

Book reviews

Mayr, E.: Die Entwicklung der biologischen Gedankenwelt. Vielfalt, Evolution und Vererbung. Translated into the German language by K. de Sousa Ferreira. Berlin, Heidelberg, New York, Tokyo: Springer 1984. vi+766 pp., 3 tabs. Hard bound DM 88,-.

The book under review is a translation of Mayr's *opus magnum* "The growth of biological thought" which appeared in 1982. It is Mayr's contention that one can understand biology only after a study of its history. However, there is at present no book available on the history of those ideas which have directed the development of biology. For this reason, Mayr decided to write such book himself. Inspired by Lovejoy's "The great chain of being" he chose not to write a history of general biology, but to analyze separately the development of its major parts. The present volume covers systematics, evolution and heredity all of which are classified in Mayr's terminology under ultimate causation. In addition, he discusses general issues in three introductory chapters and in the epilogue. A future volume will consider those aspects of biology dealing with proximate causation: physiology, embryology and anatomy.

Mayr is a systematist and one of the founders of the synthetic theory of evolution. Accordingly, he is very much at home with the scientific problems covered in the part of the book on systematics and evolution. In addition, Mayr has had a lifelong interest in the history of biology as is shown by the historical paragraphs in his first book "Systematics and the origin of species" and many of his subsequent books and articles. Finally, Mayr is also one of the fathers of modern philosophy of biology. In this field, his major themes are the controversy between typological thinking (essentialism) and population thinking, and reductionism. It is this combination of scientist, historian and philosopher which makes the book of such immense scholarship. There is at present no book which can match its scope, depth and richness in detail.

Mayr is known for having strong opinions. "I have sometimes been called dogmatic" he says of himself (p. 8). In particular, his two Leitmotives, population thinking and anti-reductionism, have determined the content of his book profoundly. Some readers will undoubtedly find the book too subjective. This is reinforced by Mayr's "tactic" to make "sweeping categorical statements" (p. 8). For example, Mayr's internalism, the view that factors internal to science have determined most of its development, is by and large unjustified. He remarks that his tactic derives from his belief in Hegelian dialectic and it is indeed one of the greatest virtues of the book that it does not only offer a narrative but also forces the reader to think himself.

In a book of such magnitude it is of course easy to find numerous errors and omissions, many of which have been pointed out in the reviews of the 1982 English edition of the book. For example, literature citations and the reference list are very careless. The glossary is too difficult and not comprehensive enough for the layman (who is one of Mayr's main targets). Finally, this reviewer found Mayr's analysis of Darwin's concept of natural selection inadequate. Mayr does not mention sexual selection nor the case of the neuter insects. Both show how well advanced Darwin's concept of natural

selection was. Darwin's emphasis on sexual selection demonstrates that for him it was not adaptation which determined evolutionary success, but propagation. The neuter insects which were one of Darwin's main problems in the 1850s, brought him close to the concept of inclusive fitness.

Thus far, this review has mainly dealt with the parts on systematics and evolution. In the third section which deals with heredity, Mayr's lack of direct research experience is evident. This part fails to achieve the level of excellence and originality of the other two parts but is nevertheless readable. The same might also be said of the three introductory chapters which are on the writing of history, the philosophy of biology and the general of biology respectively, and the epilogue which is on philosophy of science.

In conclusion, "The growth of biological thought" is a book which should be read by historians and philosophers of science. For biologists, who agree with Mayr that a historical study is indispensable to understand present-day biology, Mayr's book is the best available at present. It will undoubtedly become a classic in the history of biology. The low price makes it possible for the book to find a place in many personal libraries. It is fortunate that this excellent translation makes the book more accessible for German readers.

G. J. de Klerk, Canberra

Turner, B.J. (ed.): Evolutionary Genetics of Fishes. Monographs in Evolutionary Biology. New York, London: Plenum Press 1984. xviii+636 pp., several figs. and tabs. Hard bound \$ 85.-.

