. The interruption at this moment has made me more curious to know what happens in the other half of the movie.” replied her husband.

The lady pinched her husband jokingly begging him to stop.

She asked her husband to get something to eat as she was feeling hungry. He got up and went across the hall to get something for her.

While he was coming down the stairs, he saw something and stopped suddenly. He was not able to believe his own eyes. A bike started outside the theater. The guy had a black jacket on, with cooling glasses on just as he had seen in the movie. He got out his phone and placed it on his right ear while starting the bike. Apprehensively he saw his cell phone, it was dated June 27th. Exactly one year back on this date, Wakar was arrested who played a key role in Hyderabad blasts. His entire body started sweating. He felt as if his hand was amputated and separated from his body. He turned his head slightly to have a glance. He was not sure if it was real...”

“He was injected”

This story was originally written in Telugu by Srinivas D Y, a 1st year M.E student, working in Prof. Sanjeev K Gupte's Lab. It has been translated to English by Guru Raja D (Aerospace Engg.).



Vemparala Bharadwaj

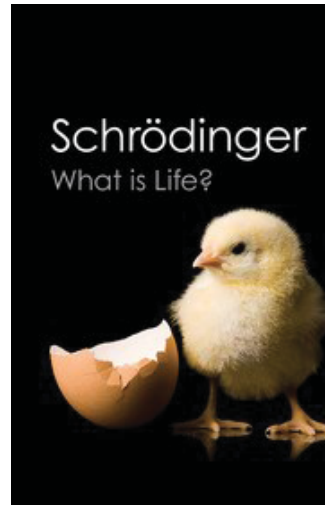
What a Life!

I do read a great deal, particularly stuff which enlightens me. And being a thrifty self, I never throw away money on books which I neither have the confidence to run till the finale, nor have I substantial peer assurance of it being worth every dime I pay. One day, while searching for a way of egress from my boredom, I indecisively entered a bookstore. Although it was completely vague, I tried to sophisticate my random walk to avoid looking like a prankster to the grumpy shopkeeper. And in a flash, my eyes turned to a small stack of black-coloured books, with a yellow chicken on the covers. It read, 'What is Life?' The first thought that struck my mind was, 'Is it so easy to answer one of mankind's most mystifying questions in barely two hundred pages, and that too, of the size of a palm?' At the top of the spine was written, 'Schrodinger'. My mind paused for a moment, and I opened the book in excitement, banishing all my presumptions and trivial judgements.

As a common practice, I began by glancing at the preface to get an overview of the whereabouts this book has been written to lead the reader to. It was commonplace for authors to start by introducing the events and thoughts that provided the inspiration, the struggle, the ups and downs that they faced in the process of writing the volume and a final thanksgiving note to their dearest. Instead, he opened with a striking statement that 'man's wisdom is to meditate not on death, but on life'. In the next few lines of the minimal one-page preface, he sets down, clearly and concisely, the genuine attempts of a physicist to unravel the subtle mysteries of life confronted by a layman. It was such a power-packed and inspiring read that I was urged to have it without further ado. I started to go through it the very moment after I got hold of my copy. He started by tackling the usual questions that one might think of, like, the atoms being so small and Brownian motion, in a very radical and compelling manner and slowly, he moved to subtler concepts of heredity and the mechanisms by which it works. And in the later part of the book, he delved into contentious topics like 'Science and Religion' and concluded without dwelling on the sensitive aspects.

These short essays investigated the relationships which have eluded and puzzled philosophers since the ancient ages. Above all, modesty and humility pervaded the whole book, which left me, in the end, feeling thrilled and satisfied for having decoded some of the puzzles that have been rumbling in my mind and with the contentment of having gained a genuinely new understanding about the mysterious world which we live in. It is a must-read for all those who are searching for answers to the most dazzling questions of life. This gem of a book is written in such a way that it will make you read it in a few hours, but the insights are so profound that you will never forget it. It is a one-of-a-kind book and definitely worth rereading.

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a street-walker's woes

On Going a Journey

– With Due Apologies to Hazlitt

Balaaji Mahadevan



One of the pleasantest things in the world is going a journey; that I like to do myself. I can enjoy society in a room; but out of doors motor cars and bullock carts are company for me. I am never less alone than when alone on a street.

"The road ahead is my study, buses my book."

