



# Edmund Chi Chien Lin



Edmund Chi Chien Lin, Professor emeritus in Microbiology and Molecular Genetics, died peacefully in Boston on March 6, 2006. He was born in Peking, China, October 28, 1928 to a prominent family. His father had risen from a job in the family rice store, winning a scholarship sponsored by the British under the settlement of the second opium war and taking a degree at the London College of Law, later to become a Justice on the first Supreme Court of the Chinese Republic. Ed, like his two siblings, one of whom studied architecture at Yale, was schooled entirely in English and held (perhaps with tongue-in-cheek) that his education in Chinese matters was deficient. Nonetheless, it was law which he was studying at the National Peking University before fleeing via Hong Kong to the United States just before the fall of Peking to the Communists in 1950. Deciding that to retrain in American law was impractical, he quickly completed an A.B. degree in Biology at the University of Rochester, 1952, and took a Ph.D. in Biological Chemistry at the Harvard Medical School, 1957, participating in Eugene Knox's pioneering studies on adaptive enzyme synthesis in animals and showing that the levels of tyrosine transaminase were subject to dual control by substrate and adrenal hormones. He was forthwith

made faculty member in the same Department, later moving to the Department of Microbiology and Molecular Genetics where he became Professor, 1969, Chairman, 1973-1975, and remained until retiring in 2003.

The work of Lin and his group focused on the catabolism of polyhydric alcohols particularly glycerol, its metabolic and genetic complexity, a line begun with B. Magasanik, with whom an intended postdoctoral period had been short circuited by the faculty appointment. Highlights over the years include: (i) enzyme induction by the product of the first reaction in the pathway; (ii) the glycerol-phosphate intermediate entering cells intact.; (iii) the recognition, through mutants, that the PEP-phosphotransferase system discovered by Kundig and Roseman widely acted on sugars as a combined vectorial step of transport

and initial metabolism; (iv) the finding that glycerol entrance, normally diffusive across the plasma membrane, was aided at low levels by an inducible non-concentrative glycerol facilitator, later to become a founding member of the family of channel proteins which includes the aquaporins; (v) the implication of glycerol kinase, the first enzyme of the pathway, as key to capture of glycerol; (vi) the discovery of end product inhibition in catabolism – of glycerol kinase by fructose-1,6-bisphosphate – and its role in preventing the “metabolic embarrassment” (a typical Lin neologism) of excessive glycerol metabolism giving that toxic phoenix in biochemistry, methylglyoxal; (vii) showing that the glycerol system had different enzymes catalyzing the same reactions, differently expressed, as well as both scattered and linked genes under common regulations, for which he coined the term regulon; and (viii) the final fifteen years which focused on the discovery and analysis of a two component regulatory system, comprising proteins ArcA and ArcB which govern turning on or off those genes (a “modulon”) needed for growth in aerobiosis or anaerobiosis. His group provided one of the most finely worked out mechanistic pathways for such systems, capping the work in 2001 with the demonstration that the state of reduction of quinone was key to the signaling.

He was also a founder, with a Science paper in 1964, of the field of experimental evolution in bacteria, showing, for example, how conversion of the bacterium *Aerobacter aerogenes* from one that was unable to utilize xylitol as a carbon source to one that involved sequential alterations in enzyme specificity, regulation of expression and solute uptake. It was a deep interest, and a long promised book on the subject, alas, remained just that. (Writing was important, and among other books, he was an editor of that “bible” of microbiology, *Escherichia coli* and *Salmonella*, 1996.) A practical bent led to his name on six US patents, and he cofounded two biotechnology companies. There were collaborations over many years with one of us on issues of transport ranging from higher cells down to the origins of membranes, and with Spanish colleagues on evolution and oxidative stress. The list of coworkers is long and typically international, and the same may be said for the many shared meals. Use of chopsticks was the first lesson.

Lin was a man of irony, strong political views, personal reserve and high culture. The take on academic politics, if fond, leaned to the conspiratorial. After Tiananmen Square he renounced his title as Honorary Research Professor at the Chinese Academy of Sciences and did not visit China again. In 2003, with the same sex marriage bill, he wanted it known that he was gay. Close colleagues were unaware of his adopted son, Bertrand (named after the philosopher B Russell). With keen interests in classical music he took up the flute as an adult, and there were the two leftfront seats at Symphony. Engagements included food, modern art, the collection of Chinese calligraphy, and, strongest of all, France (he had an apartment in Paris), where over many years he claimed to read only Proust.

Respectfully submitted,

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