

essay on the reception of the *Origin of Species*; to say that he has none is wrong, and to label him as an essentialist is again typological thinking. And lastly, a more general point (4) pp.375, 504 etc.: A better appreciation of natural theologians and scientists in England is achieved if one considers the reliability of *testimony*; in science, there is one's own experience, the personal witness of acquaintances, and the testimony of others in papers and books. One is unique in this respect in being the testimony of the Author of Creation, and

therefore particularly valuable.

Certain classes of mind, Marxist in particular, will detest this book; most others will find it exceedingly stimulating, not to say infuriating. It has as many points as a porcupine, for intellectual aggression, not defence. There will be a lot of love-hate relationships engendered. I love it, spikes and all. □

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High time for unification in catalysis

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Metal-catalyzed Oxidations of Organic Compounds. By Roger A. Sheldon and Jay K. Kochi. Pp.424. ISBN 0-12-639380-X. (Academic: 1981.) \$56, £37.

METAL-catalysed oxidations of organic compounds have been attracting increasing attention over the past decade or so in three conventionally distinct fields of chemistry: liquid-phase oxidations, traditionally an area of study by the organic chemist; heterogeneous gas-phase reactions, the province of the physical chemist; and enzymatic reactions, that of the biochemist. Many of us who are involved in one of these branches of the subject have sometimes been slow to appreciate the value to our own field of an advance in either of the other two, and it was high time someone attempted to unify the subject. Moreover, for obvious reasons, metal-catalysed oxidations have strong attractions to industrial chemists, who can almost certainly be helped in their task by an understanding of how nature works; for example, it is probably not an exaggeration to suggest that a full understanding of how cytochrome P450 acts in the living cell could help an industrial project aimed at catalysing the aerial oxidation of benzene to phenol.

In this book the task of unification has been undertaken by two men who are well suited to it by virtue of both their complementary fields of experience — industry and academia — and their distinguished activities as researchers in the field. They have succeeded admirably.

The structure they have adopted is logical: to consider first the mechanistic principles of the oxidations, grouped by reaction type — oxidations by molecular oxygen, by peroxides, by oxometal reagents and so on; and then to describe synthetic methodology, grouped by compound type — olefins, aromatic hydrocarbons, alkanes, oxygen-containing compounds, and nitrogen, sulphur and phosphorus compounds. It is true that this results in a certain amount of repetition; for example, the mechanism of oxidation

of arenes by cobalt(III) on p.122 is repeated on p.319. This may irritate some readers but, by and large, it serves to reinforce one's knowledge and understanding in proceeding through a complex subject.

The coverage is enormously comprehensive, including details of reactions catalysed by (salts of) 33 metals, with well over a thousand references, including some from 1981. To some extent, then, the account reads more like a review than a textbook. The disadvantage of this is that little, almost trivial, points are occasionally included for completeness and slightly upset the flow and development of the major themes; but this is certainly outweighed by the advantage of having such a valuable collection of well-referenced information so readily to hand.

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Moving pictures

P.W. Hawkes

Image Sequence Analysis. Edited by T.S. Huang. Pp.437. ISBN 3-540-10919-6; 0-387-10919-6. (Springer-Verlag: 1981.) DM85, \$39.60.

PROCESSING a single black-and-white image in a computer requires a substantial amount of memory and, all too often, of time. If we add colour, the difficulties become appreciably but not insuperably worse. As soon as we are driven to try and extract information from large numbers of images, though, the complexity and immensity of the problem become such that all but the very best-equipped must surely blench. Reading between the lines of this interesting and detailed discussion of the problems of extracting information about moving objects from image

sequences, and related topics, I cannot help feeling that Professor Huang and his colleagues must occasionally have quailed; nonetheless the overall impression is one of optimism.

The book is divided into three parts. The first consists of an introduction, largely devoted to the estimation of motion parameters, and a review by H.H. Nagel of the various applications (with an extensive bibliography and an author index). The second, on image sequence coding, enhancement and segmentation, contains four chapters: "Image Sequence Coding" by E. Dubois *et al.*; "Image Sequence Enhancement" (the editor and Y.P. Hsu); "Image Region Extraction of Moving Objects" (B.M. Radig); and "Analysing Dynamic Scenes Containing Multiple Moving Objects" (J.K. Aggarwal and W.N. Martin). The final section, on medical applications, consists of a single chapter on processing medical image sequences by W. Spiesberger and M. Tasto.

The possible applications of this work are, in many cases, of considerable industrial importance, with the result that although much abstract and abstruse material is presented, we are repeatedly brought back down to earth by the specific illustrations. In the introduction, Huang and Tsai offer the following by no means exhaustive list of potential applications: road traffic monitoring; cloud tracking; microcinematography and X-ray sequences of moving parts of the body, the heart in particular; bandwidth compression of picture-phone and TV conferencing signals; robot vision and dynamic monitoring in industry; and, inevitably, target tracking for military purposes. Readers from other fields will have no difficulty in extending this list: *in situ* studies in electron microscopy, the behaviour of nerves and muscles — there can be few fields where studies of rates and types of change could not benefit from some automation.

Most of the book is concerned with image coding and with the study of rates of change of position, ranging from the position of cars or missiles to the position of a contrast medium in a diseased and a normal kidney. It is written in such a way that the newcomer familiar with "static" image processing can understand in detail the methods used to analyse the "dynamic" situation and, at the same time, the absolute beginner — industrialist, tycoon, general, doctor — can comprehend at least the kinds of problems for which the methods have been devised and judge whether they will be of any help to him. In short, this is a meaty, fairly readable and eminently useful addition to the image processing literature. □

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