I cannot see the wit of walking and talking at the same time. When I am on the road, I become like any machine on the road. I am not criticizing the dogs, pigs, cows and bulls. I just wonder whether they too are machine-driven. When they give company, why should I yearn for human company? I like solitude, when I give myself up to it, for the sake of solitude; nor do I ask for

"A friend in my retreat
Whom I may nod at
And cause an accident"

But this looks like a breach of manners, a neglect of others, but you are thinking all the time of your safe passage. "Out upon such half-faced fellowship", say I. Let me not face a friend on my way.

The soul of a journey is liberty, perfect liberty, they say. But I face all impediments and inconveniences on a road. The walker's way being occupied by hawkers, I turn to the busy motor lane of the road. I get an island of peace where cows lie in the middle of the road blissfully munching

posters oblivious of the chaos caused. Ignorance is bliss! Watch ahead, Jump over the gutter, balance yourself on the median, find an escape route among the speeding vehicles. I don't turn back, don't smile at familiar faces, don't shake hands, don't even nod; I become a saint with a steady mind, a detached soul with a constant purpose and a supreme being emerging unscathed at every turn.

I excuse myself from worries for a while, without feeling at a loss, the moment I step on the road. I have a purpose. Let me fulfill it. I am not Coleridge, who could go on in the most delightful, explanatory way over hill and dale a summer's day, and convert a landscape into a didactic poem or a Pindaric ode. I am only an ordinary citizen of India unfortunately living in a city. Yet will I turn to Thee in authority in Hope; Thou shall bring order on the roads and we shall keep ourselves intact.

William Hazlitt, an English writer (1778-1830), wrote an essay on the same title describing the pleasures of undertaking a journey alone. This is a modern, Indianized version of the same and describes the plight of a person who tries to navigate the 'busy' roads of India.

Balaaji is a 1st year M.E. student, working in Prof. V. Kumaran's Lab.



The Unsettling Aspects of Evolution

Saurojeet Chakraborty

The theory of natural selection, as proposed by Charles Darwin in the last century, has been a subject of frequent controversy since the days of its enunciation. Evolutionary biologists have been unable to account for the following hard facts, which seem to go against this classical theory. My attempt here, is not to stir up controversy, but rather to present a holistic outlook towards the subject matter.

A demerit of Darwin's theory is that evolution has never been observed, as such fossil links like the *Archaeopteryx* have been the centre for controversy for decades. A very impressive counter theory is that of the Aquatic Ape Hypothesis (AAH) which states that humans spent quite a lot of time adapting to a semi-aquatic existence, post the Ice Age. Contradictory to the Darwinian theory, the theory states that primates spent much time adapting to a terrestrial environment, as opposed to an arboreal one. The AAH is one of the many hypotheses attempting to explain anthropogenic evolution by a single causal mechanism, but is unsupported by paleontological evidence. However, several arguments favour the AAH. One of such arguments is the fact that humans have a bigger brain size than their ancestral hominids. The "Human Encephalization Quotient", a parameter describing the size and complexity of the brain of a species, is the highest for man (7.4-7.8), followed by whales and dolphins (4.14) whereas, primates have values ranging from 2.1 to 2.4. This argument is bolstered by the fact that aquatic bodies are low-gravity environments, where gravitational magnitude is lessened, due to counteracting upthrust. On land, gravity restricts mammals from achieving humongous dimensions, lest they get crushed under their own weight. Consequently, aquatic mammals are typically bigger in dimensions and brain sizes, whereas grassland mammals stagnate in brain development. A team led by Ca-

"Evolution has never been observed...in the Cambrian period, there is a sudden explosion of animals...the Trilobite...had flippers and complex eyes...there are no half-formed stages of organisms with less complex eyes as fossils."

nadian biochemist Stephen Cunnane has stated that developing and maintaining a healthy human brain is heavily dependent on a key series of micronutrients, notably docosahexaenoic acid DHA (an Omega 3 fatty acid) and iodide ions, both abundantly found in water. Why should we base our opinions principled on the Occam's razor? Is parsimony the final guiding parameter as to the validation of a proposed hypothesis and is it always that the simplest model has to be the most tenable one? Does Nature really operates in the shortest way possible and may there not be alternate routes of our existence?

