

Book Reviews

Maclean, N.: The Differentiation of Cells. Genetics- Principles and Perspectives 1. 1. Ed.

London: Arnold 1977. 216 pp., 95 figs., 14 tabs. Soft bound £ 5.95

'The Differentiation of Cells' is the first book in the new series, Genetics-Principles and Perspectives: a series of texts, edited by K.R. Lewis and B. John. The book deals with developmental biology of the cell in a broad sense. A wide variety of subjects as diverse as the evolution of protein molecules, role of hormones in differentiation, episomes and viruses and the role of cell contact in growth and differentiation, are discussed.

Chapter 2, dealing with differential gene expression, is the heart of the book. In this chapter, each of the four sections is headed by a fundamental question relevant to cellular differentiation. The reader is given the definite impression that he is close to the core of the problem of differentiation. Despite his involvement with this approach, the author often emphasizes that differential gene expression in itself does not explain differentiation.

The text is written clearly and concisely. Most illustrations are good; the drawings are especially instructive. The book may be recommended to anyone who wishes an introduction into the mysteries of the differentiating cell and into the many forms in which the problem of cellular development presents itself.

A.F. Croes, Nijmegen

Portugal, F.H., Cohen, J.S.: A Century of DNA. A History of the Discovery of the Structure and Function of the Genetic Substance.

Cambridge-Massachusetts-London: M.I.T. Press 1978 384 pp., 103 figs., 1 tab. Hard bound £ 12.95

This book contains the fascinating story of a hundred years of DNA research, from its discovery in 1869 to the dechiffration of the genetic code in 1969, giving honor to the crowned and uncrowned pioneers in this field. The entire field in DNA research is documented in 13 chapters which are full of life and excitingly reflect the atmosphere of the times, laboratories and characters of the scientists. As a history of science it is also a history of society. The glory of human achievements is overshadowed by the destruction and sufferings due to the madness of war.

Besides the scientific value of the development of DNA from it being a substance of not great interest to the central realm of molecular biology, the study of DNA is also a mirror of the development of science. From a more private field of isolated scientists it became a subject of world wide communication and competition, demanding but often sacrificing magnanimity and fairness. It is hard to believe that it was only in 1952 that DNA was generally accepted to be the genetic material, although many indicative results had been presented, and that such immense progress in the knowledge of DNA and on the molecular basis of life has been achieved since that time. Therefore, it may be no overestimation when viewing the second century of DNA research, Francis Crick concludes 'There will inevitably be a proportion of novel, unexpected and significant advances in nature of which we can hardly guess. In short the whole field is likely to be even more fascinating in the year 2000 than it is today'.

Jumping genes and discovery of the structure of eucaryotic genes are already today proof of this statement. Let us hope that by that time or even better, earlier, another exciting history of DNA research will be written with such devotion, fascination and optimism as contained in this book. Gudrun Eitner, Gatersleben

Drews, J., Högenauer, G.: R-Factors: Their Properties and Possible Control. Topics in Infectious Diseases, Vol. 2.

Wien-New York: Springer 1977. IX, 362 pp., 75 figs. Hard bound DM 59,-

The use of antibiotics has had an enormous influence on the pattern of infectious diseases throughout the world. This form of chemotherapy has created some problems of its own. One of these problems, the subject of this book, has been the appearance of strains of organisms resistant to the administered antibiotics. In general, the genetic determinants responsible for these resistant cells are located on deoxyribonucleic acid (DNA) molecules called Resistance plasmids. These R plasmids have a stable inherited intracellular form characterised by independent replication.

Topics in Infectious Diseases, volume 2, is comprised of eighteen original papers presented at the Sandoz Symposium held in Baden near Vienna, Austria, 27-29 April 1977. The first part of this book is devoted to the epidemiology and ecology of R plasmids. From these studies it appears that the influence of antibiotics, both in the hospital as well as in the bio-industry, are a very complex matter. However, the discovery of DNA sequences called transposons, which are capable of translocating from one DNA replicon to another, suggests that these 'jumping' elements could play an important role in adaptation and distribution of R plasmids among bacteria.

The papers in the second part deal with the biochemical and genetical aspects of R plasmids. They show a clear picture of the rapid progress in this field by means of the advent of new DNA-techniques. The use of restriction endonucleases, in particular, has opened the way to both the elucidation of the genetic organization of plasmids and a better understanding on the enzymatic mechanism of antibiotic resistance.

A panel discussion on the complicated relation between the composition of the resident bacteri flora and the use of antibiotics ends this book. In addition, new recommendations are proposed for both the producer of antibiotics as well as for the consumers.

As a minor criticism, one might wish that a general introduction was added to this book in which some basic information about plasmid properties was presented for intended readers not familiar with this subject. However, the up-to-date content and the interdisciplinary approach makes this book valuable to all those who are occupied with the use of antibiotics in our world.

P.M. Andreoli, Nijmegen

Sherman, M.I. (ed.): Concepts in Mammalian Embryogenesis.

Cambridge (Mass.)-London: MIT Press 1977. 404 pp., 38 figs., 11 tabs. Hard bound £ 17.50.

