BOOK REVIEWS

Dunning, F. W., Garrard, P., Haslam, H. W. and Ixer, R. A., Eds. *Mineral Deposits of Europe*. Volume 4/5: *Southwest and Eastern Europe, with Iceland*. Oxford, London and Northampton (The Institution of Mining and Metallurgy and The Mineralogical Society). 1989. xv + 454 pp., 192 maps and sections. Price £50.00.

This volume completes the series of joint publications on the mineral deposits of Europe organised by the Institution of Mining and Metallurgy and the Mineralogical Society. National authors have provided in-depth accounts of the mineral deposits of France, Luxembourg, Spain, Portugal, Italy, the European part of the USSR, Turkey and Iceland. The result is an authoritative description of the mineral occurrences and ore genesis of this area and a valuable reference to mining history, production, ore grade and reserves. Because of national differences in development or outlook there are contrasts in emphasis and content between the various chapters. This does not detract from the value of this volume which describes areas noted for the complexity of their geology and the fascinating variety of mineral commodities and styles of mineralisation.

Introduction to Southwest Europe. J. Agard and A. Emberger have written an introduction to the chapters covering France, Luxembourg, Italy, Spain and Portugal. There is a clear statement of the principal mineral deposits and production of the area with a historical comparison. The authors have tried to draw together a summary of the geological and tectonic units of SW Europe. This is a difficult task due to the large number of local formation names. The result is highly successful as a synthesis but makes for difficult reading where long lists of formation names or deposit names are used. The text really comes into its own when related to the maps in this and the other chapters. The best way to do this is to photocopy the relevant maps so that they can be compared line by line with the text. A better layout of the chapter or a fold-out map would have helped this chapter significantly. The geological summary leads to a synthesis of the mineral deposits of the area by geological provinces and tectonism. The authors conclusions here would have been greatly helped by a correlation chart showing formation names and deposits in the respective areas against geological time. Their detailed comparisons, across national boundaries, provides useful insights into the complex and extensive metallogenic provinces of the area.

France and Luxembourg. J. Bouladon has divided France and Luxembourg into six distinct tectono-metallogenic zones on the basis of the gravimetric map of the area. Each zone is described in turn and the occurrence of the various commodities detailed for each zone. The author achieves this remarkable synthesis without losing sight of the need to appreciate the resources of the area as a whole. Antimony, for example, occurs in three of the six zones and the individual occurrences are described separately by zone. Meanwhile, in the description of Zone A (Armorican Massif and Limousin), 31 antimony deposits are tabulated from the main occurrences throughout the area. Details supplied in this tabulation include date of last working, production, grade and 'probable reserves'. This degree of detail and correlation is provided for each of the many other commodities. The mineral occurrences are liberally illustrated with comprehensive maps and wrought into a description of metallogenic development. The author has clearly been able to draw on the extensive National Inventory of Mineral Resources held by the BRGM for the details included in this chapter.

Spain. The mineral deposits of Spain are described by F. Vázquez Guzmán in 92 pages. Spain has a significant mineral wealth with production spanning one to three millenia for a range of metals including copper, gold, silver and mercury. Non-metallic commodities include gypsum and fluorspar. Many of these deposits are, or have been, world class suppliers including the pyrite belt in Huelva and Sevilla provinces and the remarkable mercury production from Almaden in Ciudad Real. The description is very clear and is organised by each of the many commodities produced in Spain. There is a clear statement of the production figures which form a valuable point of reference, although there may be too much detail here for a summary. The description of the occurrence, extraction and processing of each commodity is clear and precise.

Portugal. Description of the mineral deposits of Portugal by D. Thadeu concentrates extensively on the geological and structural controls on deposition. Details of existing and recent mines are given but the descriptions cover only the geological and structural controls and the mineralogical result. Maps or sections of the mine areas are generally missing apart from the few largest deposits and these are rather idealised and sketchy. Details of processing or production are generally omitted as are details of old mining areas and mineral occurrences. The details of the geological and structural background of the country is authoritative but largley repeats material this author has already published. For the student of mineral deposits there are good descriptions of significant deposits. For the explorationist the absence of reference to other mineral showings means that one cannot use this contribution to appreciate the mineral wealth of the rest of Portugal.

Italy. In contrast, the description of the mineral deposits of Italy by P. Zuffardi commences by categorising 144 metallic and 142 non-metallic deposits in terms of location, host rocks, size, mining history and commodity. These data are further summarised in terms of Italian reserves and the production of the various commodities. Regretfully, the maps showing the geographical distribution of these deposits and their metallogenic provinces are reduced to a size which obscures significant details. The deposits of Italy are described within 8 metallogenic areas and further subdivided by commodity. The geology and structure is comprehensively described for a country with a complex geological history.

The European part of the USSR. V. I. Smirnov has described the mineral deposits of the European part of the USSR, an area stretching east to the Caspian Sea and including, for geological completeness, all of the Urals. This area includes the Ukraine and Moldavia, Georgia, Azerbaijan and Armenia in the south, Estonia, Latvia and Lithuania in the north as well as White Russia and the Great Russian Plain extending from Moscow to the Urals. Other areas of current interest for their mineral deposits such as Uzbekistan lie further to the east and are not included. The present openness, accessibility and resulting interest in this area could not have been considered remotely possible when this chapter was written, yet it provides an excellent basis for study of the area in the new circumstances. That the chapter was written at all is a tribute to the author (sadly deceased) and the editors of this volume. The chapter reflects the time in which it was written and, therefore, mineral statistics of production and reserves are lacking except for iron ore and the many good maps and sections contain sound geological information but, often, not the means to locate them. The metallogeny is described in the context of a geosynclinal model. This may have less effect on the interpretation of the geology of the plains but it has clearly affected interpretation of the Urals. The region is divided into structural areas independent of the National boundaries and the occurrence of each commodity is described within these areas. There is considerable emphasis on iron ore and bauxite deposits. These are covered in some detail with many examples, clear maps and useful statistics. Copper, nickel and chromium deposits are mentioned in less detail whilst gold and platinum deposits are included only by outline accounts of widely acknowledged deposits. There is little here for the student of non-ferrous mineral deposits and nothing for the explorationist. Despite these criticisms, this chapter is an extremely valuable contribution. It provides an excellent point of reference to an area of considerable current interest.

Turkey. I would like to know much more about the geology and mineral deposits of Turkey than can be provided in the 12 pages which Galib N. Sağiroğlu has contributed. The short contribution is compensated by an excellent and informative metallogenic map of the country. This map is spread over two pages and contains a lot of fine detail which becomes clearer with the use of a magnifying lens. A great deal of synthesis of the geology has clearly been accomplished in order to prepare the map and this synthesis is continued by the excellent survey of mineral occurrences. Many deposits are mentioned but none are described. The clarity with which the deposits are summarised is not supported by the map. This records the presence of many mineral occurrences but contains much fine detail which precludes attempts to form a general view.

Iceland. The Miocene and younger rocks of Iceland contrast strongly with the Precambrian rocks with Hercynian and Alpine deformation which have been a significant part of other chapters of this volume. The mineral deposits are described by Freysteinn Sigurðsson and Helgi Torfason. With the exception of a little titanium and showings of chalcopyrite, these deposits are principally non-metallic. Sulphur, salt and pumice or perlite for light-weight construction are the main products. Geothermal energy is a significant commodity and the authors have provided a clear and informative summary of its distribution and use.

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