In the Geological or the Evolutionary Time-Scale, no fossils exist in the Precambrian period and in the Cambrian Period, there is a sudden appearance, virtually an explosion of complex animals. Common fossils of this period include the Ammonite (extinct marine mollusc belonging to the class Cephalopoda) and the Trilobite (a kind of extinct marine Arthropod). Considering the Trilobite, it had flippers and complex eyes (ommatidium) observed in modern-day insects. If evolution did indeed occur by natural selection, we should indeed have half-

formed stages of such organisms with less complex eyes as fossils. Paleontological evidence cannot support this claim which then questions our intuitive understanding of what we mean when we say "Natural Selection". As per evolution, a new species will not appear overnight, but must evolve from simpler species. The FARM gap is another instance to corroborate this. What this means is this there is no intermediate fossil links between Fishes (F) and Amphibians (A) and Reptiles (R) to Mammals (M). It's almost as if these creatures developed overnight and got incorporated in the Ecological Column.

As for *Archaeopteryx*, it did have dinosaur features, notably- teeth in beak, a long bony tail and

hooks on the edge of wings. But it had wings with modern flight feathers, like birds and herein lies the discrepancy. Feathers, as per evolutionists, have developed from the scales of reptiles, but we haven't found fossil evidence suggesting a gradual transition between the two! Typically, a feather is a complex structure. The vane has fine filaments of barbs and barbules, hooking up to form an light, airtight membrane. How can such a structure develop from scales and have no fossil remnants? It's as if fossilization stopped every time transition occurred from one class of vertebrates to another. Take another modern-day example: the duck billed platypus showing both oviparous (lays eggs) and viviparous (mammal-like) characteristics. No track record of its ancestors or related prehistoric species have ever been found. The next argument which I cite is known as the "Equus Contradiction" of evolution. The modern-day horse is said to have evolved through the following stages:

Needless to say, due to running, finally modern horse has one toe, rather the hoof made of one

Time Period	Ancestor	No. of toes	Lumbar Vertebrae
Eocene	Eohippus	4	18
	Orohippus	3	15
Oligocene	Mesohippus	3	-
Miocene	Merychippus	3	-
Pliocene	Pliohippus	1	19
Pleistocene	Equus	1	17-18

bone called the cannon bone. However, natural selection would imply that as the running requirements became overpowering, the lumbar vertebrae would increase. Why does it then decrease, then increase and then again decrease? I mean, clearly natural selection was what the final purpose was. Why then this disturbing trend? Something which evolutionary biologists intentionally hush up. According to evolutionists, it took some 208 million years for every variety of evolve from the Jurassic era. But, it seems that it took one-third of this time merely to modify the hoof of the modern day horse. It seems that something is seriously very wrong with the evolutionary time-scale. A similar controversy arises when we try to explain the evolution of whales.

Whales suckle their young, but live in the sea. It is said that a distant ancestor of the whale, a mammal on land, returned to water. Firstly, if natural selec-

tion was at work, then why would a creature who had mastered terrestrial living return to an aquatic habitat? Even if that is assumed, dissatisfactory and incomplete fossil links exist to corroborate it.

Only the first two species have fossil records, the rest is mere speculation based on the similarities. In the November 2001 issue of the National Geographical magazine, the artist replaced the small hoofs of the *Ambulocetus* with claws and webbed feet to convince the reader that it was well on its way to becoming adapted to an aquatic environment. All specimens can vary a little in selection but there is obviously a limit, too much variation would compromise fitness that could lead to eventual extermination of the species. The breeding variation "speculatively extrapolated" by Darwin to suggest the possibilities of new species was much more than the breeding limit of a species as seen by both natural and artificial means. In spite of being fully aware, Darwin wrote on his book "On the Origin of Species" that "It is rash to assert that a limit has been attained in any one case of species evolution".

Why are we then, so hell bent on presuming that everything was as per the Darwinian theory? Is there not a teeny-tiny bit of chance that we were maybe, a bit wrong? And this is corroborated by the fact that not all animal evolution can be successfully explained by evolution. Or maybe we're entirely wrong and that evolution was just a faux-pas of human intellect? Maybe all creatures did appear all at once, and historical, mythological and evolutionary evidence does point to that possibility. Perhaps we will never know. But we as humans could at least cease to be arrogant and learn to accept alternatives, especially when the evidences are really compelling. The day we accept that our explanations and theories have limitations will be the day we will actually become a better species-and I'm hoping that will come about by forces other than of natural selection!

"Feathers, as per evolutionists, have developed from the scales of reptiles, but we haven't found fossil evidence suggesting a gradual transition between the two!"