This interesting volume in the series of "Monographs in Evolutionary Biology" is intended for geneticists, vertebrate biologists and evolutionary biologists, but ecologists and marine biologists as well as those involved in Fisheries will find interesting theories and data on evolutionary ecology. The first and second chapter of the series of twelve discuss origin and maintenance and biological role of tetraploidy in respectively Salmonidae and Catostomidae. In Poeciliid fishes an abundant variation in genetically determined melanic pigmentation and coloration is found. In addition, internal fertilization and ovoviviparity make these fishes extremely suitable to study important genetic processes like sex determination, isolation, polymorphic loci and the adaptive value of unisexuality. In view of this and the wealth of information about genera like *Xiphophorus*, *Poecilia* and *Poeciliopsis*, the presence of five chapters on separate aspects of the genetics of these fishes is fully justified.

Gene mapping in fishes and other vertebrates (ch. 4) widens the scope of the book by analysing linkage groups of homologous genes over the evolutionary history of all classes of vertebrates. The rapid advances in the construction of gene maps of enzyme loci promises the future reconstruction of ancestral gene arrangements and a proper recognition of genes involved in the inheritance of polygenic characters. The chapter on the evolutionary phenetics and genetics of *Gasterosteus aculeatus* presents a fascinating web of ecology, morphology, genetics and speciation in locally scattered small populations. The problem of panmixia is central in the chapter on

the genetics of the atlantic eel. The alloenzyme variation in the speciose family of the cyprinids (> 1,600 species) is considered in its usefulness as an additional data source to taxonomic problems.

Finally, an analysis is presented of genetics of Cichlidae which focusses on relative DNA contents of cells, karyotypes and chromosomes. Most chapters are clearly subdivided in paragraphs and sometimes separate information on the methods applied (eg. Moore ch. 7), the criteria used (eg. Ferris, ch. 2) and measuring techniques (eg. Bell ch. 9) is provided.

The addition of small paragraphs about the main techniques used and their pitfalls would certainly have enhanced the accessibility of the presented information for non-specialists in this field like students in fisheries and fish culture. I fail to understand how increased cell volume due to polyploidy is favorable for exchanges of metabolites or in oxygen-poor environments (p. 86).

The book as a whole is well written, sometimes exciting, presents an impressive amount of data and references and is of considerable value for the future development of this important field.

J. W. M. Osse, Wageningen

Pernes, J.: Gestion des Ressources Genetiques des Plantes. Tome 1: Monographies. Tome 2: Manuel. Paris: Agence de Coopération Culturelle et Technique 1984. 1: xvi+212 pp., several figs. and tabs. 2: xi+346 pp., several figs. and tabs.

In order to improve the agricultural production in the Third World, some years ago the French Agency of Cultural and Technical Cooperation sponsored a research project in this domain. Under the leadership of J. Pernes, eight plant breeders have contributed their experience on three tropical plants which play an essential role in former French colonies. These are: coffee, rice and millet. The report of these working groups is presented in two volumes. In the first, in a very comprehensive manner, facts and perspectives on the breeding of the three above-mentioned plant species are presented. The second volume is a kind of handbook for plant breeders, dealing with the organization of complex species, strategies of breeding, evaluation of breeding procedures, conservation of genetic resources, statistical evaluation of plant breeding procedures and genetic methods in plant breeding.

All contributions are presented in a very detailed but comprehensive manner. Unfortunately, these two books will have a very limited community of readers on the international levels because of language difficulties.

K. Esser, Bochum

Scowcroft, W.R.: Genetic Variability in Tissue Culture: Impact on Germplasm Conservation and Utilization. Rome: IBPGR Secretariat 1984. iv+41 pp., 1 table.

This report issued by the International Board for Plant Genetic Resources primarily deals with the difficulties imposed by the genetic variability in tissue culture on germplasm conservation in plants. From the beginning of the report onwards it is made clear that genetic instability is a major problem in the rapidly expanding field of in vitro plant propagation which now includes almost all major crops.

Variability may be expressed directly in the callus or suspension cultures (instability of tissue culture lines) or indirectly in the plants regenerated (somaclonal variation). The author takes great care to show that most genetic changes originate from the tissue culture phase and do not pre-exist in the starting material.

The molecular basis of the genetic variability in tissue culture is unknown at the moment. There is much speculation

on the significance of modification in DNA amplification and of increased transposition of transposons observed in tissue culture. However, the relation between these phenomena and genomic variation remains obscure.

The prevailing conclusion is that for a successful conservation of germplasm in vitro dedifferentiation should be kept at a minimum. The genome proves to be most stable in meristem cultures. The highest instability can be expected in regenerates from callus.

