

BOOK REVIEW

J. Herbert Taylor — DNA METHYLATION and CELLULAR DIFFERENTIATION. Springer-Verlag, Wien, New York, 1984, 135 pages, VIII, 17 figures, cloth, price: S 620,-, D M 89,-

The book is published as the 11-th volume in a series: Cell Biology Monographs.

Many authors consider that DNA methylation is an important event for gene regulation. But there are also biologists who show skepticism toward this idea. Therefore, DNA methylation is a controversial problem. In the reviewed book the Author demonstrates that DNA methylation is an important, although only a subsidiary mechanism of cellular differentiation in vertebrates.

The book is based on literature data and experiments of the Author, which try to relate DNA methylation and cellular differentiation and show how both can fit together. The book is divided into six chapters, each contains a number of subsections. The first chapter: "DNA Methylation and Cell Differentiation — An Overview" contains essential data about new properties of DNA after methylation. The Author concludes that the methyl group projecting into the large groove of DNA can make critical differences in the binding of various specific proteins to double-stranded DNA what in turn can change the phenotype. In the subsequent subsections the types of differentiation in insects and vertebrates and also modifications of the genome which can be associated with differentiation are described. In the second chapter: "DNA Methylation and Transposable Genetic Elements" a review of different hypotheses about the role of methylation is presented. Perhaps the most important proposal concerning the function of methylation in eucaryotes is that it serves as a system for regulating RNA transcription. The rest of this chapter is devoted to the description of transposable elements in prokaryotes and eukaryotes. But the connection of transposable elements with methylation, if any, is not clearly demonstrated. The third chapter: "Differentiating Systems and their Methylation Patterns" is, in my opinion, the most interesting part of this book; it contains concrete examples of correlation between DNA methylation and gene expression at specific loci. Further, methylation patterns of globin, vitellogenin, ovalbumin and ribosomal genes are described and the correlation between DNase I sensitivity of chromatin and cytosine methylation is presented. The next short chapter: "DNA Methylation and the Inactive X Chromosome of Mammals" gives evidence that DNA methylation is also involved in the inactivation of the X chromosome. In the fifth chapter: "Mechanisms of Suppression by DNA Methylation" the Author discusses the mechanism by which methylated CpG sites can inhibit transcription. He also reviews data on prokaryotic and eukaryotic DNA methylases. The last chapter: "Evolution, Stability and Regulation of Methylation Patterns" deals with the possibility of 5-methylcytosine residues functioning as hotspots for mutation. The Author also discusses the hypothesis that DNA methylation may be a distinguishing marker that allows repair enzymes to recognize a new strand and repair it preferentially just during replication. The last few subsections of this chapter form a review, in which the Author presents his hypothetical conceptions on the subject of the universality of methylation as a regulatory mechanism for differentiation and gene expression and as a control of methylation patterns.

In spite of many theoretical hypotheses the book can be a very useful source of information about DNA methylation as well as the role of this modification in cellular differentiation.

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