

only read both volumes of this 'magnus opus' by Professor Richard Gordon but to actually enjoy the rich tapestry of historic anecdotes and multidisciplinary tangents this book provides. The writing style used is that of a doctoral thesis, which may lack elegance but works well as means of communicating the complicated matrix of ideas presented in this book. Richard Gordon is a complex man with diverse and sometimes controversial views; and his writing gives one the impression of strolling through such a mind, complete with almost unimaginably dense and thorough references for each point along the way. This journey will take the reader through the theoretical world of 'morphogenic waves' and 'cell state splitters', a world championed by the lowly axolotl and a world where we are challenged to consider a spherical cow. For those who choose to take up the challenge of reading this considerable work, a long and sometimes surprising journey lies ahead.

The book opens with a historical overview of the discipline of embryology, as a means of introducing the terminology required to navigate this book. To this end, Gordon does an admirable job and whether you accept or even understand his final hypothesis regarding cell-state splitters, nuclear tensegrity and the physics behind morphological changes in the embryo, these first few chapters are worth buying the book alone. There is even a helpful glossary of terms, many of which seem to have been relegated to embryology at sometime in the murky past before molecular biology and its associated terminology began to proliferate. We are also reminded in the first chapters that DNA and the genes encoded in it do not an organism make. To the contrary, temporal and spatial (physical) information also play a major role in the determination of cell lineages and morphogenic changes in the embryo. More importantly, we are reminded of the importance of hypothesis-driven science and model building versus dogmatic scientific enquiry as personified by vitalism at the turn of the century.

Having equipped his readers with a thorough introduction to embryology, Gordon then begins to outline his views on development, evolution and finally the hierarchical nature of the genome as it might relate to morphogenic or differentiation waves in embryos. To help him accomplish this goal he

continues to use extensive quotes from the literature and, at one point, a flip-style animation of a differentiation wave in the axolotl embryo. Gordon's use of quotations, rather than the paraphrasing of previous work, does take time to adjust to; it works well in the earlier chapters but becomes more tedious near the end of the book.

Originally, I was interested in this book's treatment of genome evolution and stability, which are introduced to support the idea of differentiation trees. Gordon points out the hierarchical nature of the genome, citing gene duplication and gene clustering as a means of exchanging or creating developmental units (e.g. the *HOX* gene cluster) that control major morphological changes in the embryo (i.e. segmentation). As we move into the post-'Human Draftome' era it seems very timely that this book should be discussing development on a genomic level, much in the same way that molecular biologists have begun to look at genome-wide gene and protein expression in the attempt to understand cellular metabolism. Conceptually differentiation trees, or hierarchical and functional units of the genome, are quite appealing. What may be harder for the reader to accept is whether the cascades of genes encoded in these differentiation trees can be triggered by changes in the physical forces to which the embryo is subjected, balanced ultimately by the cytoskeleton within each cell. To conclude, this book is a long and sometimes convoluted synthesis of evolution, developmental biology and genetics. Yet, whether you accept the ideas presented in this book or not, I prefer to take a more Daoist approach. For it is not whether you finish the book or even accept the ideas presented, simply making the journey of reading it, as I found, may be rewarding enough in itself.

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Books received

Human Chromosomes (4th. edn). Orlando J. Miller and Eeva Therman. Springer-Verlag, New York. 2001. Pp. 501. Price \$44.95, paperback. ISBN 0-387-95046.

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Future Perfect: confronting decisions about genetics. Lori B. Andrews. Columbia University Press, New York. 2001. Pp. 264. Price \$19.96, hardback. ISBN 0-231-12162-8.

Broadening the Genetic Base of Crop Production. H.D. Cooper, C. Spillane and T. Hodgkin (eds). CABI Publishing, Oxford. 2001. Pp. 452. Price \$140.00, hardback. ISBN 0-85199-411-3.