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BOOK REVIEWS

GOTTSCHALK, G.: *Bacterial Metabolism.* Springer-Verlag, Berlin-Heidelberg-New York, 1979. 281 pages, 161 figs., 41 tab. Cloth DM 43.— US $ 23.70.

This book presents an up to date account of bacterial metabolism, illustrating data with clear and interesting examples. Both, scholars and students of this subject will find this book worth reading, not only because of the contents but also of the author's style, the presentation of tables and diagrams and the pleasant type.

In the first chapters the principal reactions of energy and biosynthetic metabolism have been discussed using *Escherichia coli* as a model organism. Then the diversity of aerobic metabolism among bacteria has been outlined. Hereafter a brief description of the regulation of the level and activity of enzymes has been given followed by a large chapter on fermentation. The last two chapters are devoted to chemolithotrophic and phototrophic metabolism and to nitrogen fixation.

The author has succeeded to confine to the essentials of metabolism. This results in a book with a stronger biochemical character than books on General Microbiology in which metabolism is also amply discussed. It becomes clear that metabolism takes place in and around cells: transport processes, Mitchell's theory and regulation are very clearly presented. Further the structure of cell walls and cytoplasmic membranes are shortly mentioned, but for example genetics, virusses and growth characteristics (batch culture and chemostate do not appear in the index) are probably willingly not treated in this book.

A chapter on the role of bacterial metabolism in nature (cycles of matter) is not included and could have concluded the book. Because of its character this book is very useful for students that already followed a course in General Microbiology. Only then they will be capable to put metabolism in a microbiol (bacterial) frame.

A. A. N. VAN BRUSSEL

J. SCHULZ-SCHAEFFER: *Cytogenetics. (Plants-Animals-Humans).* Springer-Verlag, Berlin-Heidelberg-New York, 1980. XIII + 446 pp. 219 figs., 11 tab. Price: DM 69,00 cloth; US $ 40.60.

This book is an ambitious volume, in which the author attempts to give a survey of cytogenetics throughout both the plant and animal kingdom (including Homo sapiens) and to bring the diversity of approaches within a common intellectual framework. It covers all aspects of cytogenetics, though the treatment of different topics varies. One can, however, see the immense task which faced Schulz-Schaeffer and appreciate the effort needed to draw all of the information together. It is intended for the college student as well as for researchers. There is no doubt that the broad scope, yet frequent detail, of this book has achieved the aims of the author and publisher.

In the first part of the book (chapters 2–8) the structure (including banding patterns in mitotic chromosome), function and movement of chromosomes is treated. The second part (chapters 9–19) of the book deals with variation in chromosome types, as well as in chromosome structure, function and movement. A chapter on extrachromosomal inheritance concludes the book.

There are bound to be minor criticisms on any book of this size. Most serious is the fact that many scientific plant names are misspelled. In table 15.2 listing crop plants according to their classification as autoploids (segmental alloploids, respectively) or alloploids, incorrect examples are given. According to Krapovickas and Rigonis, the groundnut, *Arachis hypogaea*, is not an autoploid, but an alloploid, which is believed to have derived directly from a wild allotetraploid. *Coffea arabica* is not an autoploid but an alloploid. Segregation of incompatibility genes in *Coffea arabica* is disomic, and also the meiotic behaviour of interspecific hybrids strongly suggests alloploidy.

Most cultivated bananas are triploid and contain genomes from *Musa balbisiana* and *M. acuminata*. Therefore, many of them are alloploids, some are autotriploids derived from *M. acuminata*.

The tetraploid potato, *Solanum tuberosum*, is regarded as an autotetraploid by some authors, but as a segmental alloploid by others. *Malus* and *Pyrus* originated by secundary polyploidy from species with lower basic numbers, but this origin was so remote that the plants with 2n = 34 usually behave as normal diploids. The forms with 2n = 51 are autotriploids, not allotriploids, as suggested in the list given.

The author quotes Stebbins' opinion that almost all apomictic *Compositae* are obligate rather than facultative apomicts. However, recent biosystematic studies on various species of *Compositae* clearly showed that different apomictic species contain both sexual and apomictic races and cytotypes. Moreover, pollen grains of apomictic plants are able to fertilize sexual plants, which may at least partially result in the formation of apomictic progeny.

