botics applications is evident in the work of Kramer and Fuchs. Over the past three to four years they have been assembling a robotic system for reaction development, analysis, and optimization. Their goal has been to develop a system that will allow a researcher to initiate a series of automatically executed organic synthesis experiments. A number of disciplines lie between organic chemistry and laboratory robotics. This project has combined important concepts from mechanical engineering, electronic engineering, computer science, analytical and organic chemistry, to name a few.

Ward, Perozzo and Deschamps are pursuing the automation of protein crystallization experiments. This is a promising new application at the forefront of the intersection of the pharmaceutical industry and biotechnology. They have designed a system that can prepare the hundreds of vapor-diffusion crystal-growing experiments that are required to define the optimum conditions for protein crystal growth. They are working to implement the automated inspection of the crystallization droplets.

The development of 'user-friendly' interfaces for laboratory robotics systems is still a significant bottleneck in the development of applications. Rollheiser, Schmidt, McCampbell and Stelting describe the steps required to make a Zymate system menu driven. They interfaced a second laboratory computer running a custom-designed BASIC program to the Zymark controller to make the system easier to use for nonspecialists.

I think this book is useful and highly recommend it to both novices and practitioners in automation technology. The breadth of applications and the problem-solution orientation of most of the papers make it a good introductory text. Experienced users of laboratory robotics systems may be a little disappointed by the lack of detail. However, they will find many useful ideas in the numerous pictures of custom-designed devices and bench layouts.

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The scientist as author

The Art of Scientific Writing: From Student Reports to Professional Publications in Chemistry and Related Fields, by H.F. Ebel, C. Bliefert, and W.E. Russey, VCH Publishers, 1987, DM 48.00 (softcover), DM 98.00 (hardcover) (xix + 493 pages) ISBN 3-527-26677-1

The Art of Scientific Writing is itself an example of what can be achieved using the tools and guidelines laid down by the authors. The possibilities of the new technology have been exploited to the full to produce an attractive and readable book that will be of benefit to all scientists who wish to improve their writing skills. Although its target group is 'the broader scientific community', the examples in the text are almost without exception drawn from chemistry. This will make it all the more useful for readers of this journal.

In Part I a comprehensive review of the various types of scientific communication is given: student reports, laboratory notebooks, grant proposals, theses, journal articles, editing and writing books. In addition all the important aspects of the publishing process that are of importance to the author are described, including the roles of the various people who will concern themselves with the author's brainchild before it finally appears in print. Handy tips are given for proofreading, a task that many authors are notoriously bad at. Essentially, one has to learn to read what is actually on the page rather than what one knows should be there.

On p. 67 the authors decry the practice of publishing the same results in a full paper that have been previously published in a short communication. On p. 69, the same practice is seen as 'an obligation some researchers fail to fulfill'. In all fairness, this does refer to the special case where experimental details have not been included in the 'short communication'. One way to overcome this would be to have editors ensure that a fixed format, where an experimental procedure section is obligatory, is adhered to.

In their discussion of the incompatibility problems of electronic text-processing no mention is made of the work towards standardisation that is taking place. Applications of ISO 8879, the Standard Generalized Markup Language (SGML), as adopted by the Association of American Publishers (AAP), could solve many of the difficulties. It has proven itself in straightforward text and formulae although the typesetting of SGML-coded tables still requires extensive manual intervention. The basic approach requires identifying all elements of a manuscript and tagging or coding them rather than specifying how they should appear in printed form. Software systems in which the additional markup is hidden from the author are being developed to make the keying-in process as painless as possible. University Microfilms International are currently working with the Virginia Polytechnic Institute to define the essential elements for PhD dissertations so that the latter can be submitted on diskettes, marked-up according to the AAP standard.

In Part II, the materials, tools and methods of scientific writing are dealt with. The instructions given by publishers will often tell the author what he should produce; this section describes how to go about it. There is a discussion of the IUPAC nomenclature, the correct use of quantities, units and numbers, how to produce camera ready quality formulae, equations and figures as well as a section on the preparation of tables. A useful set of appendixes completes this part.

