Stach's Textbook of Coal Petrology

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The title of this book is a tribute to Professor Erich Stach of Krefeld, Germany, who is one of the founding fathers of modern Coal Petrology. In his original Lehrbuch der Kohlenpetrographie he showed, with many illustrations, the great merit and facility of examining the heterogeneity of coal with the aid of polished sections and oil immersion objectives. Great strides have been made in coal microscopy since publication of the first edition in 1935. The current version is a complete new work by a number of authors of international repute, who have made contributions in their specific areas of expertise. In addition, the new edition is published in the English language and, like the original textbook, is profusely illustrated with excellent photomicrographs and diagrams.

The book is a comprehensive survey of nearly all aspects of coal petrology and since it is at present the only one of its kind, it most certainly fills an important gap in fundamental scientific literature. It deals with the subject matter in five chapters, which have been written under single authorship or by several authors, with each contributing individual parts. The chapters have the following titles:
1) Introduction and historical survey (4 p.);
2) Fundamentals of coal petrology (60 p.);
3) Origin of the petrographic constituents of coal (74 p.);
4) Methods and tools of examination (73 p.);
5) Applied coal petrology (80 p.).

Chapter 2 discusses the origin of coal and the development of coal facies in relation to different peat-forming environments, and how the original vegetable material changes into coal is dealt with under diagenesis and coalification. Of interest also is a comparison between coalification (leading to coal formation) and bituminization (leading to oil generation).

The recently developed views of M. Teichmüller regarding the formation of oily substances during the coalification process are briefly referred to. A large part of Chapter 2 is devoted to detailed descriptions and terminology of the macerals, the micro lithotypes and the lithotypes of coal as defined by the International Committee on Coal Petrology.

In Chapter 3 the individual coal constituents are related to botanical entities and to specific conditions of peat formation. The alteration of these constituents during the peat, brown coal and hard coal stages is mentioned and illustrated with photomicrographs.

Chapter 4 gives an excellent survey of the methods used in preparing the coal for microscopic study; also described are the procedures used for the quantitative maceral, microlithotype, and mineral matter analysis as well as for rank determinations. The latter are carried out by vitrinite reflectance measurements, which are dealt with in considerable detail. A section on coke microscopy is included also.

For those unfamiliar with coal petrology, the last chapter of the book may well be a revelation. It shows how varied are the applications of these investigations. They range from actual coal technological processes, such as coal preparation, and the evaluation of suitability of coking coals and their blends for the production of metallurgical coke, to geological applications. In the latter field, the value of coal petrology for seam correlations and for oil and gas prospecting (through vitrinite reflectance measurements) are discussed in some detail.

This book has covered the subject matter in a most admirable manner and the authors can be congratulated on a job well done. It is modern in concept, contains an extensive and up-to-date bibliography, and can be recommended for both college students and professionals who desire more information on this comparatively new field of scientific endeavour. Only the high price is considered a disadvantage for individual purchases.

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The largest chapter in the book explains the action of water and dissolved salts in stones and the effects of chemical weathering especially in relation to the porosity and permeability of the material. The following topics are discussed: sources of moisture, moisture transfer mechanism in capillary systems of stones and masonry walls, and origin and behaviour of salts in capillaries. The chapter dealing with the effects of plants and animals stresses their chemical action. Interesting is the finding that weathering conditions are strikingly similar to those in urban areas.

Fire and frost action are also discussed. The processes which may produce disruption of stones due to frost action are: volume increase occurring when water changes to ice, displacement of water away from the advancing ice front, conversion of pore water into ordered water at the surface of solids, and volume increase due to the unfrozen water at temperatures below freezing. The environmental changes increase the damage and cracking of rocks due to frost action.

The book is well illustrated with photographs and graphs. The bibliographies, conveniently located at the end of each chapter include English and European literature up to 1970. The appendices contain a useful table of properties of some rock forming minerals but should mention the reaction between dolomite and high alkali portland cement. The specifications for stones published by the American Society for Testing and Materials should be updated to include the recent specification for concrete aggregates (ASTM C33-74a) which contains the concept of varying weathering conditions for different types of concrete constructions in different regions of the U.S.A. Conversion tables and a glossary of geological and technical terms are included.

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