The section on pseudogamy is not clear and may cause some confusion. According to Schulz-Schaeffer a male gamete is necessary for embryo endosperm and seed formation. This is not true: the male gamete fuses with the fusion nucleus to form the endosperm nucleus. The embryo develops from a diploid cell without fertilization and is present before pollination takes place. Later stages of the development of the embryo require the presence of secundary endosperm.

In the treatment of apomixis I dearly miss the standard work by Rutishauer: "Fortpflanzungsmodus und Meiose apomiktischer Blütenpflanzen".

However, these are minor points in an otherwise nice volume that will quickly assume its rightful place as a good textbook on cytogenetics. The book is well illustrated and written in a simple clear language. The textbook is consequently recommended to everyone with an interest in cytogenetics.

TH. W. J. GADELLA

John D. WEETE: *Lipid Biochemistry of Fungi and Other Organisms.* Plenum Press, New York and London, 1980. 388 pp. US $ 45.00 + 20% outside USA, ISBN: 0-306-40570-9.

In 1974 research on lipid biochemistry of fungi has been reviewed extensively in Fungal Lipid Biochemistry by John D. Weete. The content of that book has been rewritten, expanded and updated and is now presented under the title of Lipid Biochemistry of Fungi and Other Organisms. Inevitably in a book of moderate size, covering a wide range of subjects, some topics receive less detailed treatment than others. Although the title of this new book suggests that it is built around two "groups' of organisms, the "Other Organisms' clearly receive too little attention. They are only used for comparison in fungal lipids and lipid metabolism. Notable organelles in plant lipid metabolism as chloroplasts deserve more than three references in a book like this.

As far as the fungi are concerned it is a concise, authorative and up to date account of research in lipid biochemistry. A very brief first chapter includes a one page section on the historical aspects of fungal lipid research. As much of our fundamental knowledge on the biochemistry of lipids has been gained through work with *Saccharomyces cerevisiae* and *Neurospora crassa* it is a pity that these historic landmarks are not outlined in this introductory chapter. The second chapter is concerned with fungal lipid content and production and the factors influencing this process. The polar lipids including the fatty acids and their metabolism, acylglycerols, glycerophospholipids and sphingolipids are treated in detail in the next six chapters. Particular attention is paid to the yeast fatty acid synthetase as a multifuntional enzyme. The apolar lipids, represented by aliphatic hydrocarbons, sterols and carotenoids are the main topics of chapter 8 and 9. The final chapter, contributed by Darrell J. Weber, deals with the metabolism of fungal lipids in reproductive processes and during germination.

All the chapters look really up to date in their approach. Specialists will not find it hard to quibble with points of detail but on the whole the compiler offers a very valuable and useful reference book. The cited literature, compiled in a final section with over 1000 selected references, is a very important part of this book. In many cases the reader is referred to review articles for detailed information. As the substrate is essential in fungal growth so the cited literature is essential for detailed comprehension of this fundamental scientific area. Librarians be prepared.

H. W. GROENEVELD

M. HICKEY and C. KING: *100 Families of Flowering Plants.* Cambridge University Press, Cambridge, U.K., 1981 567 + xix pp., 100 + xiv figs. ISBN 0.521.23283.X, hard cover, price £ 27.50. ISBN 0.521.29891.1, paperback, price £ 8.95.

This book raises ambiguous feelings. The cover says that it is designed to enable students of botany to gain some knowledge of the relationships between families of plants. The introduction is more careful and mentions also the appreciation of the diversity of the floral structure. As only very few words are spent on the relationships, the second object is the main item of this book indeed. That emphasis is laid on the floral structure is even shown by the place of the illustrations of flower types (pp. 3–16) in contrast to those of leaf and inflorescence types (pp. 544–553).

