

## The Phototrophic Prokaryotes

GÜNTER A. PESCHEK, WOLFGANG LÖFFELHARDT, GEORG SCHMETTERER (eds.)

1998. Kluwer Academic/Plenum Publishers, New York

836 pp. 26 × 17 cm

Price: \$ 156

ISBN 0-306-45923-X

As the editors remember in the Preface, in 1973 Gerhardt Drews, Roger Y. Stanier and Norbert Pfennig launched the first International Symposium on Phototrophic Prokaryotes (ISPP), which was held in Freiburg, Germany. The Symposium had had two precedents: the 1st Symposium on Bacterial Photosynthesis, held in Yellow Spring, Ohio, USA, in 1963, and the 1st International Congress on Photosynthesis, held in Freundstadt, Germany, in 1968. The use of electron microscope techniques had made it possible the discovery of both tylakoids, in 1949, and the structure of chloroplasts, in 1952. The same technique had also revealed the existence of intracytoplasmic membranes in cyanobacteria and purple bacteria. Since then, the knowledge of photosynthesis and its mechanisms has advanced dramatically. The ISPP arose as a forum for scientists to discuss all aspects of their research on phototrophic prokaryotes, both anoxygenic and oxygenic. After having moved from UC Berkeley, California, to the Institut Pasteur, Paris, in 1971, Stanier realized that European researchers working on phototrophs hardly had personal contact among them and were not acquainted with their colleagues' research and achievements. Besides promoting discussion and exchange of information on that field of research, these symposia would also make it possible to meet researchers from Eastern Europe, mainly from the Soviet Union, where there was a long tradition on research on phototrophic bacteria.

The concept "phototrophic prokaryotes" comprises all kinds of prokaryotic organisms that require light to grow. Yet, it does not refer exclusively to prokaryotes from the same evolutionary origin. In fact, they are a huge, diverse group which very often are not phylogenetically related among them. Since the 1st ISPP, new technological developments have contributed to more tremendous progress in the study of these microorganisms, and the topic has become more and more interdisciplinary. Two areas—and those related to them—have especially advanced: genetics

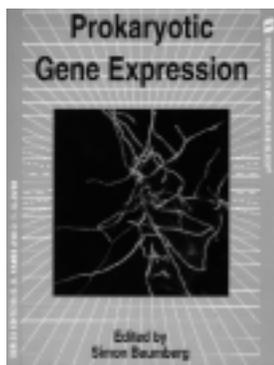
and molecular biology. *The Phototrophic Prokaryotes* is the Book of Proceedings of the 9th ISPP, held in Vienna, Austria (September 6–12, 1997). It is a compilation of the research which makes up the state-of-the art on phototrophic prokaryotes, presented at that meeting. Books of Proceedings are not just an excuse to increase the number of publications of participants in scientific meetings; they are the records of the meetings themselves and reflect their scientific quality. *The Phototrophic Prokaryotes* is a proof of the excellent scientific outcome of the Vienna meeting. That meeting was the first ISPP for which a Book of Proceedings backed by an international publisher was issued, which may contribute to a wider diffusion. We must remember, however, that the Proceedings of the 4th ISPP (Bombannes, France, 1982) were published, under the title *Photosynthetic Prokaryotes*, as a monographic issue of the *Annales de Microbiologie* (1983, 134 B), an official journal of the Pasteur Institute; this assured their wide distribution and their presence in specialized libraries. The editors of *The Phototrophic Prokaryotes* stated that they "would be pleased to see that this becomes a regular institution at future ISPPs". Unfortunately, not everybody in the field is of the same opinion, and the next ISPP (Barcelona, August 26–31, 2000) will not have a Book of Proceedings.

