anti-Communist should attract a special kind of moral credit such as is not accorded to someone who has had the sense to do neither. Performing two intellectual U-turns may purify a man's spiritual nature, but it doesn't establish him in my opinion as a reliable thinker. What it may do, it seems, is provide him with material for art. Generally speaking the question "Does the end justify the means?" is most suited to a College Debating Society, the answer being given by a count of Ayes and Noes. Mr Koestler, as Mr Rees demonstrates, has transformed an examination of the question into a work of art. I should have thought Mr Koestler's argument was skewed intellectually by the pressure of abnormally strong feelings of guilt—you really can't get to the truth when there's so much guilt about the place—yet as a work of art the book is clearly a classic. But I do feel bound to look back again to the opposite pole, where I find it hard to go along with the claims made for Mr Koestler there. He is extremely clever and he knows what some of the concepts of the hard-core sciences are about: I take leave to question very seriously the uses to which he puts them.

Of recent years Mr Koestler has become increasingly preoccupied with the so-called 'para-' subjects—telepathy, telekinesis, parapsychology and so on. In writing for *Nature* about Aldous Huxley, who also came to have this preoccupation, I lumped them all together under the title 'parascience', where 'para-' according to the Oxford English Dictionary meant 'beyond, wrong, irregular' and according to me could be replaced by 'non-'—'non-' being at only one stage before 'anti-'. In *The Roots of Coincidence* Mr Koestler begins by trying to establish parascience on the same footing as science; by saying that theoretical physics breaks previously sacrosanct 'laws of nature' in for instance the concepts of negative mass and time reversal, while parapsychological research has become more rigorous, statistical, computerised. A specious argument: on the one hand negative mass and time reversal are straightforwardly within the logic of the established mathematical metaphor; whereas everybody knows you can be rigorous, statistical, computerised from premisses that are entirely fallacious. Mr Koestler then goes on to postulate a world of psychic reality alternative to that of phsyical reality (and interwoven with it in the matrix of 'oceanic reality'; complementarity is invoked, of course), where the seemingly acausal events of the paraworld—amazing coincidences, peculiar premonitions, levitating tables and crumpling spoons—may be as accounted-for as the casual events of the physical. The world of 'oceanic reality' you reach by way of mystical or mescalin experiences.

One can readily take a magnanimous line towards Mr Koestler as a man. For instance when he flirts in *The Midwife Toad* with Lamarckism, one can see his sense of justice compelling him to establish the claims of dissident off-beat minds in the dialectical process of arriving at scientific truth. And when he attacks determinism one can only respect that element of the human spirit which insists on having some say in its own fate, and which rejects the idea of absolute predetermination and inevitability. But one's attitude to him as a thinker has to be cautious, clever as paint though he may be. One has to watch out for preoccupation with the paranormal turning a man into a parathinker.

William Cooper

Chromatographic

Extraction Chromatography. (*Journal of Chromatography* Library, Volume 2.) Edited by T. Braun and G. Ghersini. Pp. xvii+566. (Elsevier Scientific: Amsterdam, London and New York, 1975.) Dfl. 130; $54.25.

THE title of this book will be unfamiliar to most western practitioners of chromatographic separation methods. It is defined in chapter 1 as the reversed-phase partition chromatographic separation of ions usually, although not necessarily, using systems which greatly favour partition into the stationary phase. Various means, including complexing and chelating agents as well as physical partition, are used to achieve this end. The separations described in this book are exclusively inorganic, although this does not seem to be intrinsic in the method.

I personally feel that this nomenclature is unfortunate in that it does not give due emphasis to the distribution between two phases, which is the essential mechanism of all chromatographic processes. It has arisen, however, from the extensive use of liquid–liquid extraction in the separation of the products of nuclear fission, the chromatographic applications having followed later. In so far as the term extraction chromatography is restricted to those inorganic chromatographic separations, in which an ion is converted into a non-ionic complex which is extracted preferentially into a non-aqueous stationary phase; it is probably an acceptable innovation.

Within these limits this collaborative work succeeds admirably. After introductory chapters on the theoretical aspects and the correlation between chromatographic and liquid–liquid partition results, three excellent chapters describe experimental methods (which are necessarily rather elaborate in all reversed-phase partition chromatographic techniques), stationary phases (in considerable detail) and support phases. The last by Katykhin is outstanding and will be very valuable to organic chemists and biochemists as well as those concerned exclusively with inorganic separations. This chapter contains a wealth of tabulated material on all the commonly used support phases, including physical properties such as density, surface area, total porosity, average pore diameter, capacity for typical organic stationary phases and HETP values for a wide range of chromatographic systems. International suppliers, including those in east European countries, are also tabulated. To my knowledge no such extensive compilation has appeared elsewhere. Katykhin also discusses the pretreatment of the support materials and column packing. He also includes a description of the preparation of sintered porous PTFE blocks which can be moulded into any required shape, and can be used repeatedly in a variety of reversed-phase chromatographic systems, including annular blocks for continuous chromatography.

The remainder of the book deals with special applications of extraction chromatography to specific inorganic ionic groups. Stronski deals with the separation of radionuclides, and shows that in the majority of cases a difference of unity in atomic number suffices for complete separation. Separations of the individual elements are also usually possible in most vertical columns of the periodic table, for example, Li, Na, K, Rb and Cs; Ca, Sr and Ba; Au, Pt and Pd; and the halides, F, Cl, Br and I. Complete separations in the IVth, Vth and VIth groups, however, are still difficult. Separations of the actinides and lanthanide elements are described in chapters by Muller and Siekierski.

In summary it seems that good separations of most pairs of inorganic ions can now be achieved simply and effectively by extraction chromatography both on the analytical and preparative scales. The method is particularly suitable for highly radioactive elements, as preparative separations can readily be carried out by simple remote control in well-shielded enclosures, whereas analytical separations can be carried out at such high dilutions that special precautions are usually unnecessary.

This book provides an excellent and complete coverage of the whole field of the separation of inorganic ions by column, thin-layer and paper chromatographic methods, and as such it is highly recommended.

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