In their discussion of equations and formulae, the authors offer an

explanation of something that has intrigued me for some time: why certain constants such as that of Planck and the speed of light are always typeset in the italics convention usually reserved for variables – as fundamental constants they are the exceptions that prove the rule!

Advice is also given on how to collect and organize references to the literature with a description of card files and electronic database systems. In addition, the authors have developed a set of comprehensive guidelines for constructing references. As there are many strongly held beliefs how this is best done, it is always wise to establish beforehand what the rules of the publisher or university in question are. The authors plead for more standardisation in this area. Many copy-editors and authors who have had to revise complete lists would undoubtedly agree.

It is inevitable in a book of this scope that to many readers much will be self-evident. To those contemplating writing a book, a thesis will be a problem of little concern, unless of course the author is a supervisor of graduate students as well. Apparently there are still people who need to be convinced of the advantages of pc's and wordprocessing. And, of course, nonchemists are not likely to be wildly interested in the problems of chemical nomenclature. However, there is probably something of interest for every scientist and it is a useful reference for writers as well as their publishers.

DEREK COLEMAN

Quantification of analytical chemistry

Literature of Analytical Chemistry: A Scientometric Evaluation, by T. Braun, E. Bujdosó and A. Schubert, CRC Press, 1987. US$ 90.00 (outside the U.S.A., US$ 100.00) (vi + 259 pages) ISBN 0-8493-6591-0

The authors' stated purpose "is collecting and presenting in an organized manner the most pertinent scientometric and bibliometric information dealing with the statistical evaluation of the literature of analytical chemistry". It might be useful at the outset to cite the authors' definitions of bibliometrics and scientometrics in their introductory chapter. "Bibliometrics considers books, periodicals, etc., as formal and tangible documents, its major goal being the quantitative analysis of library collections and services in order to improve scientific documentation, information, and communication activities. Scientometrics analyzes the quantitative aspects of the generation, propagation, and utilization of scientific information to contribute to a better understanding of the mechanism of scientific research."

In a systematic fashion, the authors define and estimate the volume of the literature on analytical chemistry in chapter 2 and discuss the growth of this literature in chapter 3. An important correction, taking into account the early literature, leads to revised doubling times of the worldwide body of chemical and analytical chemical literature of 14.5 and 13.9 years, respectively. The authors attempt to answer the question to what extent this growth reflects the growth of analytical knowledge. It is the human side of the scientometrics, *i.e.* scientific activity, productivity, and progress of scientists that the authors explore in the book to considerable extent in addition to data on the literature itself.

Chapter 4 defines the notions of obsolescence and reference half-lives of analytical chemistry literature, and chapter 5 classifies that literature with respect to countries, language, subfields, topics, and techniques. Chapter 6 analyzes in detail the analytical chemistry journals, including such aspects as citations, interrelations, influence, peer review, gatekeeping patterns, publication speed, and various correlations among them.

As an example of a 'scientific revolution' within a field, the development of continuous flow analysis (CFA) followed by flow injection analysis (FIA) is described in chapter 7. Chapter 8 addresses the subject of authors of analytical chemistry papers in terms of their productivity, citation analyses, ranking of papers, and professional connections. Chapter 9 reports on a case study, trends and patterns of the literature on prompt nuclear analysis.

The final chapter presents scientometric indicators for cross-national comparison of publication productivity in and of citation impact on analytical chemistry between 1978 and 1980. These indicators are based on papers selected from 247 chemistry journals, including 22 analytical chemistry core journals. Papers were assigned to countries by the nationality of their first author according to the mail address. In addition to the various global statistics, the individual scientometric indicator values are given for each of 36 countries from Australia to Yugoslavia. This accounts for a relatively large portion of the book (72 pages).

The placement of tables and graphs in relation to the text where they are explained and commented upon is not always conveniently close. For instance, the figures displayed on pages 232-240 are discussed on pages 155-156. A minor error occurred on page 5 in the second paragraph: Baker has been publishing a report every five years, not 'five reports annually'.

The book provides a rarely seen global perspective on the publication activities of analytical chemists and on trends and progress of analytical chemistry. It allows a researcher, a publisher, or a group in a given country to lean back and to see where they or their research topics are in relation to the overall analytical chemistry activities. Some results may be