Part 1 of *The Phototrophic Prokaryotes* (Historical Perspectives) offers an overview of the progress made on the knowledge of both anaerobic photobacteria and cyanobacteria, and of bioenergetic and metabolic processes in anoxyphototrophs over the twenty-four years passed since the 1st ISPP. The main body of the book is devoted to "Electron Transport and Bioenergetics" (24 chapters), "Photosynthesis" (20 chapters), "Metabolism of N, C and H" (19 chapters) and "Ecology and Symbiosis" (15 chapters). Other topics discussed are "Phylogeny, Taxonomy and Evolution" (7 chapters) and "Genome Analysis and Molecular Biology" (6 chapters). Instead of having one only index, there are four indexes devoted respectively to authors, subject, organisms and genes, which makes it easy the task of finding what one is interested in. Congratulations to the editors on such a decision! The presence of an index devoted exclusively to genes is an indication that research on phototrophs has expanded dramatically in the area of genetics. In fact, the first completed genome of a phototrophic prokaryote (the cyanobacterium *Synechocystis* sp.) was presented at the 9th ISPP. Let's see if the attendants to the 10th ISPP are to witness another milestone in the field.

Whenever the ISPPs are mentioned, the memory of Roger Y. Stanier is present. Virgil (70–19 B.C.) wrote: "Graft, Daphnis, the pear trees / your descendants shall gather the fruits." (*Ecloques* IX, 50). These meetings are part of Stanier's legacy to science. G. A. Pescheck, W. Löffelhardt and G.

Schmetterer by editing this excellent book have collected the 1997 crop and made its fruit available for researchers on phototrophic prokaryotes around the world.

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## Prokaryotic Gene Expression

SIMON BAUMBERG (ed.)

1998. Oxford University Press, New York (Series: Frontiers in Molecular Biology, vol. 21)

325 pp. 24.5 × 19 cm  
Price: £ 32.95  
ISBN 0-19-963603-6

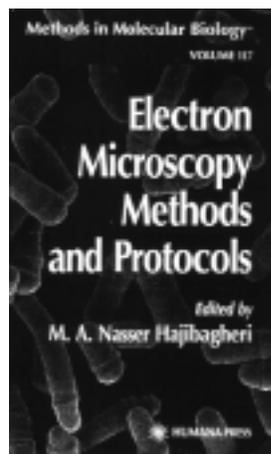
All sciences have developed dramatically over the last century, but in particular the explosion of new knowledge in life sciences began some thirty years ago. This modern expansion has its basis in the advancement of the techniques in genetics and molecular biology. More recently, the advent of nucleic acid sequencing has unveiled detailed information on gene structure and organization. As essentially single-celled organisms, bacteria process many environmental signals and use this information to optimize their metabolism, growth rate, DNA replication and cell division. Adaptive responses in bacterial cells are controlled by gene regulation. *Prokaryotic Gene Expression* is a comprehensive review of current knowledge and research in this area, written by researchers of prestige in their fields.

The gene regulation of gene expression can potentially occur at several stages in the stepwise transfer of information from a gene to its protein product. By reading the different chapters we can discover gene regulation mechanisms. An introductory chapter describes the early developments in gene expression and how the main topics were established. First, it describes the "classical" types of regulatory mechanisms, such as how protein molecules recognize and interact with nucleic acids; it reviews transcription, which is the most frequent control point in bacterial gene expression; it also details promoters, repressors and activators. Following chapters focus on non-classical control exerted at the post-transcriptional level. Post-transcriptional control affects mRNA stability, translation and programmed frame shifting. Next, it discusses the subtle effects on gene expression of DNA topology. In a set of chapters, the authors show how the control devices discussed previously can be integrated within a global regulatory network. In the first, they focus on the general stress response in *Escherichia*; the

following chapters describe systems involving two-protein components, known as the histidine protein kinase domain (HPK) and response regulator domain (RR). These systems are involved in the regulation of a wide array of different biological processes (they regulate chemotaxis and nitrogen assimilation in *E. coli*, but they control the initiation of sporulation in *Bacillus subtilis*). Another chapter deals with systems in which genes are turned on or off by DNA arrangements. It describes pathogenic bacteria such as *Haemophilus* and *Neisseria* which have multiple switch systems. Then there are three examples of complex systems in which a variety of control devices are integrated: bacterial pathogenicity, sporulation and antibiotic production. Finally, a brief concluding chapter basically consists of by now unanswered questions on the origins of regulatory molecules, selective pressures leading to the evolution of regulatory systems, and different control mechanisms for same systems in different organisms.