The report is a survey of the most recent literature which is very critically evaluated. The author emphasizes that not all the variation in the regenerates from tissue cultures is genetically determined and that in many cases there is no rigorous proof for a genetic origin.

It is to the author's credit to have written this concise review in such a clear and vivid style.

A. F. Croes, Nijmegen

Farjon, A.: Pines/Drawings and Descriptions of the Genus Pinus. Leiden: E. J. Brill 1984. 219 pp., several figs., drawings and tabs. Hard bound Dfl. 96.-.

The genus *Pinus* with evergreen trees and shrubs is the fascinating object of this book. The more than ninety species of pines are widely distributed in the northern hemisphere. This group of trees is very important in some respects and therefore it is often the object of scientific reflections. This large-sized book gives a comprehensive overview on 92 species of pines. They are arranged alphabetically with drawings on the left pages facing the descriptions opposite. Most of the drawings are made by the author himself. They show the essential elements of pines, one form of the variable habitus as well as branches, needles and cones. The descriptions comprise important characters, including ecological and distributional details with distribution maps, and moreover, closely related species are mentioned. The introductory part of the book reviews essential botanical details of taxonomic value; inflorescences, morphology and development of cones, germination of seeds and growth, root systems, structure of the needles, and so on. A classification of the genus *Pinus* is given on pages 194-196 as a table with all the mentioned species and ten selected characters. This system follows that of Van der Burgh (1973), who divides the genus into 8 sections and 21 subsections. In a few instances the system in this book differs from that of Van der Burgh because the author prefers a narrower species concept. But in the case of sections with one or two species it is useless to mention one subsection for each. It is also not clear why the author avoids the systematic category 'subspecies' and uses only 'varietas' for the infraspecific structure. The few pages concerning 'Phylogeny and biogeography of the genus *Pinus*' (by D. I. van der Burgh with cladograms by A. Farjon) are especially interesting.

It is an important book. Dendrologists can here find very good quality scientific and aesthetic representations of the 'Pines'.

W. Vent, Berlin/DDR

Lima-de-Faria, A.: Molecular Evolution and Organization of the Chromosome. Amsterdam, New York, Oxford: Elsevier 1983. xvi+1163 pp., several figs. and tabs. Hard bound Dfl. 450.-.

It is difficult to evaluate the merits and disadvantages of this book within a few sentences. The dilemma becomes obvious when considering the statement of the author on the first page - that chromosomes and genes are of secondary importance for the cell, compared to molecular recognition processes leading to self-assembly. Clearly, the function of genetic material is based on molecular recognition but this

author needs 1,186 pages, taking on chromosomes and genes, to substantiate this conclusion. Just the amount of information on chromosomes and genes assembled in these 1,186 pages is suitable to emphasize the relative importance of the genetic material and its structural organization. I am, of course, aware that Professor Lima-de-Faria, after having studied chromosome structure over so many years, will not deny the value of studies on chromosome structure and function for cellular function and differentiation. The aim of his provoking introduction is more likely an intention to direct the reader to a more integrated view of basic biological phenomena. This is, more generally, one of the primary tasks of this book, where the author tries, certainly for the first time in such an approach, to create a hypothesis which considers a chromosome as a unique and integrated function unit, described with his postulate of a "chromosome field". A considerable part of the arguments provided in the first sections are preparing this concept which is then introduced in chapter 16. It is essentially based on the idea of a polarity along the chromosome which determines many parameters of its structure and function. Subsequent parts of the book elaborate on this concept.

Irrespective of the development of the concept of the chromosome field, this book contains a wide range on information, even basic molecular biology textbook knowledge. It represents an, often somewhat one-sided, assessment of classic cytology and of recent molecular data. I can, in some instances, not agree with the conclusions drawn from molecular experiments, but on the other hand, the author criticizes with strong arguments current concepts on the (non-)function of eukaryotic DNA sequences. The author often succeeds in re-emphasizing the complexity of phenomena: for example, the properties of heterochromatin, which are indicated by cytogenetic evidence but have largely been neglected in the discussion of molecular observations.

So, the book represents an unusual view on chromosomes and genes, which has been assembled from many thousands of original papers. Necessarily, not all references are correct or reflect the actual priorities of certain ideas, but the extensive citations will be very useful to workers in chromosome research. Considering the many open aspects of chromosome structure, which are just beginning to come to our attention, the book is a respectable approach in integrating present-day knowledge on chromosomes. The price will restrict its availability to libraries. The publishers might consider issuing a cheap paperback edition on less expensive heavy-weight paper.

