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PATHOLOGICAL MEMBRANES

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Preface

A series of lectures entitled "Pathological Membranes," presented at the University of Pennsylvania School of Dental Medicine, provided the basis for this volume. These lectures were sponsored by the following pharmaceutical companies:

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with minor contributions from additional sources. Therefore, I express my most sincere gratitude to these sponsors for their support.

Although the volume was to include coverage of as many as possible of the various diseases that are accompanied by membrane alterations, the paucity of sufficiently reliable information on certain membrane disorders limited the realization of this aim. Reviews on such disorders will be forthcoming when continued research brings a better understanding of the nature and significance of the membrane changes observed therein.

Accordingly, this volume reflects current knowledge of the pathology of membranes. Because most research has focused on membranes of malignant cells, many chapters are devoted to this topic. A few chapters report investigations on pathological alterations of erythrocyte membranes, including changes in these membranes during aging. The remaining chapters deal with more specialized topics, such as opiate receptors, physiochemical measurements of pathological changes, shedding of bacteria and eucaryotic cells under normal as well as pathological conditions, and the appearance of irregular immunogenic markers on some cell membranes.

Although the coverage of topics presented here cannot reflect the full range and scope of this field, it is hoped that this volume will convey the importance of pathological membranes, attract new investigators, and serve to intensify ongoing research.

Finally, I would like to thank my wife, Anne Nowotny, and Mrs. Dorothy Shanfeld, Miss Grace Nejman, and Dr. Eniko Kovats, for editorial assistance.

A. Nowotny

Philadelphia

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Chapter 1

Shedding Bacteria

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I. INTRODUCTION

The dynamic state of eucaryotic cell membranes is well established, and it is obvious that the phenomenon of active transport through cell envelopes, excitability, receptiveness, biosynthesis, and a number of other essential biological functions of the cell require a complex and highly functional boundary which not only keeps the subcellular organelles neatly together but actively participates in their dynamic functions. These observations and assumptions seem to be applicable, although in a more restricted fashion, to procaryotic cells.

The bacterial cell wall appears to be less dynamic and much more rigid than the membrane of eucaryotic cells. Its major role seems to be the maintenance of the shape of the bacterium (Salton, 1960). Under the cell wall lies the cytoplasmic membrane rich in enzymes, other proteins, and lipids. This plasma membrane resembles to some extent the membranes of eucaryotic cells, both structurally and functionally. This is the site of transport regulations, biosynthesis, and assembly of macromolecules, including components of the rigid cell wall.

In spite of the relative inertness of the bacterial cell wall, it would be fallacious to consider it as a stationary, passive container of the highly dynamic cellular apparatus. It has appendages with important functions. It has layers with great significance in disease and in health, and, above all, these and other components of the cell walls are released not only under pathological but also under apparently normal conditions, which