The book is recommended to advanced students and scientists dealing with life sciences, especially to microbiologists and molecular biologists. Besides its contents, each chapter includes figures that help to a better understanding of the text, and extensive selected bibliography. Headlines of single units in the chapters are very descriptive and allow to know the topics handled in them.

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## Electron Microscopy Methods and Protocols

M. A. NASSER HAJIBAGHERI (ed.)

1999. Humana Press, Totowa, New Jersey (Series: Methods in Molecular Biology, vol. 117)

296 pp. 23.5 × 15.5 cm  
Price: \$ 89.50  
ISBN 0-89603-640-5

The development of electron microscopy, about 1930, was a major technical breakthrough for science. Since then, the progress in techniques have led to the improvement in electron microscopes, that are surely the most powerful tools in basic and applied research for a great extent of scientific matters. This is especially true in all studies aimed to understand the intimate structures of the living matter. The possibility of magnification up to 200,000× (ordinarily), as compared to about 1000× for light microscopy, gives an idea

about the potentialities of electron microscopy. Both kinds of electron microscopy—transmission and scanning—are mainly research tools. In microbiology, transmission electronic microscopy (TEM) allows to see viruses and cell ultrastructure. Scanning electron microscopy (SEM) provides the picture of the structure of intact organisms and internal structures in realistic detail. Neither TEM nor SEM, however, allow the view of actual living cells.

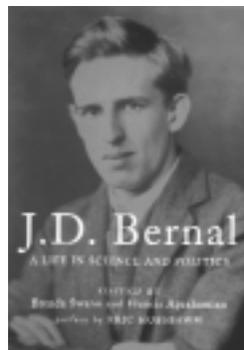
Some practical problems must be faced when working with electron microscopy. To solve them, both experience and adequate technical training are necessary. And also to get acquainted with the continuous changes that appear in these sophisticated instruments to improve their applications.

*Electron Microscopy Methods and Protocols* can be essentially used as a technical guide. In fifteen chapters, hands-on experts describe the techniques to analyze cells, tissues, biological macromolecules, molecular structures and their interactions. The basic contents of Chapters 1 and 2 deal with the required preparation of specimens, such as ultra-thin sectioning, freeze-fracturing, support films, fixatives and epoxy resins. Protocols for negative staining of biological particulates are also described. The following chapters deal with more specialized matters, such as special procedures for cryoelectron microscopy, production of cryosections and their use in immunocytochemistry, high resolution fine structure, and antigenicity. A whole chapter (Chapter 6) is devoted to the application of LR Gold resin for immunogold labeling and another one to low-temperature embedding in acrylic resins (Chapter 7). Among the aspects that most microscopists consider critical is the preservation of some antigenicity. This aspect is exhaustively discussed in Chapters 8 and 9. There, the development of methods for the visualization of antigens on sections and the use of microwave energy are considered. The last three chapters are devoted to the molecular structure of nucleic acids with the most advanced procedures to study those macromolecules and the protein–DNA complexes. Key points of the book that users will appreciate are, among others, the numerous applications examples offered by experts, readily reproducible X-ray microanalyses techniques, and the production of cryosections through fixed and cryoprotected biological material.

The scope of the book falls within the fields of general and cell biology, microbiology, biochemistry, crystallography, genetics, histochemistry, immunology, and some other different subjects related to physics, biology and medicine. Like most titles in this collection (“Methods in Molecular Biology”), *Electron Microscopy Methods and Protocols* achieves its goals as a technical guide. It is recommended to cell and molecular biologists, microbiologists, crystallographers, immunologists, histochemists and, of course, electron microscopists.