W. Hennig, Nijmegen

Dawkins, R.: The Extended Phenotype. The Gene as the Unit of Selection. Oxford, San Francisco: Freeman 1982. 307 pp. Hard bound £ 9.95.

This book can in many respects be regarded as an "extended" version of "the Selfish Gene" by the same author. As such, it suffers from the fact that the author often refers to earlier conclusions and statements, which makes reading difficult except if the reader is familiar with the details of the earlier publication. In some sections the new book reads as a response to criticism concerning the earlier book, a fact which also does not contribute to the clarity of the presentation. However, new aspects on "selfish DNA" are introduced not considered before. In my opinion, it would have been better to have allowed more time for a "maturation" of the ideas on "selfish DNA", thus enabling a more carefully edited book rather than two which are not very compatible. Irrespective of this criticism, it is stimulating and informative to read this book even if the reader does not share the views provided.

W. Hennig, Nijmegen

McLaren, A.; Wylie, C.C. (eds.): Current Problems in Germ Cell Differentiation. British Society for Developmental Biology, Symposium 7. Cambridge, London, New York, New Rochelle, Melbourne, Sydney: Cambridge University Press 1983. x + 401 pp., several figs. and tabs. Hard bound £ 42.50.

This book based on the lectures presented at the seventh international symposium of the British Society for Developmental Biology held in September 1982. Nineteen contributions covered such main research problems as those involving primordial germ cells and eggs of nematodes, insects, amphibians, birds, and mammals.

The first section includes papers by Mahowald and Boswell, Smith et al., and Eddy and Hahnel and deals with the role of specific cytoplasmic factors in the determination of primordial germ cells. In the second part, Heasman and Wylie, England, and Snow and Monk analyze the control of the migration of primordial germ cells towards the gonads, especially the important role played in this process by sulfated glycosamines, fibronectin and collagen typ I as well as the cytoskeleton and the extracellular matrix. Part 3 of the book deals with teratocarcinoma cells, their embryonic origin (M. Evan et al.) and the analysis of specific cell surface molecules with the help of monoclonal antibodies (P. Stern). The peculiarities of human germ cell tumors are described by McIlhinney.

During recent years clear evidence has been reported that the development and differentiation of germ cells are directly connected and controlled by somatic cells. This is described and critically discussed in mammals, *Xenopus*, insects as well as in the nematode *Caenorhabditis elegans* in Part 4 and 5 of this book. Part 4 includes also a very important paper of Anne McLaren concerning the role played by the chromosomal sex in germ cell development of mice.

It is a well established fact that mRNA and nuclear proteins accumulated during oogenesis play an important role during early embryonic development. Our knowledge as to the fate of nuclear proteins during embryonic development, the control of histone gene expression and the nucleocytoplasmic transport of macromolecules in frog oocytes and embryos is critically reviewed by Dreyer et al., Woodland et al., and De Robertis et al. in the last part of this book.

All in all, this is a clearly written, up-to-date and stimulating book on the hot topics in the field of germ cell differentiation. It will be of interest to a wide range of researchers in developmental biology, cell biology, endocrinology, and genetics.

J. Schöneich, Gatersleben

Cohen, S.; Cross, G.A.M. (eds.): Towards the Immunological Control of Human Protozoal Diseases. Philosophical Transactions of the Royal Society of London B. Biological Sciences, Vol. 307, No. 1131. London: The Royal Society 1984. 213 pp., several figs. and tabs.

This invaluable volume contains seventeen reviews by leading experts in trypanosomiasis, malaria, leishmaniasis and amoebiasis research. The results of recent immunobiological, immunochemical and molecular biological studies are critically assessed, especially in view of finding ways for immunological control of these important tropical diseases.

The structure of variant glycoproteins of African trypanosomes, antigenic variation and the role of chromosomal translocation in it, and the intricate pattern of parasite host relationship are described. There are two papers on the immunology of South American trypanosomiasis and the potential use of surface glycoproteins as subunit vaccine. There is a contribution on the mechanism of cytopathogenicity of *Entamoeba histolytica* and on the involvement of

Lyt-1⁺2⁻T cells, leading to macrophage activation in acquired resistance to *Leishmania* infection in rodent model studies.