This monograph, condensed by 14 leading investigators in the field, is based on the assumption that most mammals develop identically in the murine manner. The description of embryogenesis is mainly limited to the mouse and confined to pre-implantation stages: later stages are said to be inaccessible to manipulation. Even within these narrow confinements, a multitude of unsolved items can be mentioned. These include the mechanism of division of the blastocyst into an embryoblast (= Inner cell-mass) and a trophoblast, the origin of the blastocystic cavitation, the inversion of germ-layers, the establishment of the primitive streak and the head-process and also the participation of the trophoblast in the ectoplacental cone or the egg-cylinder of the embryo. No agreement is reported to have been reached about the prospective fate

of the different temporary structures in the embryo. Attempts are mentioned to study cell-lineage with genetic markers in order to construct a prospective fate-map of the early embryo but many more experiments are required before conclusions can be reached.

In addition to morphology, special attention is given to the molecular events during the period under consideration. Since visualization of proteins in electrophoretic patterns depends very much on interpretation, data concerning the machinery of embryonic protein synthesis are rather a subject of speculation. Moreover, they generally derive from studies *in vitro* so that differences with the intact counterparts *in vivo* must be taken into account. Finally, the absence of macromolecules from the maternal reproductive tract may influence development even if the time-course of events in cultured eggs seems morphologically identical to those grown entirely *in vivo*.

Proceeding from the view that successful development requires a functional genome, sites are studied in the genome which may regulate the expression of structural resp. regulatory genes in the embryo. The former may cause an alteration in the synthesis of critical proteins while the latter may be responsible for a disruption of the developmental program (timing of gene function). The use of mutants with lethal genes could provide some information in the matter. The picture becomes especially confused, however, where the T-locus on chromosome 17 of the mouse is concerned. Attempts are described to evaluate the possible role of this genetic system which mostly leads to lethality at specific stages of development: survivors suffer from morphological distortions of varying severity. Whether developmental arrest is due to missing genetic information, to inadequate metabolic requirements, to a meiotic disturbance in the sperm or to specific antigens on the relevant sperm-surface, the possible reason why embryos fail to proceed in development is not yet clear. Despite of about 150 references related to this chapter, one can not escape the impression that the more one appears to know about the subject, the more complicated it becomes.

Particular importance is assigned to the cell-surface as an instrument of interaction between cell and environment, as a place of

mutual cell recognition or as space for feto-maternal relations during embryonic nidation. The zona pellucida around the egg-cell is seen as a peculiar structure to be acting as a charged molecular sieve to select entering macro-molecules or as a tool involved in the species-specificity of fertilization. Since negatively charged groups are situated on the surface of the trophectoderm before implantation, phase specific antigens can be attached to them. A transient expression of antigens can be related to a rapid switching on as well as switching off of genetic information as development proceeds. The relationship between the appearance of antigens and the synthetic activity within the embryo has not yet been elucidated.

A special chapter is dedicated to the role – if any – viruses may play on the course of embryogenesis since some viruses may eventually integrate into the genome and transform specific 'target organs' into tumors. Embryonic cells are generally not permissive for virus replication but they become so subsequent to their differentiation. Virus-caused transformation of differentiated cells may activate specific genes which normally are repressed in the healthy adult. But does the mere detection of virus-related gene products justify the suggestion of an important involvement of viruses in the cellular differentiation during embryogenesis?

A last chapter deals with malignant terato-carcinomata in mice which appear if isolated parts of an egg-cylinder or pieces of a genital ridge containing primordial germ-cells are transferred into an extra-uterine site of a syngeneic host. The tumors consist of a population of rapidly dividing, undifferentiated cells which sooner or later will kill their host. Under certain circumstances, these cells, can differentiate into a wide range of cell-types, once their neoplastic growth has been lost. Terato-carcinomata represent an excellent system for studying not only cell-differentiation and the control of gene expression on it but also a way for analyzing the fundamental relations between ontogeny and oncogeny.

Even if the title of the book does not cover its content, it is controversial and provocative enough to demand that attention be paid to it. It frames many more questions than it answers.

H.A.L. Trampusch, Amsterdam

Announcement

International Plant Breeding Symposium II

The second international Plant Breeding Symposium will be held at Iowa State University on March 12-16, 1979. This symposium will be the sequel to one held on the Iowa State campus in 1965, the proceedings of which were published in the book entitled 'Plant Breeding: A Symposium.' During the past decade and a half, advances in research related to and accomplishments from Plant Breeding have been sufficiently great and significant to justify a summarization and discussion of these advances for the benefit of Plant Breeders in particular, and mankind in the broad sense. It is to accomplish these goals that Plant Breeding Symposium II will be held.

Ten pertinent topics will be discussed during the course of the Symposium, with one half-day allotted per topic. The following subjects will be considered:

1. Progress in meeting human needs through plant breeding.
2. Exotic germplasm: Resources and utilization.
3. Application of tissue culture to plant improvement.
4. Morphological and physiological traits.
5. Selection and breeding methods.
6. Chromosomal and cytoplasmic manipulations.
7. Breeding for stress environments.
8. Pest resistance: Pathology and entomology.
9. Development of plants for multiple-cropping systems.
10. Improvement of nutritional quality.

We would like to make this Symposium useful to plant breeders, scientists in related fields, commercial seedsmen and students on an international scale.

For registration information contact: Dr. K.J. Frey, Agronomy Department, Iowa State University, Ames, IA 50011, (515) 294-7607 or TWX 910-520-1152.