Introduction

The first volume of *Biopolymers* deals with the most recalcitrant representatives of biological macromolecules: lignin and melanin as well as their bio-geochemical conversion products humic substances and coal. From the ecological point of view, they are of general significance for the global carbon cycle because they represent gigantic reservoirs of bound organic carbon. Moreover, among them are substances of immense economical importance. Thus, coal represents the largest source of fossil fuels on earth and could again become the main resource of raw materials for the chemical industry when the crude oil will have been exhausted. In the same respect, lignin as a fairly unused renewable raw material will also gain attention by the industry. Humic substances in soil and water represent the largest pool of organic carbon in the biosphere being three times higher than that of carbon dioxide in the atmosphere. Not least, humic substances significantly influence soil fertility and they are necessarily required for plant growth. Several chapters of the present book describe the various functions of the mentioned biopolymers in nature and also their applications in economic processes.

The structural complexity of lignin, melanin, humic substances, coal and related compounds has continuously challenged the ingenuity of researchers to develop suitable methods for their characterization. This volume describes the most important of these methods in special chapters. The biopolymers mentioned have complex aromatic structures in common and the constituents are more or less randomly covalently linked, mostly via non-hydrolyzable bonds. These structures are difficult to degrade by microorganisms. Only oxidative enzyme systems, which form radicals inside the macromolecules are capable of attacking them efficiently. In several chapters of this book, the degradative principles underlying the disintegration of aromatic polymers are discussed.

It is not possible to cover all aspects related to lignin, humic substances and coal and to consider all results obtained over the last years in a single book. But the volume editors hope that the relevant data and knowledge have been compiled and that this volume of *Biopolymers* will give sufficient and elucidating insight into the chemistry, the genesis and the biological and economic significance of these complex natural substances. Not least, the book should stimulate future research in this field.

From the onset of this endeavor, it was obvious to us that the range of topics we wished to include virtually necessitated our drawing on the expertise of a considerable number of scientists. We were aware that choosing a multi-author format entailed risks that might negatively impact on the uniformity of the book and on the timetable for its completion. On
In conclusion, viewing this book in total, we believe that its overall quality and usefulness vindicate our decision to ask colleagues from all over the world to contribute to this project. Their willingness to impart their knowledge to a broad scientific public is gratefully acknowledged. The expertise, enthusiasm and the costly time which they devoted to their chapters, although all of them have many other obligations and duties, is highly appreciated. Last but not least, we would like to thank WILEY-VCH for publishing *Biopolymers* with their customary professionality and excellence. Special thanks are due to Karin Dembowsky and her colleagues; without their constant effort the book could not have been published.

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M. Hofrichter
A. Steinbüchel