Cells, Gels and the Engine of Life – A New Unifying Approach to Cell Function. Gerald H. Pollack. Ebner and Sons Publishers, 3714, 48th Avenue NE, Seattle, Washington 98105, USA. 2001. 305 pp. Price not mentioned.

Somehow I could not help but think of bananas when I started reading the book by G. H. Pollack and that was not just about the consistency of the fruit. People do different things to bananas; grind them to juice in Karaikudy, mash them to 'panchamritam' in Pazhani, some fry them to chips and out there in Kerala, they cook them and make 'thoran'. It depends on the immediate chemistry, or is it physics, before the end... and the banana is not the same either. I doubt the culinary preps help us in knowing the real banana. Pollack makes a strong case for ideas originally developed by Gilbert Ling in the form of his association–induction hypothesis and takes them further with similar views on everything, from membrane potential to secretion. I do admire Ling, but more for his pugnacity and courage and have also felt there is some value to thinking about cells in that manner. None of these can be dismissed as trivia, rather they represent a view closer to reality than most biochemists would like to admit. But then, it is not easy when generations have produced the most consistent picture of cellular biochemistry with basic premises not very different from the chemistry in a stew. Whereas some form or other of the biochemistry has given us flavours that we have hoisted on the electron microscopic pictures of cells to model physiology that is measured, it is not clear where Pollack can take us with his 'Jell-O pudding'. Biology has always suffered; classicists rile us with taxonomy and the monotony of anatomy, the postmodernists are busy putting us off with nit-picking details of reinvented chemistry and rehashed high-school physics. All of biochemistry is artifact willy-nilly reproducible, so is the electron microscope picture... . Pollack makes us believe that physiology is so in a good measure. He is much obsessed with proteins and their properties alone. His arguments can be literally felt under one's skin, if you pause to think what is underneath. His discourse derives from the fact that the consistency of the cellular milieu is not that of the contents of an Ehrlen–Meyer flask of chemical reactions, but of a well-chewed gum wrapped in wax-coated paper... .

We do not have to go far to feel the texture of a cell. Pinching oneself is sufficient. It is not like any of the biochemist's preparations or the spectroscopy samples or that of the crystallographer. It is just like us, a banana wrapped in its peel... with nearly 30% protein and other materials; that is how it should be, like an appropriately prepared agar gel. So gels are what cells are, is Pollack's point and one easily concedes him that. Rubber band is my favourite gel for comparison. Stretch it and allow it to equilibrate with the room. If now one releases it, the band itself is cooled, meaning its resting state is energetically higher. They say the stretched state is more ordered and entropy increases when it shrinks, etc. The fun fact is that the happier state is achieved by absorbing heat. Perfectly good explanations can be had for this too. If the job is of explaining a cell as a self-organizing system that keeps entropy low, this will be a good example to go to town with a book of life. But gels make us miss some really cool stuff to think of. When a membrane has an average thickness of 70 Å and potential drop of 70 millivolts across, it is like having a 100 million volts/km field. A bolt of lightning happens with much weaker a field. The dielectric properties of the matter intervening must be special. While Pollack's writing is a good reflection of possibilities – one cannot deny sequestration in cells or else everything inside will turn to ammonia, CO_2 and water, with a few salts dissolved. Barriers must exist, so things do not just happen as dictated by charges and associations. The barrier, in some sense can be like our skin and sequestered organelles, like tissues. Similar components, but their distinctive properties put them in different locations. Proteins of a certain character stay near, on or as membranes.

There is no substantial argument against all that Pollack says about water activity leading to certain properties... the only question is whether that is what happens in a cell. I doubt a feasible explanation of a few select phenomena is sufficient to turn cell biology on its head. One does not need to have a whole book to tell us that what is true for the banana is true for a banana cell. Pollack's arguments can be as refutable as of those who view the biological membrane as a pure lipid bilayer. This latter genera hope to learn about everything in biology by shaking lipids in buffers and making fluidity measurements or water transport across such bilayers assisted by drugs. Many will be out of business if they are told to decipher biology without using the ubiquitous phraseology of conformational change (they have recently taken on the more natty jargons of protein folding) or fluidity. When you do not understand something too well, you say there is some unclear conformational change and half of all the biological effectors change the fluidity of lipids.

