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Progress in Food Contaminant Analysis, Edited by J. Gilbert. Blackie Academic and Professional, London, 1996. ISBN 0 7514 0337 7. xiv + 426 pp. £89.00.

This book originated as a follow-up to *Analysis of Food Contaminants*, also edited by John Gilbert, but published by Elsevier Applied Science in 1984. It is similarly based on applications and techniques, concentrating on areas of current interest and highlighting recent advances in techniques. In many ways, it is complementary to the earlier volume, parts of which, say, on clean-up by size-exclusion chromatography and immunoassay of veterinary drugs, remain relevant.

Professor Gilbert has assembled 14 renowned authors from different parts of the world, UK, Spain, South Africa, USA, and New Zealand, to contribute 10 chapters, on sampling and sample plans for food surveillance exercises (N. T. Crosby, 31 pp.), automated clean-up techniques for trace component analysis in complex biological matrices including foods (M. J. Shepherd, 33 pp.), chromatographic and allied methods of analysis for selected mycotoxins (E. W. Sydenham and G. S. Shephard, 82 pp.), inductively coupled plasma–mass spectrometry (ICP–MS) for the analysis of trace element contaminants in foods (H. M. Crews, 40 pp.), applications of immunoassay to pesticide analysis (B. M. Kaufman, 32 pp.), bioassay and chemical methods for analysis of paralytic shellfish poison (P. A. Burdaspal, 35 pp.), analysis of food contaminants by combined liquid chromatography–mass spectrometry (LC–MS) (J. Gilbert, 51 pp.), analysis of foods and biological samples for dioxins and PCBs by high resolution gas chromatography–mass spectrometry (GC–MS) (D. J. Hannah, L. J. Porter and S. J. Buckland, 27 pp.), approaches to evaluating high-temperature food packaging materials as sources of food contamination (H. C. Hollifield and T. H. Begley, 36 pp.), and progress in developing European statutory methods of analysis (R. Wood, 49 pp.). There is also a subject index (10 pp.).

This is a book packed with information. It draws together a very wide range of methods, as well as data obtained by them, which will be invaluable to the expert, provide reliable guidance to those entering the field, and give those unfamiliar with the area a detailed overview.

The book contains much sound, and often detailed, practical directions and advice. Thus, once analytical uncertainty has been reduced to one-third or less of the sampling uncertainty, further improvement to the analytical method is of little consequence to overall accuracy. This means that, where sampling errors are high, it is better to use a rapid method of analysis with a high throughput of samples rather than a more accurate but laborious one, thus allowing homogeneity (or degree of heterogeneity) of the product to be established.

Much attention has recently been focused on mycotoxins and accordingly the largest chapter is devoted to them. Because low levels need to be determined in complex matrices, the development of clean-up procedures, such as solid-phase extraction and use of immunoaffinity columns, have received considerable attention. The trend has been to favour GC and high performance LC, but thin layer chromatography remains viable. Immunochemical methods have advanced dramatically, with a shift from radiochemical to enzyme-linked assays. Techniques, such as supercritical chromatography, supercritical extraction, and capillary electrophoresis, are still at the research stage. The necessity for unequivocal confirmation has become more apparent, with GC–MS and LC–MS the techniques of choice.

There are clear parallels with other categories of contaminants. For trace elements, inductively-coupled plasma–MS has revolutionised the situation, combining isotope-specific detection, low limits of detection, rapid analysis times, and muiti-element determination. Currently, the throughput for solid samples (most foods) is limited by sample preparation, which therefore needs study. Isobaric overlaps are beginning to be solved through high resolution. Combination with capillary electrophoresis has led to limits of detection as low as 8 fg strontium.

For pesticides, the focus is on immunochemical methods, mainly for their rapidity, ease of operation, and inexpensiveness, combined with the need for only minimal clean-up. Assays are available for most classes of pesticides. Several are available in kit form, hence protocols tend not to be detailed here.

For paralytic shellfish poisons, the plethora of available methods is reviewed, yet none is considered fully satisfactory.

It is worth noting in passing that eating the soup of toxic clams is a stronger risk factor than eating just the toxic clams, probably due to the presence of partial inhibitors of the poison. One of the snags of the mouse bioassay is that its limit of detection is as high as just under half the most widely accepted regulatory limit of 80 μg/100 g meat. The limit of detection of an *in vitro* tissue-culture assay is 2 μg/100 g, whereas the corresponding figure is 5–10 μg/100 g for an ELISA and 5 μg/100 g for capillary electrophoresis. Lack of international validation of the alternatives, leaves the mouse assay as the arbiter.

For dioxins and chlorinated biphenyls, GC–MS plays a key role, its high resolving power and specificity being invaluable for dealing with the large number of congeners. The methods are based on stable-isotope dilution, automated clean-up giving concentration factors of up to 1000 with analyte recoveries generally exceeding

80%, and a high-resolution (10 000 or more) mass spectrometer operating in the selected-ion recording mode. Regulatory methods have been devised along these lines.

For food-packaging materials, GC–MS, LC–MS, and supercritical-fluid extraction/chromatography are prominent. Modelling of migration of additives from polymers into food has provided a better basis for the construction of food packages from layers of recycled and virgin polymer.

LC–MS has made great strides in the last decade and a chapter is devoted to describing them, and their application to pesticides, veterinary drug residues, mycotoxins, phycotoxins, other natural toxicants, and miscellaneous contaminants. The limit of determination can be below 1 ng and, because of the high degree of specificity, LC–MS, as well as GC–MS tend to be confirmatory methods of choice. For aflatoxin B, the limit is 60 pg, but HPLC with fluorescence can go down to 20 pg in that case. For trichothecenes, supercritical fluid chromatography–MS has achieved 1 pg.

The final chapter emphasises the requirements of official bodies for data that are reliable and can be seen to be reliable. Hence the development of international protocols on internal quality control, proficiency testing, and procedures for collaborative testing of methods of analysis. This, quite properly, is an area of increasing importance, ultimately, through application in international trade, affecting all our lives.

Already the list of chapter headings contains a number of abbreviations. Indeed, so does this review. To be more user-friendly several chapters, but not all, start with lists of abbreviations. These could usefully have been collected together at the beginning of the book or incorporated into the index. The index itself could well have been expanded.

Overall, the book is highly recommended. Even with its great density of factual material, it is remarkably free of errors.

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