Searching for a Story



Subhasish Baral

I have always wanted to tell a story, a story that would both be interesting and profound so the reader can be lost in its depth of thought or its fictional charm.

This isn't the first time I am committing myself to writing seriously; I had earlier written stories surrounding my experiences during the several trips I have undertaken in the past. This time around, I thought I would write a scientific article on my area of research. But it didn't feel right, I felt I didn't know enough about the problem and the work that had already been done to understand it, to write about it authoritatively. So I decided to write on my research only after doing a more exhaustive literature survey.

Then I thought it might be a good idea to write about my PhD interview at IISc. But again, though it was a very important event in my life, I felt it would be too early to look back on that day.

The next thing that came to my mind was swimming and I quickly sat down to write about this particular incident in my early days as a swimmer. But soon after, I had the feeling that I would bore all my friends and acquaintances with yet another of my swimming experiences. And thus, this idea too was abandoned.

I then thought I could write my story around an ethical issue. The decadent moral values of the youth in our society had time and again disturbed me since long and this, I felt, would be the perfect opportunity to voice my thoughts on the issue. But very soon, I realized that I wasn't very experienced or mature to enunciate moral commandments as I found myself faced with ethical conundrums often.

After a string of failed attempts at writing a story, I was feeling very low and depressed when suddenly I was struck by the idea of writing an inspiring story. But it too sounded drab and boring. I wanted something different, away from the routine and the mundane.

I tried to think clearly but the stories that flooded my mind all revolved around myself. This led me to consider writing about someone other than me. But most of the stories about other people that I could think of did not have a conclusion.

I wanted a story that would be dream-like and engaging which would captivate the reader and hold him in a trance but I wasn't able to find such a story despite trying very hard.

So, bottomline? I am yet to find the perfect, dream-like story.

Subhasish Baral is a PhD student with Dr. Narendar Dixit and Dr. Rahul Roy.

SUDOKU

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Placements - 2014
Hearty Congratulations !



Kapil Newar
Cognizant Technology
Solution



Rahul Shukla
RGUKT



D B Sridhar
Tata Consultancy
Services



Ankit Sangwan
Impetus Infotech India
Pvt Ltd



Nirmal Kumar
TVS Motors



Aravinda Reddy M
Tata Consultancy
Services



Ravi Gautam
SABIC



Ipshita Banerjee
SABIC



Shiva Naresh M
RGUKT

Post-Doctoral Offers - 2014
Hearty Congratulations !



Sivarama K Perala
MIT, Cambridge
USA



Mohan Verma K S
Harvard Medical School
USA



Shinde Vijay M
TU Delft
Netherlands



Aravinda Reddy M
Purdue University
USA



An Ode to Professor Bird

Dr. K.S. Gandhi

tribute

Plenty are societal needs
 answers affordable is the need.
 Old ChE brought many a solution
 by setting some methods in motion.
 Based they were on wizened experience
 but, a pity they were full of empiricism.
 Many a formulae one had to mug
 since there appeared no method to hug.
 Out flew Bird, with a span so great,
 accompanied by Stewart and Lightfoot,
 note there is always a triumvirate,
 brought unity and order with Phenomena Transport.
 It was a Kuhnian revolution
 that swept the entire profession.
 Profession, taller it stood with perspective no less,
 to unify with new neighbours borderless,
 ever more confident to play its rightful role
 to give clean air, water and food for all.

The seminal book
 'Transport Phenomena' by R.
 Byron Bird, W.E.
 Stewart, and R.N.
 Lightfoot, established the frame-

work for teaching transport phenomena
 in the undergraduate and graduate level
 and continues to enjoy immense popularity
 even today. The three greats are referred
 to as the 'triumvirate' here. Bird recently
 celebrated his 90th birthday this year on
 February 5. This poem was penned in his
 honour and was originally published on his
 website (www.engr.wisc.edu/cbe/bird-birthday-symposium-banquet.html)



लागा चुनरी में दाग



Sagar Garg

बिट्टो हमारी शाम बाहर खेलने जाती
 बारिश में छप-छप करते कागज़ की नाव बहाती
 खिलखिलाती, मुस्कुराती और अपनी छोटी बेहेन के साथ ठहाके लगाती
 ना कोई उसको फ़िक्र सताती, बस मस्ती में वो उड़ती जाती