The choice of 100 families of which representatives are available in Britain for use in teaching is a good thought. The heading of each family contains its size in genera and species and is followed by paragraphs on distribution, general characteristics, economic and ornamental plants, and classification. The description of the general characteristics is clear, concise, and complete. I found some hidden treasures in these descriptions, like "Inflorescence usually a coiled cincinnus, uncoiling as flowers open so that newly opened flowers always face in the same direction" (Boraginaceae), alas followed by the "Ovary... of 2 carpels... becoming at maturity 4 carpels". The presentation of the classification is unbalanced; e.g. in the Boraginaceae and Solanaceae the characters of the tribes are given, but the lists of tribes under Compositae and Gramineae are useless because of the absence of any indication of the backgrond of the classification and thuis of the relationships. For each family a representative (for some large families more than one) is chosen and shortly described with quite rightly emphasis on pollination as this is of importance in relation to the flower structure. Alternatives for study are also indicated.

The flower analysis is meticulously described in the extended captions. The representation of fruit and seed is rather haphazard and apparently not according to an outlined plan. The hundreds of original figures are a great contribution to botanical literature. It is unfortunate that most figures have suffered from heavy shading combined with heavy printing; shading is also not consistently on the same side of the objects; in fig. 26B the shading of the annulus and operculum is on the lower side, of the styles and filaments on the upper side. The figures of the Compositae should have had a better enlargement.

The book is completed by four comparative tables for closely related families, tables of flowering times useful for planning courses, an extensive glossary, and an index of families and genera.

The authors have invested much time and energy into this book and it certainly had deserved a better printing and another month of carefully going over all details.

Nevertheless, the result is quite an accomplishment that will find its way, especially as the price of the paperback is very reasonable.

W. VINK

J. B. HALL and M. D. SWAINE: *Distribution and ecology of vascular plants in a tropical rain forest – Forest vegetation in Ghana* – Geobotany 1. XV + 383 pp., 75 figs., 32 tables. ISBN 90-6193-681-0. Dr. W. Junk BV Publishers, The Hague, Netherlands, 1981. Price US $ 112.00/Dfl. 225,00 (Cloth).

This work, number one in a series "Geobotany", consists of two parts. Part two (chapters 9–11, p. 103–321) gives distribution maps for Ghana, with notes on morphology, the architectural model, taxonomy, chorology, ecology, and utilisation, of 624 forest plant species. These species distributions form also the documentation of the characterisation and distinction of forest types in the Ghanaian rain forest, as was earlier set forth in an article in the Journal of Ecology in 1976. The distribution maps presented stand out, for a tropical country, by that they are not based on herbarium specimens which happened to be available, but on the careful floristic inventarisation of a large number of sample sites, all in closed canopy forest, scattered over the whole Ghanaian forest area as evenly as possible. The latter proved to be quite difficult in cases, as closed canopy forest

is nowadays largely restricted to forest reserves, and even these have often been subject to strong timber exploitation. The forest belt is divided into 11 types and subtypes, *viz.* Wet Evergreen forest (in the extreme SW-corner of Ghana; rainfall 1750 mm per year or more, and with the greatest floristic diversity), Moist Evergreen forest, Moist Semi-deciduous forest (with 2 subtypes: North-west and South-east subtypes; these together being the forest type with the largest extension), Upland Evergreen forest (above 500 m), Dry Semi-deciduous forest (with 2 subtypes: Inner Zone subtype, and Fire Zone subtype), Southern Marginal forest, and South-east Outlier forest; the latter two types ar in Ghana only.

New is the method of a floristic approach, which initially abandons such criteria as the amount of rain fall, geology, soils, phytosociology, and species-dominance of trees, deciduousness, etc., though later on, as a matter of course, much correlation with these features was demonstrated. These were used in more precisely establishing the final boundaries. Useful guidance was also obtained by "indicator species ananlysis" of the data set.

The complete species lists were submitted to a multivariate analysis by a computer, by "reciprocal averaging". Thus, of a total of 1300 vascular plant species recorded (out of a total of c. 2000 forest species in Ghana), 749 species were used for ordination of the species and the samples, and classified, resulting in the definition of the forest types. As a matter of fact all Ghanaian forest should be classified as seasonal, and main correlation appeared to be with precipitation. The advantage of the method is that subsequently studied forest can readily be identified by ordination of the majority of the species recorded.

