

# ***The Biomarker Guide: Interpreting Molecular Fossils in Petroleum and Ancient Sediments***

by **Kenneth E. Peters and J. Michael Moldowan**, ISBN 0-13-086752-7; Prentice Hall, Englewood Cliffs, NJ, 1993; 363 pgs.

## Review by **Christopher G. Kendall**

This is a handbook for biomarkers and their application to hydrocarbon exploration and exploitation. The authors have aimed this book at a diverse audience, such as students, exploration geologists with a geochemical background, and experts in the field. I differ in believing that this book is not for the novice of inorganic geochemistry or geology, nor could I recommend this book to the geophysicist who has never worked with biomarkers. However, this is a clear and well written text that is aimed at the hydrocarbon industry. It is so tightly organized and detailed that it is not an easy read for the novice, though it is a very fine reference book. For those in the field of biomarkers or those who need to refer to a particular compound or process for analyzing biomarkers or have a need for a short description of that process or compound, this book will be useful.

The text is broken down into 4 chapters: (1) Introduction to Biological Markers, (2) Description of the Fundamentals of Biomarker Separation Analysis, (3) Guidelines for Interpretation, and (4) Discussion of problem areas and further work.

The book begins by systematically reviewing the authors' current understanding of biomarkers. It defines what biomarkers are and how they may have formed, with specific emphasis on their role in petroleum geology as geochemical tools for correlation and determination of the thermal or maturational history of source rocks and the hydrocarbons associated with petroleum reservoirs. The introductory chapter also discusses a little organic geochemistry, the nature of organic bonding, optical activity, stereochemistry and lists many of the compounds associated with biomarkers. In this introduction, as in the rest of the text, the chapters are broken down into sections beginning with key words or sentences and italicizing important information associated with that particular section which needs further explanation. Important or key words are printed in bold throughout the text, so a person scanning the text can easily find what they're looking for.

The Second Chapter, Fundamentals of Biomarker Separation Analysis, begins with a discussion of how Chevron's Biomarker Laboratory is organized and how specialists are grouped in teams to cover various topics including chromatography, biomarker and GCMS skills, the geological quality of the samples and familiarity with conventional geochemical parameters, etc. There is a general description of how rock samples should be prepared and cleaned up, how liquids should be treated, how gas chromatography and mass spectrometry work both from the equipment end and what the expected output of such studies might be. There are small sketches of the equipment used and a very nice series of tables of the types of GCMS analysis. Important points are highlighted in bold letters. The sections have numerous headings and contain information that is almost annotated in form. The text is very much to the point.

Chapter 3 is the longest chapter of the book and deals with the guidelines to interpretation, mainly explaining how to correlate source rocks, how to use biomarkers for correlation with their sources and how one can interpret depositional environment, maturation, and biodegradation. Much of this chapter is laid out according to the significant use of a specific compound. For instance, botryococcane is described in a short descriptive section in bold letters with emphasis on how it might be applied to understanding the depositional setting of a particular source rock. This is followed by a more extended description underneath. In this chapter there are also discussions of topics including vitronite reflectance, thermal alteration

index, Van Krevelen diagrams, etc.

The final section of the book and the most interesting to the researcher, is a description of areas that require further research including the application of biomarkers to migration, the kinetics of petroleum generation, correlation, depositional environments and age determination. In this section, the authors list what they consider to be important topics for research and offer to help those who might be interested in these topics. The book ends with a full and complete glossary with a good set of recent references and an index.

This book will be extremely useful to the expert biogeochemist and probably is an important reference for others with more than a passing interest in biomarkers. The book should be purchased for the libraries of universities or oil companies. It's particular utility is that it contains information about particular biomarkers or techniques applied to understand that biomarker so it can be used for correlation or to understand the geochemical history of the rocks that are being studied.

This is not the sort of book to have at your bedside before you sleep, but certainly should be on the shelves of most professional geochemists. The book is packed with facts and is most complete. The typesetting is clear, the figures are well drawn and the book has been professionally put together. For those of you who need a text on this topic, this probably is the book for you.