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## J.D. Bernal. A Life in Science and Politics

BRENDA SWANN, FRANCIS  
APRAHAMIAN (eds.)

1999. Verso, London & New York.

324 pp. 24 × 16 cm

Price: \$ 24.50

ISBN 1-85984-854-0

The charm of this highly readable review of only a fraction of Bernal's frenetic activities lies in the fact that the authors of chapters such as “Bernal at War”, “The Scientist”, “Bernal at Birkbeck” and “Early Years and influences” are entirely authentic. All the book's co-authors had more or less close relations with the “Sage” as he was called from a young age. They remember how one frustrating night, Picasso painted a devil and a god on the wall of Bernal's Bloomsbury apartment (reproduced in the back cover of the book). Or how Lord Mountbatten insisted Bernal cut an inch off his hair on the well-timed transatlantic *Queen Mary* trip where, as “science advisor” at the Quebec Conference, he was due to meet with the UK Prime Minister and the USA President. All of this authenticity inspires delightful reading. One only wished that, along with the careful scholarship, the editors had properly expanded the index and included a complete list of Bernal's disparate and far-flung writings.

“Nearly all scientific publications are written so as to conceal as far as possible the personality and aims of the author..., and this is one reason why science is so little read or understood outside the ranks of the specialist.” J. D. Bernal wrote this in his influential paper “Towards a science of science” in 1965, the year of his second most severe stroke, seven years before his death. A champion for the power, beauty, importance and universality of science from the beginning to the end of his life, Bernal concealed neither his aims nor his personality from anyone. Although this polymath who burst with knowledge and passion to share it from his precocious Irish childhood through his long-standing professorship at Birkbeck College of the University of London has faded from view, his influence lingers. He trained a generation of scientists, put the sociology of science and the study of peace on the maps of academia. He was a crucial leader in the development of the science of X-ray crystallography. The structure of molecules, the spatial distribution of their atoms regularly aligned can be deduced when X-rays, a form of short wavelength light, pass through the material in question and on the other side blacken a photographic plate with spots or other patterns. From the spacing and intensity of the patterns in the photographic film—joined by a great deal of imaginative deduction via calculation, the structure of the molecules through which the X-rays passed can (by the talented, hard-working crystallographer) be inferred. In this practice J. D. Bernal was an originator and a master.

When Bernal wrote about the Watson–Crick hypothesis for the structure of DNA, the famous “double helix” that was verified by X-ray analysis by Maurice Wilkins and Rosalind Franklin, he put it this way: “The implications of this purely structural discovery were enormous; it was the greatest single discovery in biology.” Typical of his generosity and sense of community he never says here (in his book *Science in History*, 1954, so shortly after the crucial DNA work) that he himself developed the methods, trained these two crystallographers and in general made possible the crucial confirmation of Watson and Crick’s Nobel-prize winning idea. When his most famous crystallographer student, Dorothy Crowfoot Hodgkin of Oxford University, won the Nobel Prize herself for solving the chemical structure of vitamin B<sub>12</sub>, she proclaimed in no uncertain terms that she should have shared it with Bernal. Others too thought Bernal’s contributions worthy of a Nobel Prize, whether in Peace or in Physics or in Chemistry. But Bernal had a way of saying exactly what he truly believed to anyone who happened to be interested, and this included the right to practice free-love (two of his four children were fathered by women to whom he was never married) and the advisability of communist social organization. He supported Trofim Lysenko’s theories of heredity long after the ideas of this Stalin-protected pigheaded charlatan deserved any attention at all. Bernal also championed a future for humanity of disembodied intelligence, and advocated vociferously from worldwide platforms a “World without War”. This reviewer suspects, as have many before me, that Bernal’s big-mouth pronouncements and his contempt for the trivial did cost him his Nobel Prize in the end.