छोटी पर पानी फेक कर, उससे बच दौड़ी चली जाती
 उससे छुप छुप कर ना जाने किस गली में पहुच जाती
 शाम ढलने लगी, ये सोच अब वो घबराती
 वापसी का रास्ता ढूँढ़ने के लिए, यहाँ वहाँ नज़र दौड़ाती

रास्ता नज़र आने पर वो बाहर के लिए कदम बढ़ाती
 पर चार अनजान शकले उसे सामने से घूरी जाती
 वो डरती, घबराती, फिर तेज़ी से कदम बढ़ाती
 पर वो चार अनजान शकले उसे पीछे से पकड़ ले जाती

वो चीखती, चिल्लाती, बचने कि गुहार लगाती
 पर उन बंद अँधेरी गलियों में उसकी चीख वहीं दब जाती
 घंटों तक वो रोती, चीखती, चिल्लाती, फिर बेहोश हो जाती
 जब होश आया, तो खुद को उस गली में अकेला पाती

बड़ी मुश्किल से उठकर वो वापस घर को जाती
 धीमी धीमी बारिश में अपने आंसू छुपाती
 दर्द से तड़पती पर मूँह को हाथ से दबाती

घर की चौपाल पर छोटी को इंतज़ार करते पाती
 माँ फटे हुए कपड़े देख बिलकुल सहम जाती
 छोटी पूछती, "अम्मा, दीदी को क्या हुआ", पर वो कुछ ना कह पाती

अब तो आंसू भी सूख गए बिट्टो के, वो बेचारी अब रो भी ना पाती
बस बाल्टी भर-भर के सर पर उड़ेलती जाती
चोटे तो साफ़ हो गई,
पर चुनरी पे लगा दाग कैसे छुपाती
पर चुनरी पर लगा दाग कैसे छुपाती

Sagar Garg is a UG student of chemical engineering in IIT Guwahati. He interned under Prof. M.S. Ananth in the summer of 2014.

Sisyphean

As I stare down from my temple,
I see a struggle to survive.
There is no rhyme in these lines,
only the loud silence of anxiety.
Squandering for meaning, but oblivious to facts.
Love, fame, money-all you have but truth, for everyday is a lie!
You yearn to grow old and die, trying hard to succeed.
You find solace in the mundane and peace in civilization.
A good son, an obedient student, an abiding citizen, a trustful spouse;
You're the perfect actor in an imperfect play.
You talk of revolution and change, but wish for subjugation and obvious.
Holding the steering wheel but drifted by society.
You are a beast, lost in this jungle.

I won't live to die; but die, for I have lived!!

Nemo



IISc की महिमा

IISc की हर बात है निराली
चारों तरफ है हरयाली ही हरयाली
कैंपस में तो ऐसा लगता है
जैसे सभी ओर हो खुशहाली
IISc की हर बात है निराली ॥

स्व: श्री J R D Tata के क्या कहने
हमारे अच्छे भविष्य की नींव बना डाली
सन 1909 में इस संस्थान की स्थापना कर डाली
IISc की हर बात है निराली ॥

केमिकल डिपार्टमेंट के क्या कहने, जीवन में भर देता है खुशहाली
जिन्हे देखा NPTEL पर, सामने उन्हें देख कर अपने भविष्य की कल्पना कर डाली
चेयरमैन सर ने हमारे अच्छे भविष्य की कमान सम्भाली
1st year में assignments की भरमार कर डाली
professors ने research की बात कर डाली
बिना reference के हम ने सारी मेहनत बर्बाद कर डाली
IISc की हर बात है निराली ॥

hostel में तो ऐसा लगता है जैसे हर दिन हो दिवाली
हमने अपने लिए top floor पर रहने की जगह बना डाली
पर जब lift खराब हुयी तब समझ में आया कि सबसे बड़ी गलती कर डाली
IISc की हर बात है निराली ॥

gymkhana के क्या कहने, body fitness की सारी सुविधा दे डाली
दौड़ने के लिए play ground कर दिया खाली
दोस्तों फिर भी हमें ध्यान नहीं दिया और अपनी body गोलमटोल कर डाली
IISc की हर बात है निराली ॥

Kabini canteen के क्या कहने, 5 रूपए में चाय बना डाली
mess वालों ने नारियल की चटनी खिला कर हद कर डाली
Prakruthi ने South Indian खाने की भरमार कर डाली
और Gym cafe ने रात दो बजे तक की सुविधा दे डाली
IISc की हर बात है निराली ॥

