length, and concludes with a series of appendices, an extensive list of references and an index. The first four chapters deal with the basics of the subject, covering the origin of tracks, methods of observation and analysis, the principles of the dating method, and the annealing of tracks. The non-specialist may well find this part of the book hard going, but it has the merit of bringing together, in one place, a comprehensive collection of background information that is essential for the understanding of fission-track data studies.

The final three chapters are principally concerned with the applications of fission-track dating. Chapter 5 considers the general principles, Chapter 6 reviews the range of mineral species that have been used in such studies, and the final chapter includes several summary, geological and archaeological case histories. The wide range of practical uses to which fission-track dating can be put, and the large number of minerals that potentially can provide useful information, will come as a surprise to many non-specialist readers. Estimates of uplift and erosion, dating fault movements, thermal history of basins, age and origin of ore deposits, and dating of archaeological artifacts are just some of the topics considered. The potential uses of, mostly commonly occurring, minerals are considered. In view of the present-day, routine use of apatite fission-track studies, as an aid in hydrocarbon exploration, it is surprising and regrettable that investigations of this type are given such relatively little prominence. This may reflect the authors' own research bias, or they may have felt that such applications were already widely known and documented. What is clearly demonstrated by the book, however, is the wide range of other possible uses, combining palaeogeothermometry and geochronology, and the great, largely untapped potential of the fission-track dating method, particularly in the current underuse of minerals other than apatite.

One of the main values of fission-track studies is their ability to determine temperatures at dated times in the past. The conversion of palaeotemperatures to the palaeodepths and palaeothicknesses, that geologists commonly find more useful, is an area where fission-track workers have come into some conflict with geologists, as published estimates of palaeodepths are commonly greater than can be sustained from other information. Unfortunately, one will find little hint of such difficulties, or any discussion of the related inherent problems, in the book. The authors seem happy to project linear geothermal gradients from high thermal conductivity crystalline basement, or well compacted sedimentary rocks, into eroded cover sequences, even though these may include poorly consolidated sediments of significantly lower thermal conductivity. This, of course, is not a criticism of the fission-track dating and palaeotemperature estimation method itself, which otherwise is well served by this book, but rather indicates that the values obtained by such techniques need to be interpreted and applied with some care and caution, in the context of all the relevant information.

As the uses of fission-track dating expand, and its value becomes more widely appreciated, more and more earth scientists and archaeologists will seek a working knowledge of the principles and techniques of the method, so that they can fully evaluate, and give the best interpretation to, the palaeotemperature and geochronological data obtained. *Fission-Track Dating* by Wagner and van den Haute is likely to be the first place they will look for that knowledge. It should serve as a valuable, if not essential, reference source to the geological and archaeological communities for a good number of years to come.

D. HOLLIDAY

Sinkankas, J. *Gemology: an Annotated Bibliography*. 2 vols. Metuchen, New Jersey 353 (The Scarecrow Press Inc.), 1993. xxxiii + 1179 pp. Price: £179.50.

This is a remarkably comprehensive bibliography of gems and precious stones, containing 7458 entries, predominantly of books but also shorter articles of significance from 1500 onwards. In the foreword Richard T. Liddicoat Jr. draws attention to the more than 40 years of experience that John Sinkankas has brought to compiling this work, and to the unique assessment of every item that he saw. A Preface of 27 pages outlines the kinds of information recorded in the entries with examples of the formats, and discusses the languages, outlines the symbols and abbreviations, and lists the references consulted.

All important works are listed with remarks on bindings and other physical features that will enable librarians, researchers and collectors to identify a particular edition or state. The scope of the bibliography is based on the size and relevance of the subject matter. Besides gems and gemmology, works on engraved gems, crown jewels, curious lore and biographies are entered, but, in general, items of less than 15 pages are not included.

Entries are by author in alphabetical order, and after vital dates and for some, a brief biographical

sketch, the entry number and year of publication is given, followed by title, title notes, collation, content and assessment in terms of content, accuracy and importance, sometimes augmented by the pertinent lines from a review.

In effect it is a bibliography with summaries very much in the style of *Mineralogical Abstracts*. Opening the volume is like opening the door to a gem library, with the facility to survey a vast range of books without the inconvenience of travel. Not only are the details given for pursuing further research in the original books, but also, each summary and critical assessment is a fair guide to what will be found. The summary is sufficient in fact to confer that other great benefit of the library, namely the opportunity to browse, make new connections and advance by association of ideas.

I have often felt that the two or three pages devoted to gemstones in *Mineralogical Abstracts* have in some sense lacked an anchor or a reference point. This bibliography is like a foundation stone for the gemstones abstracts, and together they provided a much more complete picture of the science than was ever available before.

For readers interested more specifically in historical mineralogy, the bibliography is particularly useful for the works published before the end of the 19th century. Some of these, such as Hintze, are in fact primarily mineralogical, where the information on gems forms a minor but significant part.

In any gemmological education programme with an historical content, the bibliography should form an essential part. Firstly, the instructors will now, with reasonable confidence, be able to place developments in gemmology into a reliable context; and secondly, the students will now have an excellent basis for any project they attempt whether it concerns research on gem species or variety via the excellent index, or whether they need to investigate current activity through the List of Serial Publications.

The volumes are illustrated throughout with reproductions of title pages or relevant plates from items in the adjacent text, which contains remarkably few typographical errors. The publication of the bibliography is a major event in the history of gemmology, and every library that has a section devoted to gems, jewellery or mineralogy should have a copy, and every serious gemmologist should either have one or access to it.

R. R. HARDING

Note: The review on page 556 was provided by G. D. Price, not by R. J. Price.