The second half of this issue summarizes the various aspects of modern malariology, such as perspectives of malaria vaccination with regard to protection, decrease in severity of the disease and reduction of malaria transmission. In greater detail it reviews the development of sporozoite vaccine and the structure and organization of genes coding for sporozoite surface antigen. It contains discussions on the enigma of antigenic variation of parasite proteins expressed on the surface of infected red cells and the involvement of the spleen, protective antigens of the erythrocytic stages of rodent, simian and human plasmodial species, the first results of studies on the expression of *P. falciparum* blood stage antigens by *E. coli* clones of a cDNA library in lambda phages and a description of *P. falciparum* merozoite antigens binding to glycoporphin of erythrocytes – the essential step leading to the infection of red cells by the malaria parasite.

The last paper reviews experimental studies on transmission blocking immunity induced by antigens of gametes early zygotes and ookinetes, the identification and characterization of some of their antigens and their potential role as part of a multicomponent malaria vaccine. It is recommended that those who wish to update their knowledge to the beginning of 1984 in this rapidly evolving field of medical protozoology should read it fully.

J. H. E. Th. Meuwissen, Nijmegen

Porter, R.R.; Lachmann, P.J.; Reid, K.B.M. (eds.): Biochemistry and Genetics of Complement. Philosophical Transactions of The Royal Society of London. B. Biological Sciences, Vol. 306. London: The Royal Society 1984. Several figs. and tabs.

The book is the edition of a discussion organized by Drs. Porter, Lachmann and Reid in January 1984. It starts with a very brief introduction by Dr. Porter on the importance of the complement system as a nonspecific effector mechanism of immunity. The three functional subunits of the complement system, the classical and alternative activation pathways and the terminal route of activation are further discussed by a number of specialists in particular fields. A new idea discussed is that activation of not only the alternative but also the classical pathway can be a matter of contra-suppression, a more or less specific antagonism of natural regulating proteins.

The book continues with a number of contributions on the genetics of individual complement components. It is stated that the greater part of the complement components have genetic variants. This is in particular true for C4, which shows a very extensive polymorphism. This is of interest since low-active variants of C4 are associated with a higher incidence of autoimmunity. Also, the linkage of the genes coding for the components C2, factor B and C4 to the major histocompatibility complex remains a remarkable fact. The association between the rate of C2 and factor B secretion by cells of the monocyte-macrophage lineage and the maturation stage of the cells is discussed in relation to the role of the cells during inflammation. The cloning and characterization of complementary DNA for mouse C3, the beta-chain of human Clq, human and mouse C2, factor B and C4 is further extensively paid attention to.

The last contribution of the book by Dr. Lachmann deals with a number of deficiencies in individual complement components and complement receptors.

In conclusion, the book is fragmentary with respect to functional aspects but very informative on the genetics of complement. It can be recommended to those with particular interest in the latter subject.

H. van Dijk, Utrecht

Announcement

Genetic Research with Nonhuman Primates: Serving the Needs of Mankind

The Southwest Foundation Forum will host an international symposium entitled "Genetic Research with Nonhuman Primates: Serving the Needs of Mankind," in San Antonio, Texas, on March 2–5, 1986. Invited speakers will present papers in the areas of biochemical genetics, cytogenetics, immunogenetics, molecular genetics, population genetics, and genetic predisposition to common diseases.

A Distinguished Scientist Award in Genetics and a cash prize of \$ 1,000 will be made to a geneticist who has already made significant contributions in health-related basic research and has demonstrated great potential for future achievement. The recipient, who need not necessarily have worked with nonhuman primates, will be invited to present a keynote address at the symposium.

Please send *requests for information* and letters of nomination for the Distinguished Scientist Award to: John L. VandeBerg, Director, Department of Genetics, Southwest Foundation for Biomedical Research, P. O. Box 28 147, San Antonio, TX 78284, USA.

Author's correction

In the paper "Heritability of juvenile characters of white spruce (*Picea glauca* (Moench.) Voss.) in central Newfoundland, Canada" by Khalil, M. A. K. 69:247–251 (1985) the author wishes the following rectification:

Page 250, equation (5): "Standard deviation of single tree heritability" should read "Standard error of single tree heritability".