the genes for quantitative traits has also been highlighted and the need for integrated nutrient and pest management has been emphasized. The economics of crop production is discussed with reference to the costs of various inputs essential for optimizing crop yield while resulting in maximum benefit to the farmer.

On reading each chapter on crops it is apparent that the authors have placed emphasis on the various disciplines which contribute towards understanding the basis of yield and crop production. There is ample emphasis on physiological processes and components of growth and yield as viewed by an agronomist. The lack of basic information with respect to the above has been mentioned in certain crops such as safflower etc. This integration of information across disciplines such as genetics, physiology, and biotechnology along with pathology, origin, history and post-harvest technology is the strength of the book. This book will be of immense value to the graduate and post-graduate students of biology and agriculture. I strongly recommend this book for libraries and students.

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PERSONAL NEWS

Zita Lobo – An obituary

Zita Lobo of the Department of Biological Sciences, Tata Institute of Fundamental Research, passed away on 6 October 2000, after a brief struggle against cancer. Zita Lobo and her close collaborator and husband Pabitra Maitra pioneered the genetics of sugar metabolism. Zita's scientific career began even before she graduated, and spanned over 30 years.

When Zita's mentor, Pabitra Maitra, joined the Tata Institute in the mid-1960s, cellular biochemistry had already deciphered most of the enzymes and pathways underlying the breakdown of carbon sources to generate ATP. Many important puzzles, however remained. Principal amongst these was the question of how metabolic flux was regulated. Metabolites generated upon breakdown and utilization of carbon sources are typically present at very high concentrations in the cell, as are the enzymes that synthesize and break them down. Yet, cellular growth profiles and metabolic fluxes maintain homeostasis when enzymes in the pathway are greatly reduced or increased. Maitra decided to take an approach to understand cell physiology that used both biochemistry and genetics as its tools. Soon after Maitra characterized glucokinase activity in yeast, he and Lobo began their collaboration which covers a major portion of our current understanding of the genetics of glycolysis in yeasts. They first examined the kinetics of glycolytic enzymes in *Saccharomyces cerevisiae* – resulting in Zita Lobo's first paper even before she had completed her B Sc degree. Meanwhile, along with Meher Irani, Maitra had begun the genetic dissection of glycolysis in *E. coli*. But this approach, selecting for inability to grow on defined sugars, effective in *E. coli* proved recalcitrant in yeast. The conventional view amongst purists – i.e. geneticists who had developed powerful methods in *E. coli* – was that yeasts were a polyploid zoo, best used for brewing and baking. Real geneticists should stay away from such ill-defined monsters. Maitra and Lobo's efforts yielded sparse results and the

future looked bleak. But very soon, in a *tour de force* that used selection pressure on different strains to isolate mutations in specific pathways, Maitra and Lobo not only pioneered yeast genetics but also dramatically explained why the first steps in getting glycolytic mutants were so difficult. Their 2-deoxyglucose selection method showed that there were three genes – encoding two hexokinases and one glucokinase – that affected the first steps of glycolysis. This genetic redundancy had confounded, temporarily, the genetic approach, but once the wall was breached, there was no stopping them.

Maitra and Lobo soon developed their collaborative efforts into one that genuinely shared talents and became mutually dependent. Their teamwork at the bench and in analysing their data was legendary. Maitra's ability to dissect tetrads and map mutants was invaluable as was Zita's ability to generate all combinations of strains and pick the mutant needle from the haystack. Genes in many of the steps in glucose or alcohol utilization were isolated and studied genetically and biochemically and, more important, analysed incisively. Recombinant DNA technology had not yet stripped genetics of its intellectual clothing and Lobo and Maitra's lab used genetics and biochemistry at their incisive best to make predictions on gene structure, function and regulation.

When the genes were cloned and analysed, many of them by Lobo, Maitra and collaborators, it was truly impressive just how many of their predictions proved correct. Exemplary in this regard was the study of regulatory mutations in phospofructokinase and the demonstration that the regulatory subunit of one isozyme was the catalytic subunit of another isozyme. In addition, Lobo, Maitra and collaborators isolated and studied many regulatory genes in carbon metabolism.

Lobo, Maitra and their collaborators were soon to hit a new difficulty in their attempts to isolate the genes encoding enzymes in the pentose-phosphate (shunt)

pathway. After quickly isolating mutants for glucosephosphate dehydrogenase and phosphogluconate dehydrogenase, they were unable to isolate mutations in other genes. The shunt pathway in *S. cerevisiae* was simply not important enough for selective tricks to work. Zita Lobo was introduced to *Schizosaccharomyces pombe*, the fission yeast by Jane Robinson and, the lab quickly applied methods of selection using d-gluconolactone, that were most effective.

The Lobo–Maitra laboratory and since, Maitra's retirement, the Lobo lab, trained and nurtured many talented scientists. Meher Irani, Shankar Chakravarti, Hemant Chikramane, Pratima Sinha, Medha Nadkarni, N. Gautam, Archana Gayatri, Inderpreet Kaur Sur, Anindya Sinha, V. Raghuram, S. Mahadevan, R. Sivakami, and S. Velumurgan were amongst those who have gone on to make their own distinctive careers. In addition, numerous others have been transients of various kinds, benefiting immensely by the intellectual ferment of the lab and Zita's fine food and drink at home. Zita was caring to the extreme, nurturing her lab members and colleagues inside and outside the laboratory. This was done with an efficiency and naturalness that made it seem easy. Those of us who co-ordinate the passage of each day sloppily could only marvel at the focus with which Zita addressed her work and yet managed to have an unending feast ready for all of us for dinner.

Zita's science and her presence was characteristically understated. She did her work and analysed and reported her results when they were done. She wrote no reviews. She did not 'sell' her science. She did not travel. She rarely went to meetings. A reading of her published science allows its value to be appreciated. We, confusedly, live in an age in which we count the number of papers better than we read them, an age in which the journal where our work is published is apparently more important than what it says, and getting a large team to work is more important than working at the bench oneself. An age in which aggression and drive must be evident in our personality and where the down-playing of others' accomplishments is matched only by the hype that we build up about ourselves. An age in which being decent is said to be a disadvantage and a sure invitation to be trampled upon. Zita Lobo lived in such an age, but she surely belonged to another. We will miss her very much. She leaves behind Pabitra Maitra who she married in 1997; her siblings and their families, and her many collaborators, colleagues and friends.

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