

Book reviews

***Practical Polyphenolics: From Structure to Molecular Recognition and Physiological Action*, Edwin Haslam. Cambridge University Press, Cambridge, 1998, xv + 422 pages, ISBN 0-521-46513-3, £60.00, US\$100.00**

Plant polyphenols are of significance in a wide range of areas in the biological sciences. The relevance of this class of compounds to flower, fruit, and beverage pigmentation, tanning of leather, physiological effects of food and drink, taste and flavour, and dental decay are discussed in this book. Studies of polyphenols have progressed with contributions from scientists in many disciplines, and the author has succeeded in writing a scientific text that approaches the subject from a chemist's point of view but clearly describes the significance of the chemistry to the properties and biological effects of this class of compounds.

The book comprises nine chapters, which cover structure and biosynthesis of polyphenols; molecular recognition; taste, bitterness and astringency; maturation and changes in astringency; anthocyanin copigmentation in fruit and flowers; herbal medicines; quinone tanning and oxidative polymerisation; and collagen and leather.

The book is written in a lively and erudite style that demonstrates the author's passion for, and expertise in, the subject. Quotation of passages from scientific literature of historic importance or from the wider non-scientific literature helps to sustain the reader's interest. For example, the chapter covering molecular recognition

begins with a passage from *Small World* by David Lodge, which allows the author to draw an analogy between molecules and attraction between the sexes. The strength of molecular interactions due to the additive effects of many weak hydrogen bonds is illustrated by a drawing from *Gulliver's Travels*, in which many weak fibres together constrain Gulliver. Although this approach is unusual for scientific texts, the science is rigorous and well-described, and the style of writing is a refreshing and successful way of communicating to scientific readers. The lively writing style is supported by clear and precise chemical structures and formulae.

The fondness of the author for leading scientists who have contributed to the development of the subject is clearly illustrated in his personal memoir to E.C. Bates-Smith, which is included in the introduction. Each chapter is well-referenced and I was unable to spot any errors in the book.

Overall this is an interesting and informative book that will be an essential purchase for scientists interested in polyphenols, whether they be biologists, chemists, food scientists, bioscientists, nutritionists or agricultural scientists.

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***Color for Science, Art and Industry*, K. Nassau (Ed). Elsevier Science B.V., Amsterdam, 1998, ISBN 0-444-89846-8, US\$132.00**

This book on colour science, art and technology should interest a wide readership. It attempts to cover many topics and, in the main, does so successfully. Although it might be thought that with such a wide range of subject material the topics would be treated in a superficial manner, they certainly are not. For those already familiar with some of the many aspect of the sci-

ence of colour application, the book will provide insights into unfamiliar areas whereas, for those whose knowledge of the topic is scanty, the book should provide a valuable entry into the subject. As with any book that is a compilation of chapters from a variety of authors, there is a variety of styles but not a great deal of overlap among the authors. The editor, who is also author of four of the chapters, has made a good choice in his selection of co-authors and subject matter to produce an intriguing book with the objective of linking science, art and technology. The book is divided into three sections — the science of

colour, colour in art culture and life and colorants, the preservation and reproduction of colour.

The first chapter in the science section is *The Fundamentals of color Science* by K. Nassau, the book's editor, and is an excellent survey of the physics of the colour stimulus and the three attributes of hue, chroma and lightness and the terms usually used to describe the colour experience. The physics of the object and the interaction of the energy distributions by additive or subtractive colour mixing are described. The theories of colour vision are covered historically and the development of colour order systems reviewed. The chapter ends with a discussion on the relationship of colour to what an individual actually sees and the ensuing difficulty of communicating the experience by language. The chapter is an excellent introduction to the following one on *The Measurement of Color* by R.T. Marcus. This chapter presents the systematic argument for the measurement of colour based on the CIE system and the calculation of tristimulus values. The concepts of uniform colour spaces, from that of Munsell to the Natural Colour System to the 1976 CIE colour spaces, CIELAB and CIELUV are described. The importance and limitations of instrument design are given with the timely warning that comparative measurements can only be made, with confidence, if instruments have identical geometry. Objective factors such as translucence, fluorescence and pearlescence are discussed. The third chapter in the section is on *Color Vision* by J. Krauskopf. The Structure of the eye and the role of the retina in colour vision are described and the neurophysiology of the process presented. The roles of adaptation and object space location interactions in perception are emphasized. The final chapter in the section is an intriguing review of *The Fifteen Causes of Color* by K. Nassau. He classifies the 15 causes into five groups, simple excitations and vibrations, transitions involving ligand field effects, transitions between molecular orbitals, transitions involving energy bands and geometrical and physical optics. This is a most interesting chapter for anyone who has not fully considered the many sources of colour phenomena surrounding us.