With the concentration of proteins (~ 30%) and other molecules and consistency expected of such a milieu, there is more reason to accept that the cells are in the form of a gel then being soap bubbles or balloon filled with aqueous stuff... which should burst out. Cells are no soap bubbles, but the general tendency is to picturize them like soap bubbles or balloons filled with water..., a model Pollack attacks. Pollack has neat answers to all. Perhaps the answers are not incompatible with the view of others. It is only the easy description and no specific need to take recourse to the whole banana that one can get away with Jell-O pudding and banana juice models. Although pumps and channel proteins exist, free flow of ions and counter-flow of water are sought to be made illogical and it is perhaps likely, true. How the pumps act is very different from the pumps we know... we recourse to stripping water in case of one ion and not doing so in the case of another, to make sure that there are specificities for Na and K channels. So does Pollack, even though it is association induction.

Starting from section III, the gels become unpalatable. Pollack sets forth arbitrary hypotheses no different from non-specific membrane models with quantum chemistry calculations, analogous to the equation someone wrote for a fish escaping the net. Many mechanisms he describes could help. They are not excluded from a scenario of sequestration suggested by cell biologists and cell membranes.

What I consider the best part of the book is that it makes you think about the cellular activities a little more carefully. Almost everyone, when it suits, uses hyperbole about selectivity and specificity in biology from replication of DNA, protein synthesis to trafficking in cells. They view cells as a pool of chemicals dissolved in water, free to associate every whichever way and add on impermeant bilayers to sequester groups of activity. Pollack's case for association and induction is strong and has to be read with an open mind. I believe this book is a good read, whether you agree with the author or not.

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Statistical Methods and Application in Biology and Medicine. D. K. Subbakrishna and V. G. Kaliaperumal (eds). Department of Biostatistics, NIMHANS, Bangalore 560 029, India. 2001. 344 pp. Price not mentioned.

The book under review contains proceedings of the first joint conference of the Indian Society for Medical Statistics and International Biometric Society (Indian region). As the title suggests, the papers included mostly deal with applications of statistics in biological and medical sciences. About 7/8 papers are mainly theoretical in nature and about 20/21 papers deal with applications. There are 7 invited papers, among which special mention must be made of review papers by Sundarraj on linear models, G. S. Shukla on longitudinal data analysis and a paper by Prajneshu on the use of Box–Cox transformations to reduce heterogeneity of error variances in nonlinear models. These papers review models/techniques used extensively in research, not only in biological or medical sciences, but also in life and social sciences. The paper by Pradhan introduces many important concepts in a short span of about 10 pages, such as Kolmogorov–Chaitin complexity, Hausdorff (fractional) dimension, Liaponov exponent and correlation dimension. The discussion is sketchy and would be difficult to follow even for scientists with some mathematics or statistics background. However, the presentation of the data by actual curves and coloured topographic pictures would be very useful to those who do not have adequate mathematics or statistics background.

Among the papers of theoretical nature, the one by Laxminarayana and Misra on inflated compound distributions is very disappointing as it does not include any applications even those of the special cases. Similarly, the paper by Nair on expected size and duration of a birth/death epidemic model gives only mathematical derivations without any applications to real (or simulated) data. The other papers in this category present the theory with applications in areas such as comparison of event rates by Ezhil and Jabbar, errors which are symmetric but non-normal by Ganguly, modeling for recurrent events by Purohit, digital preferences by Ramanath, proportionate reduction of error by Sarmukaddam, estimation of relative risk size from samples of unequal sizes by Gupta and Singh, modeling and estimation for contraceptive effect by Madhura and Vaman, and projection of AIDS by Rao and Venkatramana.

The remaining papers deal with applications to a variety of situations. Among these the reviewer would like to mention the papers by Shubha Rani on introduction to bootstrap, Chinchole *et al.* on effect of donor age on kidney transplants, Subbakrishna *et al.* on age at onset of schizophrenia in females, Antony *et al.* on suitability of human development index, Murthy *et al.* on health status of women and Gupta on nutritional status of individuals in four districts of Rajasthan. The papers by Murthy *et al.* and Gupta show how adult women/girls receive a raw deal in such basic needs as food and health, particulary in 'BIMARU' states.

The proceedings indicate that a lot more hard work coupled with good mathematical and statistical training is necessary to bring the level of research up to the world standard. Unfortunately, in the Indian school and college systems bifurcation between Life Sciences and Mathematical Sciences occurs very early and unless this is removed, Indian scientists working in this area would be handicapped. It is hoped that 'powers that be' would make efforts to rectify this situation and produce some graduates in life sciences with adequate background in mathematical sciences and graduates in mathematical sciences with adequate background in life sciences.

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