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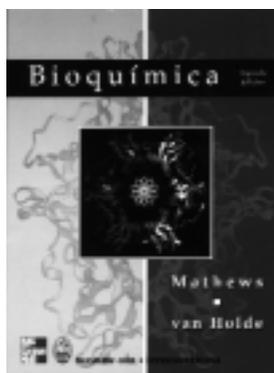
concepts, the text, the illustrating figures and tables, the summary, the references for further reading, and the questions for self-evaluation are the structured elements of each chapter. Concepts, however, are not left as something to be taken for granted. Special boxes (“Tools for Biochemistry”) distributed throughout the book give information about the history and experimental techniques that have been used for gaining knowledge in several subjects. They are very useful tools for the student.

Differently from most biochemistry textbooks, nucleic acids are introduced at the beginning of the book (Chapter 4), before discussing proteins and other living matter constituents (Chapters 5–10). Enzymes and the different types and aspects of metabolism follow in a sequenced way (Chapter 11–23). The last chapters (24–28) deal with the information metabolism (DNA replication, recombination, transcription, translation, expression, etc.). Due to the authors’ backgrounds, the text goes beyond the scope of traditional “biochemistry”, and focuses mainly on both biophysics and the bioenergetics aspects of biochemistry. This gives the reader a clearer sense of novelty and a rationale of the information provided.

This is a basic biochemistry book for students of all life science subjects, including, of course, students of microbiology, either basic or medical. In fact, the book gives special attention to microorganisms, avoiding traditional definitions that exclude the microbial world. For instance, bacterial photosynthesis (anaerobic and anoxygenic!) is deeply discussed, and a footnote (p. 651) explains that not all living forms obtain their energy (directly or indirectly) from photosynthesis, in a clear reference to bacteria from hydrothermal vents and the recently discovered microbiota from the deep subsurface.

**Imma Ponte**

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## Bioquímica

C. K. MATHEWS,  
K. E. VAN HOLDE

1998. McGraw-Hill · Interamericana, Madrid

1283 pp. 28 × 22 cm  
Price: 12,900 PTA (78 euros)  
ISBN 84-486-0213-7

This book is the Spanish translation of the second edition of *Biochemistry*, published by The Benjamin Cummings Pub. Co. In fact, it is the first Spanish edition of the basic textbook of general biochemistry by Mathews and van Holde, both Distinguished Biochemistry Professors at Oregon State University. Although based on the standard concepts needed for the student of general biochemistry, the book deserves attention because of the extremely well studied organization of the information. The fundamental



## Revistas Científicas en América Latina

ANA MARÍA CETTO, OCTAVIO ALONSO (eds.)

1999. Fondo de Cultura Económica, México D.F.

490 pp. 23 × 15.5 cm  
Price: \$ 22.50  
ISBN 968-16-5851-5

*Revistas Científicas en América Latina* is the Book of Proceedings of the 2nd Workshop on Latin American Scientific Journals, held in Guadalajara, Mexico, in November 1997. The aim of that workshop was to discuss the problems faced by scientific editors and publishers in Latin America and the Caribbean region and to set up strategies for their solution. The meeting was a follow-up to

the first Workshop organized also in Guadalajara in 1994. The book comprises the authors presentations to the four topics discussed in the workshop: 1. electronic edition *versus* print-on-paper edition; 2. sustainability of serial scientific publications; 3. presence and visibility of the publications; and 4. standardization and evaluation criteria for scientific journals. It includes also the conclusions and recommendations which resulted from the meeting's brainstorm.

1. Electronic edition *versus* print-on-paper edition. Challenges are among the best sources of pressure to promote changes and, without any doubt, new technologies bring new challenges to editing, publishing, as well as to scientific activities. Electronic publishing has provided the tools for actual globalization. The authors analyze the advantages of electronic publishing, which makes borders disappear; not only geographical borders, but also ideological and economic. Another major feature is the immediate spread of information, which makes it possible for scientists to comment on methods and results of their own research, and also to gain access to the results of other maybe distant groups, without having to wait for sometimes long publication procedures. Special interest has been put on the Internet as a means to overcome obstacles found in the traditional systems of publication. Even if electronic publishing will not replace print-on-paper publishing, its lower costs will reduce the deficits and the deficiencies that have economical backgrounds.

