

BOOK REVIEW

COALBED METHANE AND COAL GEOLOGY: R. Gayer and I. Harris (Editors), Published by Geological Society, London, Spl. Publ. No.109, 1996, 344p.

Geological Society, London has published this thematic volume at a time when coalbed methane (CBM) exploration is still in its nascent stage except in USA where it has made significant progress. CBM resource throughout the world is supposed to be many times greater than the collective resource of all known conventional gas fields. Coal plays the role of source rock as well as reservoir for coalbed methane. Gas migration is not allowed because of low permeability and at the same time coalbed acts as an effective reservoir.

The book contains 24 scientific articles and is divided into three sections – 1. Coalbed methane resources in USA and Europe, 2. Coal as a reservoir rock, and 3. Geological studies related to coalbed methane. The first section has seven papers. Murray examines coalbed methane in USA with analogues for world wide development. Falls discusses five Variscan foredeep coal basins of Germany and Great Britain and has compared coalbed methane potential with the productive Black Warrior Basin in Alabama (USA). McCarthy et al. elaborate geological controls on CBM prospectivity in a part of the North Staffordshire Coal field, UK. Coalbed methane prospectivity is assessed on the basis of mapping of coal occurrence, coal rank, gas content, gas-in-place, structure, face cleat and *in situ* stress. Knight et al. discuss coal thickness distribution in the UK continental shelf. Juch makes an assessment of West German hardcoal resources in relation to coalbed methane while Freudenberg et al. assess factors governing coalbed methane distribution in Ruhr district, Germany. In addition to coal petrology, geochemistry and basin configuration, subsequent phases of erosion/exposure and reburial are seen to play significant role in evaluating economic potential of CBM. Marshall et al. explore opportunities for development and utilization of coalbed methane in three coal basins viz. Donetsk, Kuznetsk and L'vov-Volyn basins of Russia and Ukraine and list most attractive options for utilization of CBM for generation of heat and power.

The second section having 10 papers forming the main part of the book deals with coal as a reservoir rock. Eight papers stress the importance of permeability and factors affecting it like development of cleat, cleat mineralization, fractures, matrix shrinkage, triaxial stress conditions etc. Gayer et al. discuss coal cleats in the Upper Westphalian sequence of South Wales Coal Basin, implications for the timing of maturation and fracture permeability. Hathaway and Gayer assess thrust related permeability in the South Wales Coal Field. Pattson et al. discuss nature and origin of fractures in Permian coals from the Bowen Basin of Australia. Faraj et al. elaborate on cleat mineralization of Upper Permian Baralaba/Rangal coal measures in Bowen Basin whereas P. Gamson et al. present studies on coal microstructure and secondary mineralization and their effect on methane recovery. Harris et al. describe enhanced methane desorption characteristics from South Wales anthracites affected by tectonically induced fracture sets. Levine has presented a model study of the influence of matrix shrinkage on absolute permeability of coal bed reservoirs. Konečhry and A. Kožušniková have measured gas permeability of coal and clastic sedimentary rocks under triaxial stress conditions. Dawson et al. discuss characterization of anthracite and Kožušniková investigate relationship between hydrogen content of coal and lithological characteristic of rocks overlying the coal seam.

Articles presented in the last section have little reference to coalbed methane. Lester et al. discuss problems associated with the use of image analysis in determining microlithotype composition. Šykorova et al. investigate petrological and spectroscopic characteristics of Bohemian and Moravian coals and their proneness. Nowak presents a petrological coal seam accumulation model for the Zacler Formation of the Loer Silesian Coal Basin, Southwestern, Poland. Brzaa

et al. discuss minerals and major elements in density-separated coal fractions, whereas Kostova et al. study mineralogy, geochemistry and pyrite content of Bulgerian subbituminous coal of Pernik Basin. Mclean and Murray describe sub-surface correlation of Carboniferous coal seams and interseam sediments using palynology. Karayigit et al. discuss coal geology, chemical and petrographical characteristics and implications for coalbed methane development in Sorgun and Sulova Eocene basins, Turkey.

The book is rich in illustrations having 256 figs. and 71 tables. 665 references to coalbed methane and coal geology add to its value. Typographical mistakes are very few. The quality of printing is of high standard. This book will be a source book of information to geologists engaged in exploration of CBM and also others engaged in coal and other conventional hydrocarbon-resources besides teachers and students. The price of the book is beyond capacity of individuals but must find a place as an important reference book in geological libraries.

*Department of Applied Geology
Indian School of Mines, Dhanbad - 826 004*

ATUL KUMAR VARMA

THE NATURE OF DIAMONDS, George E. Harlow (Ed.), Cambridge University Press, 278p, Price: Paperback Edition £19.95

This book provides a great deal of information about diamonds in a concise manner. Being a dedicated curator in the American Museum of National History, G.E. Harlow, the editor of the book, is well informed about all aspects of this remarkable mineral. He has done an admirable job by inviting experts to write on important aspects of diamonds in simple words, cleverly avoiding technical jargon. The list of contributors includes eminent scientists, prospectors, curators of museums, jewellers, merchants and scholars.

Chapter 1 (G.E. Harlow) deals with the structure, physical and optical properties of diamonds. The nature of colour is discussed in Chapter 2 (E. Firtsch). Unlike most other minerals, colour in diamonds is on account of unusual impurities and colour centres. Band-gap colours due to nitrogen and boron impurities; colour centres related to neutral vacancy (GR centres), distribution of nitrogen atoms around vacant sites (N_3 , H_3 , H_4 and N-V centres) and hydrogen-related defects; fluorescence and phosphorescence in diamonds; cause of colour change in 'chartreuse' diamond as well as the strange chameleon diamond; colour due to inclusions; and irradiation and other colour enhancement techniques employed on diamonds have been described. Chapter 3 (M.B. Kirkley) gives an account of the origin of diamonds and earth processes. Occurrence of diamonds from mantle-derived rocks and their characteristic inclusions; use of carbon isotopes in determining ancient harzburgitic diamonds in younger kimberlites and lamproites, eclogitic diamonds in contemporaneous eclogites; finding of diamonds in ultrahigh-pressure (UHP) terranes of Kokchetav massif; and finally diamonds in meteorites and diamonds from the impact of meteorites are described crisply. The chapter also mentions of kimberlite and lamproite craters. Chapter 4 (A.A. Lavinson) narrates diamond sources and their discovery starting from antiquity to 1730, the year upto which India dominated the diamond scene. Brazil's takeover from 1730 to 1870; subsequent South Africa's astounding ascendancy; and more recent discovery of numerous diamond fields in mid- and late-20th century in Russia and Australia are given good coverage. The possible supremacy of Canada in the near future is discussed briefly.

Chapters 5,6,8,9 and 10 deal with diamonds and diamond jewellery from early historic times to the present day. Chapter 7 gives an account of the value of diamonds in English literature. A connoisseur of diamond jewellery would find reading these chapters extremely fascinating.