The second section is on colour in art, painting and life and starts with a chapter on *Color in Abstract Painting* by S. Wurmfield which is concerned with the development of the use of colour as a means of expression in abstract painting. This chapter deals with the aesthetic aspects of abstract painting and covers the development of colour systems and the importance of contrast, spatial pattern, harmony and organization. The author refers, in the main, to 20th century painters for examples and, although the colour plates at the end of the book are presented excellently, they are only illustrative of a very limited section of abstract art. They demonstrate essentially the interaction of colour order and contrast without reference to objectivity. To this

reviewer, this chapter is the weakest in the book, not of itself, but because it is the only chapter on colour as an art form in painting. The book could have been improved with a more general chapter on the development and changes in the use of colour from classical painting to the impressionists and into the 20th century. There are two chapters in this section by J. B. Hutchings, the first on *Color in Anthropology and Folklore* and the other on *Color in Plants, Animals and Man*. The former chapter, although short, is revealingly interesting in that it deals with the relationships of human belief to colour usage and cultural meanings. That the perception of colour is only one aspect of appearance is amply illustrated. The uses of colour in human decoration, symbolism and superstition are discussed relative to ethnic, regional and tribal circumstantial meaning. Its association with our emotions illustrates the role of colour as a stimulator and motivator to our actions. His other chapter deals with biological pigments and their functional use. In plants, the role of the absorption bands of green chlorophyll in photosynthesis is discussed and the differences in leaf colour and structure are associated with plant age, position and the seasons of the year. He lists the seven major pigment colouring mechanisms and their roles in animals and flowering plants, pointing out that many of them have vitamin properties for animals that cannot synthesize them. The colour of flowers has a vital role in the dispersion of pollen, acting as a guide for insects, and animals and humans use the colour of fruit as an indicator of quality. For some animals the role of their pigmentation is that of camouflage whereas, in others, brilliant colours are used as sexual attractants or as warnings of danger. In humans the role of skin colour and geographic location is discussed relative to the level of melanoid pigmentation. *The Biological and Therapeutic Effects of Light* by G. C. Brai-nard covers both the effects of the light on biological rhythms and brain response and effects on such responses as depression, arousal and our mental association of colours, especially red, with biological situations. The therapeutic use of light is illustrated by its use in adjusting biological clock dysfunction. The effects of different wavelengths on a variety of illnesses are discussed. The chapter includes a protocol for double-blind testing in therapeutic tests.

The third section of the book is devoted to the technology of the colour industry. P. A. Lewis's chapter on *Colorants: Organic and Inorganic Pigments* gives a comprehensive listing of available pigments according to both type and colour. He carefully distinguishes between pigments and dyestuffs and discusses the effects of particle size on their dispersion and application and the resulting differences in opacity and transparency. This chapter is an excellent source of effective use of pigments for many applications from inks to exterior paints to artists colours. The following chapter by J. R. Aspland is

the companion one on *Colorants: Dyes*. Again, the various types of dyes are listed but, as importantly, the process of dying is discussed with reference to both the dye and the textile fibre properties. Examples of dying machinery and processes are given. Next, there is a short chapter by the editor on *Color Fastness and the Chemistry of Color Fading*, especially with regard to the role of illumination level and type on works of art. The chapter by G. G. Field on *Color Imaging: Printing and Photography* covers the fundamentals of subtractive colour reproduction and their application in a wide range of processes from photographic film to printing and use of the coupled camera and electronic imaging. The principles of colour separation in photography are covered along with the constraints of the colour gamut of the dyes or pigments on the resulting image. The factors and problems involved in colour lightness balance, hue shifts and saturation adjustment, colour optimization and image definition are discussed.

The two chapters on *Color Encoding in the Photo CD System* by E. J. Giorgianni and T. E. Madden and *Color Displays* by H. Lang complete the book. These chapters

are timely, considering the role of the computer in colour image capture and the ranges of photo and visual colour displays. The reader is reminded that all coupled colour-imaging systems must perform five functions—image capture, colour separation, signal processing, colour reconstruction and image display. The transfer of the captured input RGB signals, processing of the encoded colour, the limitations of the colour gamut of the cathode ray tube and the output quality are discussed fully, using the Kodak Photo CD System for illustration.

The book is very well produced with a high class of hard binding and good paper quality. The coloured figures are helpful in giving the reader illustrations of colour spaces, sources of colour, painting technique and photographic and printing variables. This reviewer recommends it both as a scientific text and for informative reading pleasure.

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