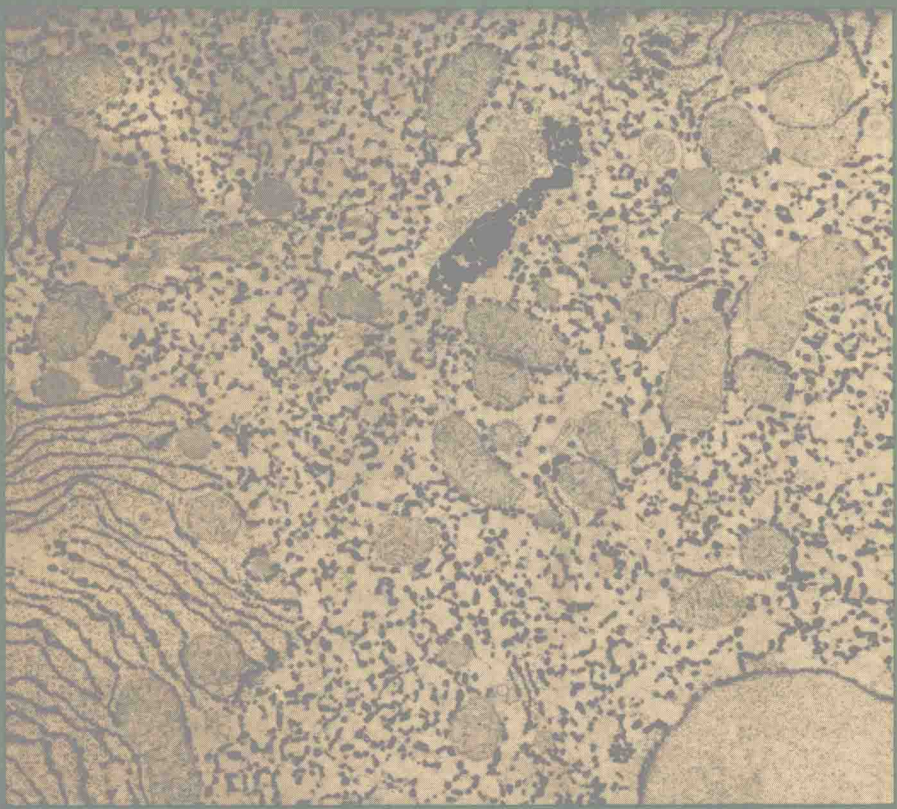
POSITIVE STAINING FOR ELECTRON MICROSCOPY



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Positive Staining for Electron Microscopy

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To My Friends
For Their Compassion—
the only universal virtue

PREFACE

In general, the available information on the chemical reactions between staining reagents and cellular ligands is meager. Moreover, this information has been scattered, mostly in scientific journals. This paucity of information is responsible for the "staining controversies" such as the staining specificity of phosphotungstic acid. In the absence of such information, it is difficult to achieve correct interpretation with regard to the location, structure, chemical composition, size, concentration, and function of various cell components.

Information on the chemistry of staining, however, has been emerging steadily because of the efforts of many scientists from various countries. As a result, we now know, at least in some cases, the precise chemical reactions involved between specific staining reagents and tissue ligands. Positive staining has already provided considerable information on the shape and size of molecules, although little is known concerning the distribution of chemical groups within them. Improvements in specific staining and the use of high resolution electron microscopy are expected to facilitate the resolution of many problems in molecular biology. Even a few years ago it would have been almost impossible to write a comprehensive book on positive staining for electron microscopy, although coordination complexes from a chemical point of view and in model systems have been studied extensively over the past century, and several excellent monographs deal with them. Today, sufficient information on various aspects of staining is available, which warrants the publication of this book.

This book presents what is known definitively, the gaps in our current knowledge, and ideas in progress. In the case of a controversy, an attempt has been made to present both sides. Alternative procedures and potential research areas also are pointed out. It is my hope that with this approach, the reader will better appreciate the advantages as well as the limitations and uncertainties encountered in interpreting the data on staining. I also hope that the information presented here will provide stimulation and groundwork for deeper study and understanding of the chemistry of staining.

The book provides in detail almost all the available methods of staining for electron microscopy. No attempt was made to include procedures which belong exclusively to the area of electron microscopy of enzymes, since a multivolume treatise on this subject is being published by the author. Although the majority of the methods presented have been tested for their reliability, they are subject to modifications depending upon the objective of the study. The instructions for the preparation of staining solutions and buffers are straightforward and complete, and should enable the readers to prepare their own specimens without outside help. It is suggested that the entire procedure be read and necessary solutions prepared prior to undertaking the processing. An exhaustive list of references with complete titles is provided, as are full author and subject indexes.

This book is addressed primarily to those interested in electron microscopy, but information on the chemistry of staining should also be helpful to those involved with the techniques for light microscopy. The book is intended not only for teachers and scientists but also for students, technicians, and research workers not familiar with staining techniques.

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M. A. HAYAT

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