2. Sustainability of serial scientific publications. This is a very difficult matter to deal with. Latin American countries need to produce and maintain scientific journals so that scientists from other regions can read and get to know the results achieved by Latin American scientists. As stated by A. M. Cetto, one of the editors of this book and also organizer of the two workshops in Guadalajara, sustainability in this context implies both scientific and editorial policies. Scientific aspects concern authors and their contributions. Articles must be well structured and reach high standards of quality and interest to attract the attention of potential readers. Editorial policies concern both editors and academic institutions. Editors must produce journals which fit the standards of quality both in contents and presentation, whereas academic institutions must recognize and support journals. A major problem, not yet solved, is the dilemma between regionalism and internationalism. To the maintenance of this dilemma contributes the justified attitude of authors, who—logically—prefer to submit their articles to journals with higher “impact factor”, and indexed in international databases. This is the only way for them to get wide recognition and, as a result, to obtain financial support for their research.

3. Presence and visibility of the publications. It is not easy for Latin American journals to be included in international databases that provide them with worldwide recognition. This problem is faced also by journals from other regions, such as Spanish and Portuguese journals in Europe and several others from Asia. Editors, usually scientists, make great efforts for their journals to accomplish the quality requirements. In most cases, however, what they find is indifference among the international scientific community and the ignorance and even scold from their own

academic authorities. From the discussion about this controversial topic, one can assume that scientific journals might be local or national in their conception but international in their intention. Even when the standards of quality in both contents and presentation are reached, other strong factors appear, such as those related to marketing policies of big companies that today control the world of the scientific publication.

4. Standardization and evaluation criteria for scientific journals. The assessment of scientific publications started at the end of the 1950s. Nevertheless, there is a lack of updated, systematic inventories of the publications produced in the region, including the national ISSN catalogues, as participants in the meeting informed. A possible consequence is the excessive number of titles in some areas, and their lack in others such as engineering and science teaching. In more recent years scientific agencies have evaluated publications to distribute the available resources among those with the highest scores. Nevertheless, the rationality of the intention usually does not correspond with the results and consequences derived from the internal evaluation process. Not all the challenges that scientific journals face today are related to traditional criteria such as quality, novelty, interest and relevance of the contents. Due to the great changes carried out in the world of scientific publishing, economic factors are of the outmost relevance. This is another point against journals which not belong to the main stream.

All these topics are discussed in detail, and illustrated with experiences which suggest different strategies, especially in the view of recent evaluations in scientific publishing and in the light of the prospects offered by new technologies. The relevance of the scientific development in Latin America is obvious. This situation was analyzed extensively in the editorials of *Microbiología SEM*, former journal of the Sociedad Española de Microbiología, and continued in *INTERNATIONAL MICROBIOLOGY*, over 1996–1998. Also *Nature* devoted an issue to science in Latin America. But as Francisco Ayala stated in one of those editorials (*Microbiol. SEM* 12: 163–166) and in his preface to the *World Science Report 1993*, it is necessary that governments assume that science and technique have played a decisive role in the social and economic development in the 20th century. This is of great importance in countries where political, social and economical problems hinder the necessary support to science. Jointly with education, science is one of the most feasible foundations of society to suffer the consequences of economic crisis.

*Revistas Científicas en América Latina* is a useful tool to analyze the scientific production and the possibilities of a very wide region of the planet with a huge potential for human, natural and scientific resources. The book addresses scientists and a wide range of professionals working in publishing-editorial fields, such as editors, science writers and journalists, librarians, database managers people responsible for research policies, and scientific international agencies.

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