Journal of Bioenergetics and Biomembranes, Vol. 27, No. 5, 1995

Introduction*

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Recently, there have been tremendous advances in our knowledge in the field of bioenergetics. These advances have become possible through a number of developments in techniques: molecular genetic techniques allowed us to modify proteins and genes in a specific way, and the enormous increase in power of computers and software has enabled us to extract invaluable functional information from protein sequence databases and from X-ray and NMR data. The high-resolution structures of more and more free-energy transducing proteins have become known (such as that of the bacterial reaction center and more recently that of the mitochondrial F1-ATPase and the complete cytochrome *c* oxidase) and we are getting close to the understanding of how the individual proteins work.

Consequently, it becomes more relevant to study the way in which these complexes function in the context of the whole cell. Interestingly, the same techniques that helped in the elucidation of the different free-energy transducing complexes are also prime tools for addressing the question that makes biology such a special science, namely how a multitude of elementary physico-chemical processes produces complex but well-regulated behavior.

This issue of *Journal of Bioenergetics and Biomembranes* concentrates on how we may figure out what the relative importance is of each of the constituent factors for the functioning of a whole cell. The examples have been chosen to cover a broad range of biological materials. After two reviews covering the principles of metabolic control analysis, there are articles on bacteria, liver, muscle, and unicellular eukaryotic parasites. Each of these cell types has special properties and poses special demands on the coordination of its biochemical processes and this makes their specific study worthwhile.

I hope that this series illustrates to what extent the analysis of complex metabolic networks has now become feasible due to advances in biomathematics and molecular biochemistry and that it may inspire young biochemists to unravel further the complexities of the living cell.

* This minireview series appears in two consecutive issues: Volume 27, Number 5 (October 1995) and Volume 27, Number 6 (December 1995).

0145-479X/95/1000-0477$07.50/0