IISc की हर बात है निराली ॥



Jitendra Kumar
Gupta
M.E. 1st Year

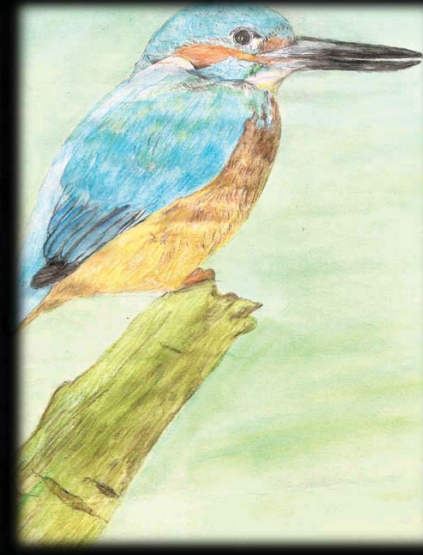
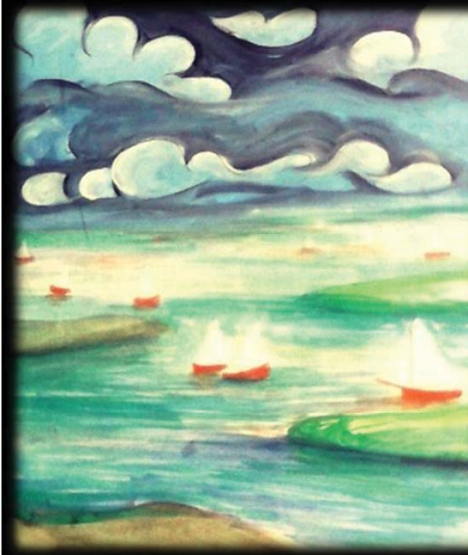
The Palette