The first part of the book (chapters 1–8; 1–100) deals with various ecological and biological aspects of the Ghanaian forest, and also contains the description of the investigations leading to the new classification of the forest zonation. Chapter 8 (p. 71–70) gives detailed descriptions of the 11 recognised forest types and subtypes, discussing floristics, structure, environment, conservation, and utilisation, including a list of characteristic species and profile diagrams. In general, the floristic variation in the forest appeared to be of a continuous nature, but still species characteristic for the zones could be tabulated. Comparison with older and recent work in West Africa, mainly Ghana and Ivory Coast, received attention.

In a number of Appendices (p. 324–383) various lists are given, including a worked example of a plot-identification from the ordination scores of all species present in the plot, a long reference-list, index to scientific plant names, and a general index.

The authors have succeeded in presenting their original research into a well-readable whole, amply illustrated. The book should and will be used by all interested in the tropical forest, although professionals interested in the methods should consult the 1976 publication as well. The printing is good.

W. J. J. O. DE WILDE

T. G. TUTIN, V. HEYWOOD, N. A. BURGES, D. M. MOORE, D. H. VALENTINE, S. M. WALTERS AND D. A. WEBB (eds.): *Flora Europaea, Vol. 5, Alismataceae to Orchidaceae (Monocotyledones)*. Cambridge University Press, Cambridge, 1980. XXXVI + 452 pp., 5 maps. £ 45.00.

On the first of September, 1977, during the Final Flora Europaea Symposium, the official presentation to the Press of the script of the fifth and last part of the Flora Europaea took place in the Senior Combination Room in St. John's College in Cambridge (England). During this ceremony one of the attendants expressed his amazement – softly, but clearly understandable for surrounding bystanders – because he still had to finish the treatment of one of the families for this 5th part. This was not the only reason, of course, that it lasted until the 3rd of April 1980 before part V of the Flora Europaea was published.

But now the last part is there and thus not only a great work has been published within a fairly short time, but, what is more, a period of over 25 years of intensive cooperation between the European plant taxonomists has come to a close.

A separate chapter in this final part gives special attention to the history of the Flora Europaea-project that "stands as a monument to international botanical cooperation". To bring the Flora Europaea to a success an organisation had been built up which included besides the British editors and professional coworkers an international advisory committee and a network of c. 40 regional advisers (for The Netherlands Dr. S. J. van Ooststroom). Not less than eight Symposia were organised; new publications, such as the "Index to European Taxonomic Literature' appeared, etc. During the Final Flora Europaea Symposium the hope was expressed that this cooperation could be continued in the sequel to the Flora Europaea, the Atlas Florae Europaeae. However, it must be seriously doubted whether one really will succeed to maintain the intensive cooperation which made the Flora Europaea a success.

In the beginning of the project the number of European vascular plant species was estimated between 12000 and 17000. After the completion of Flora Europaea it appears to be 11557, spread over 1541 genera, belonging to 203 families.

Essentially it must be possible now to determine every European vascular plant. To attain this, emphasis had to be on compilation, lacking time for original monographic work. Therefore no attention could be paid to real problems within the critical groups. Smaller problems did not always obtain a satisfying solution either: for instance, *Baldellia repens* (*Echinodorus repens*), distinguished in The Netherlands and Belgium, is considered without comment synonymous to *B. ranunculoides*, while elsewhere – in part IV – *Lamium bifidum* subsp. *albimontanum*, which appears to be a genuine *Lamium purpureum*, did receive recognition.

This does not alter the fact that the Flora Europaea fully deserves the qualification magisterial. A great compliment is due for describing and constructing keys to the whole European Flora in such a short time. It would be desirable for the European national floras to make it their task to insert the names used in the Flora Europaea consistently as synomyms, even if this requires some extra space. An example is the second edition of the "Grassentabel" by BRAND & VAN DER MEIJDEN (1980), in which it is stated that c. 25% of the Latin names of the grasses in the 19th and last edition of HEUKELS-VAN OOSTSTROOM, Flora van Nederland (1977) are different from those mentioned in the Flora Europaea.

