Voltage and Patch Clamping With Microelectrodes

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Preface

The purpose of this book is to bring under one cover a reasonably comprehensive treatment of the various methods of voltage and patch clamping with microelectrodes. These clamping techniques are among the most powerful methods available for studying the fundamental events of cell membrane excitation. The recent explosion in the use of microelectrode voltage- and patch-clamp techniques and the absence of a ready source of information about these methodologies persuaded us of the need for a book such as this. We have been fortunate in obtaining authors who are internationally recognized as experts in their respective fields, and their efforts have produced a result we believe will be useful to many.

This book is the outcome of a workshop on voltage clamping with microelectrodes organized and run by the editors of this book. The workshop was part of a satellite symposium on synaptic transmission, organized by the latter two editors of this book and held on Hayman Island off the coast of Queensland, Australia, September 4–10, 1983. The symposium was a satellite of the International Physiological Congress of the International Union of Physiological Sciences held in Sydney, Australia, August 28 through September 3, 1983.

For clarity, we wish to define the audience we seek to reach. To make our book most useful, we aimed at an audience composed of graduate students and postdoctoral fellows in biophysics, neurobiology, and electrophysiology who wish to undertake experiments requiring the use of the voltage and/or patch clamp. One purpose is to help experimenters select the best technique for their particular application because there is no universally “best” voltage- or patch-clamp system. Pursuant to this goal is some consideration of the theory and practice and the advantages and drawbacks of each type of clamp. Another purpose is to provide some “how-to” information, as well as considerations of limitations and artifacts, about each system. These and other factors may expose us to the possible criticism that we have been needlessly detailed. This is certain to be true for voltage-clamp sophisticates. But if blame is due, it belongs to the editors because we asked the authors to write their papers for scientists who are inexperienced in voltage and patch clamping. Finally, we recognize that all technical books rapidly become obsolete with the advance of technology. Nonetheless we believe this book is needed during

this time of rapid expansion of the techniques of voltage and patch clamping in electrophysiological research.

In closing, we would be remiss if we did not thank a number of people who played key roles in this enterprise—the book and the workshop at the satellite symposium on Hayman Island. We are grateful to Robert Porter, Director of the John Curtin School of Medical Research, because his provocative but considered challenge provided the impetus for our enterprise and to Orr E. Reynolds, Executive Secretary–Treasurer of the American Physiological Society, because his unfailing good advice, excellent management of our affairs, and successful help in obtaining funding made the workshop possible. We thank Howard E. Morgan, Chairman of the Publications Committee of the Society, for persuading the committee of the need for this book and for the Society to be the publisher. (It should be noted that this book has itself been something of an experiment: it represents the first venture by the editors and the American Physiological Society of accepting manuscripts on computer tapes and disks. Nancy Crawford, of the National Institutes of Health in Bethesda, Maryland, has been especially helpful in this effort.) Finally, we express our genuine thanks to the authors who responded so promptly and patiently to our constant pressure and to those nameless reviewers of the chapters who have contributed measurably to any success this book may enjoy.

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Steven J. Redman
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