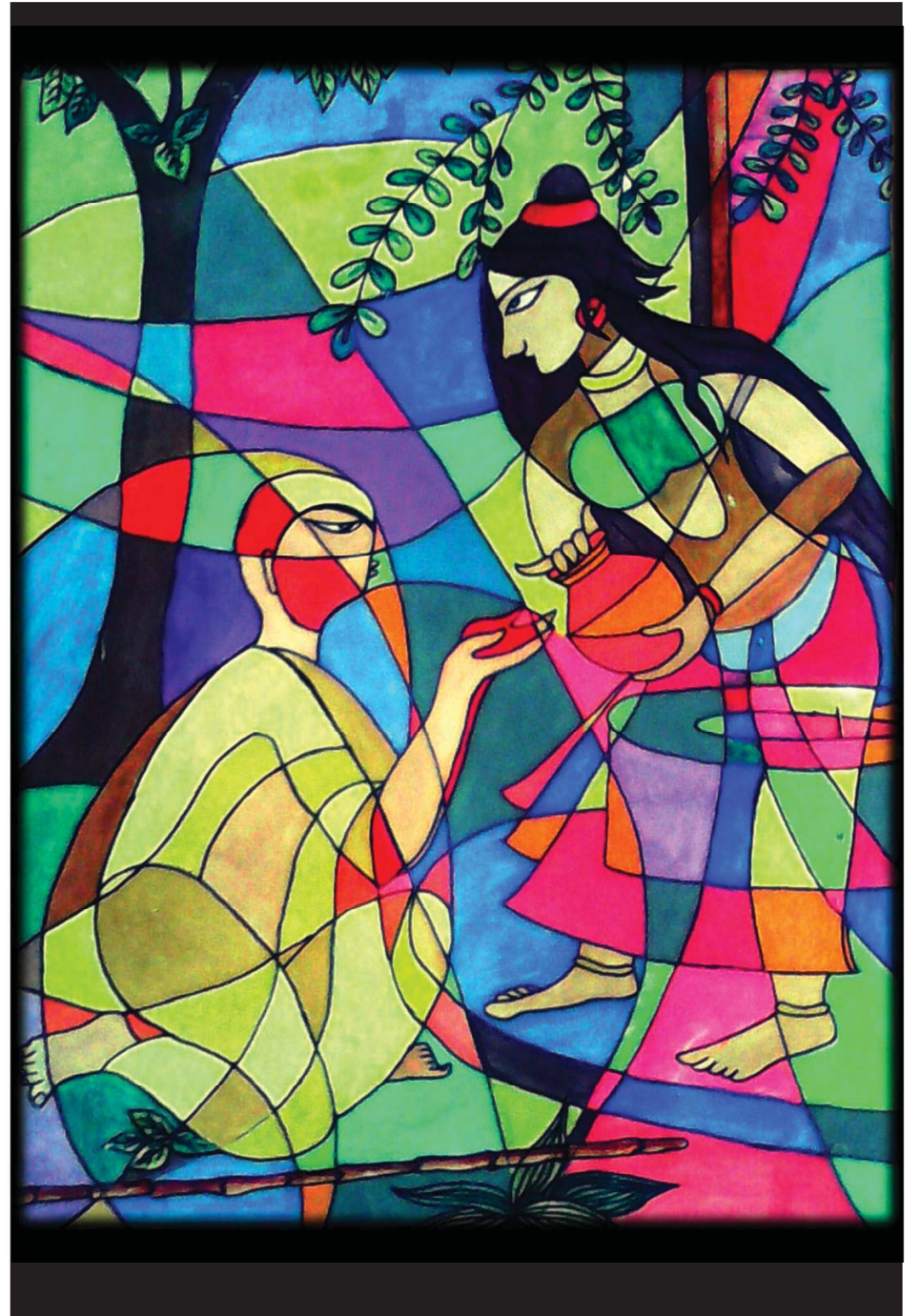


My Brush Strokes



Satyaghosh Maurya

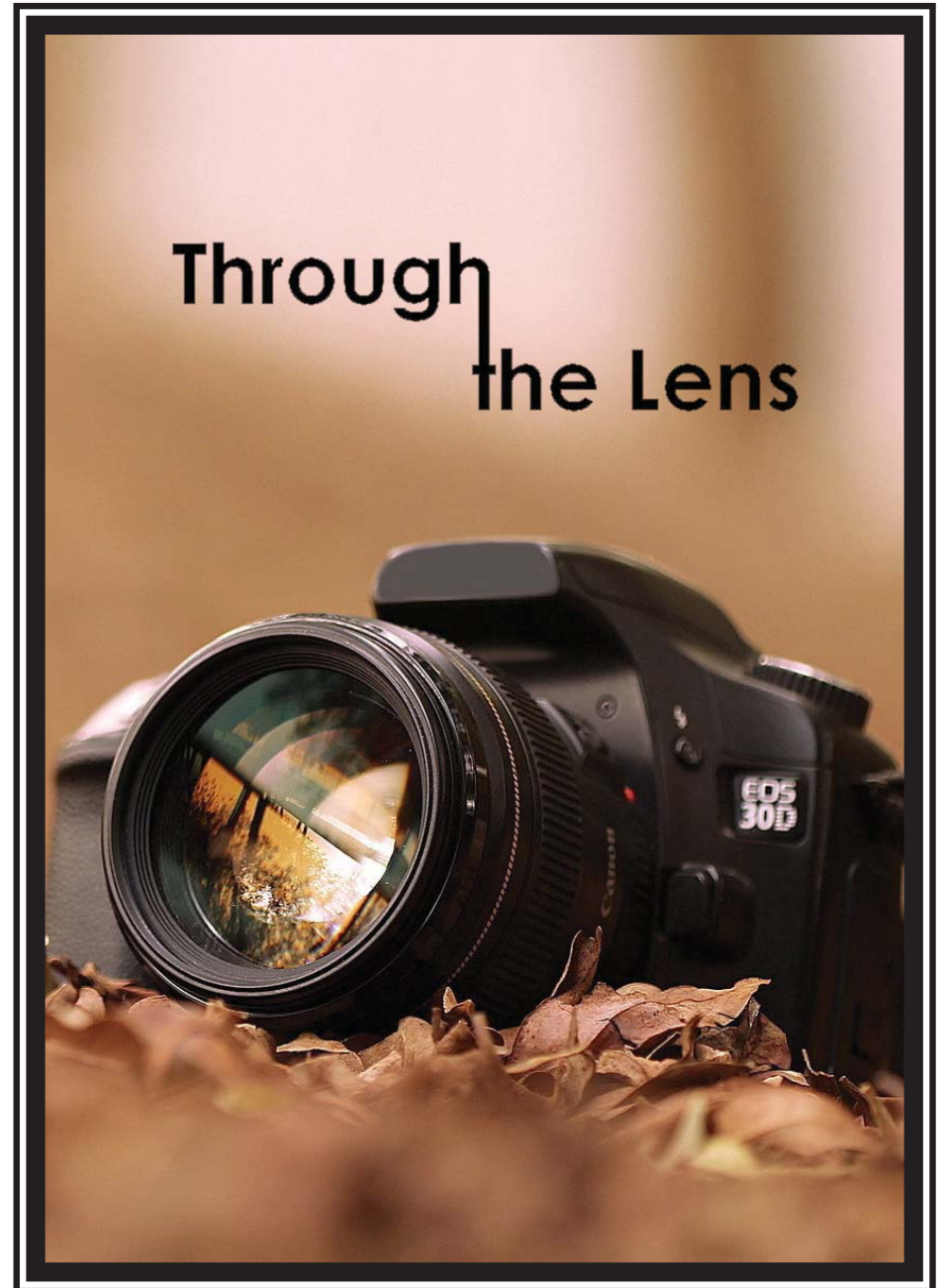






Ravi Gautam

Wonders with Pencil



The Flora of IISc - in all its glory...



Night fall in Gymkana grounds



The Grand Old Tree near Prakruthi

Faculty Hall



Rubesh R

Panoramic views captured using Photo Sphere option in Nexus 7



Department Terrace

Rubesh R

In the evening shade of the trees around Faculty hall



Rubesh R

Before I forget...



Dr. Rahul Roy (CEA Prsident)

While one may wonder how amazing things get accomplished overnight as if a genie was at work, I have learnt to never underestimate the sheer will, immense creativity and unwavering commitment of people to a common goal. I experienced it once again as a member of the CEA executive committee last year. While key members of the committee were missing from almost the start of the term, there was never a damper on the spirits of the team. The extra load was shared by all and numerous others came forward to help whenever situation arose.

CEA started the term by organizing an interaction session of the departmental students with the out-going batch of 2012. Other regular CEA events that brings the department together over tea and snacks were sprinkled over the entire year. Freshers from the new batch of Masters and PhD students were given a warm welcome by CEA members. The Teachers' day was again an opportunity to thank the mentors and teachers of the members. The CEA cricket match gave the department members a chance to show off their athletic skills. The two annual CEA talks featured two distinct speakers from diverse ends of the spectrum. Dr. Sukanya Raghavan introduced us to concepts in organic farming and ecological modernization and Dr. Shiladitya Sengupta from MIT introduced us to his journey from conducting basic research to co-founding four biomedical/pharmaceutical start-ups.