J. MENNEMA

R. GEESINK, A. J. M. LEEUWENBERG, C. E. RIDSDALE and J. F. VELDKAMP: *Thonner's analytical key to the families of flowering plants.* Leiden Botanical Series, Volume 5. PUDOC, Centre for Agricultural Publishing and Documentation, Wageningen, and Leiden University Press, The Hague/Boston/London, 1981, xxvi+231 pp., 3 plates, 1 portrait. Price Dfl. 38,50/US $21.00 (paperback).

Franz Thonner's "Anleitung zum Bestimmen der Familien der Blütenpflanzen", the second edition of which dates from 1917 and has been long out of print, may still be regarded as the most reliable key of this type on a worldwide scale that was ever published. Curiously enough, virtually nothing is known about the methods employed by Thonner in constructing this key, and one can only guess about it. Nothwithstanding the fact that Thonner's key never had its equal, it apparently did not receive the international attention it no doubt deserved, which must largely have been due to the German language being inaccessible for many. For a long time the need for a new and updated edition and at the same time a translation into English has been felt.

The present key is the result of long and painstaking efforts by the four authors jointly. One of their tasks was to incorporate the numerous footnotes found in Thonner's work into the regular key. Also many new families usually resulting from reinterpretation following recent taxonomic research had to be incorporated or, in a number of cases, mentioned as synonyms. Whereas Thonner's key of 1917 contained 812 couplets, the present one contains no less than 2117 couplets. Apart from this, the structure of the original key has not been changed, even when some major couplets are notoriously difficult. The dichotomy, too, has been left intact.

Those familiar with the old key will certainly remember its drawbacks: many questions are highly technical and will require considerable skill in dissecting delicate and/or tiny flowers, and, moreover, incomplete material such as, for instance, specimens of dioecious plants or specimens with fruits only can usually not be identified. The authors are aware of this and give some useful advice to overcome the problems. The user should read the introductory instructions well before starting to work!

A glossary of terms is appended. Explanatory figures concerning the position of the ovary in relation to the receptacle, of the ovule in relation to the placenta, and of the ovule shape, are also provided. The terms perigyny and epigyny as here explained, are to the understood as reflecting Thonner's concept: they do not necessarily correspond to general usage elsewhere. (Compare, for instance, figure 8 on page 80 in G. H. M. Lawrence: Taxonomy of Vascular Plants, Macmillan, New York, 1951.) The family descriptions found in Thonner's original work are omitted here.

The authors are to be complimented with achieving the difficult task of translating the "Anleitung" and bringing it up to date. Of course, there can be no absolute guarantee that, all efforts notwithstanding, not at some time a plant may turn out to be unidentifiable. No key, other ones probably much less than Thonner's, can be regarded as waterproof in this respect. For a final judgment, experience will be needed that can only be gained through prolonged use of the book at taxonomy courses and in routine identification work. The reviewers made some trial identifications having the new version as well as the 1917 version at hand, and found the key to work excellently.

The book is handsomely executed and the paperback is designed to withstand use in the field.

L. Y. Th. Westra and E. A. Mennega

ANNOUNCEMENT

The fourteens Miles international symposium, on CELL FUSION, will be held from June 7 to 9, 1982, in John Hopkins Medical Institutions, Baltimore, Maryland, USA.

A session consists of 5–6 presentations of 20–25 minutes each and concludes with a 50–60 minute discussion moderated by the Session Chairman.

Preliminary program:
Haploid cell fusion (fertilization), B. M. Shapiro (Seattle)
Protoplast (plant and bacterial) fusion, E. C. Cocking (Nottingham)
Hybridomas, J. Th. August (Baltimore)
Cell fusion other than hybridomas, F. H. Ruddle (New Haven)
Plant cell fusion, E. W. Nester (Seattle)
Monoclonal antibodies, to be selected

For further information contact:
Edward G. Bassett, Ph.D., Symposium coordinator
Miles Laboratories Inc.
P.O. Box 40
ELKHART, IN 46515 USA
(219)264–8460