In a jam-packed night with musical and theatrical stars from the department, we had a rousing and entertaining CEA nite that I would definitely remember for some time to come. Showcasing of musical talents from two and a half generations of the Chemical Engineering kept a rapt audience wanting for more. I was



CEA Nite, June 2013

kept wondering how I had found myself miraculously in the midst of such genuine talent. The comedy drama conceived and presented largely by the summer interns kept its funny twist for the end. And the night was made marvellous by a competitive game of Pictionary with teams comprising of student and faculty.

Another CEA event that drew another set of talents, this time the academic kind, was the ChemE In-house symposium. We had a complete day of research talks by students who presented their on-going research work to the department. The toil and effort that ChemE graduates put into their research was in clear display. The symposium also drew guests from the industry including

our own alums who turned up to learn more about our department's current research directions. The highlight of the symposium were two plenary talks by Mr. Swaminathan Eisenhower, Director Operations, Saint Gobain Glass India and Dr. Vianney Koelman, VP Computational R&D, Shell Inc. The opportunity to interact with the industry representatives gave the students a perspective to look at their research in the context of the industry.

Finally, a newly designed the Departmental/CEA T-shirt was highly sought after and was a great way to commemorate the year. All said and done, the year passed by quickly and kept everyone at their toes, yet CEA was able to make it an unforgettable one, at least for me.



CEA Symposium, October 2013

Activities undertaken in 2013

- CEA Symposium
- CEA Nite
- Freshers' Welcome
- Teachers' Day celebration
- CEA Cricket Match
- Annual CEA talks

THE CEA - 2014 TEAM

PRESIDENT - RAHUL ROY



VICE PRESIDENT - ANKIT



GENERAL SECRETARY - JATIN



JOINT SECRETARY - SIRAJ



TREASURER - RUBESH



EDITOR - SAYANI



DESIGN OF COVER ART, CONTENTS, AND PAGE ON CEA-2014 TEAM BY
ARJUN V.P.
(SUMMER INTERN IN DR. NARENDRA DIXIT'S LAB)