ATLAS OF THE EAR

by Scanning Electron Microscopy

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Yasuo Harada

*Hiroshima University Medical School
Hiroshima, Japan*

Published, in association with
Nishimura Co., Ltd., Japan, by

MTP PRESS LIMITED
International Medical Publishers
LANCASTER • BOSTON • THE HAGUE

Published by
MTP Press Limited
Falcon House
Lancaster, England

British Library Cataloguing in Publication Data
Harada, Yasuo
Atlas of the ear by scanning electron microscopy.
1. Ear
I. Title
611'.85 QM507

ISBN-13: 978-94-009-6600-0 e-ISBN-13: 978-94-009-6598-0
DOI: 10.1007/978-94-009-6598-0

Originally published in Japanese by Nishimura Co., Ltd.,
1-754-39 Asahimachi-dori, Niigata-shi 951, Japan.

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Softcover reprint of the hardcover 1st edition 1983

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Foreword

The physiology of the semicircular canals was my main research interest before I began to study their morphology. In 1966, by utilizing the isolated semicircular canal of the frog, I was able to show that cell activity in the horizontal semicircular canal has the opposite polarity to that in the vertical canals, which was the first physiological proof of Ewald's law. Several transmitting electron microscope (TEM) studies had already reported on the morphology of the semicircular canal cristae; however, my morphological work was motivated by a strong desire to see whether the morphological polarity accorded to the physiological polarity.

In 1968 I happened to see the paper written by Dr David Lim, one of my close friends. His findings concerning the vestibular morphology, when examined by scanning electron microscopy (SEM), fascinated me a great deal because of the three-dimensional quality of the micrographs. This stimulated me to become involved in vestibular morphology. In the beginning, however, I faced many problems with specimen preparation for SEM, and the first few years were spent simply solving technical problems, especially those of artifacts.

Many of the figures in this book have been photographed with a JEOL JSM U-3 scanning electron microscope over a decade. The sharpness of these pictures still, I think, bears comparison to the definition of those taken by the more sophisticated SEM scopes currently available.

My work on the morphology and physiology of the vestibular organ led me to research into the whole inner and middle ear system. This has been intensively investigated with a JEOL JSM T200 and a JEOL JSM F15 which were recently introduced to my department. Here, these micrographs from the inner and middle ear are compiled for publication together with brief captions. What is presented in the text is generally aimed at the level of the otolaryngologist, but would also be of interest to medical students. The structure of the inner ear is complicated, as is indicated by its alternative name of 'labyrinth', and it used to be a research field not easily accessible. In this atlas emphasis is placed on

the surface structure, thus enabling better understanding of the anatomy. Furthermore, this book covers almost every aspect of the inner and middle ear, such as morphology beneath the surface, the nervous system and even clinical pathology.

It is my great pleasure that this publication may contribute to the work of those concerned with the ultrastructure of the ear.

Yasuo Harada, MD

Acknowledgements

Many thanks to Prof M. Cherubino at Pavia University, Italy, who invited me to conduct research on the physiology of the inner ear. Physiological work under guidance of Prof C. Casela and Prof G. Rapuzzi at the Istituto di Fisiologia Generale dell'a Università di Pavia, was further developed in Japan and stimulated my interest in vestibular morphology.

Prof S. Kurozumi's support for this study is acknowledged.

Dr N. Tagashira, Mr M. Murao, Ms Y. Ohki and Ms M. Hayashi have been extremely helpful in preparing pictures and the manuscript. Thanks are also due to Dr I. Hunter-Duvar and Dr M. Suzuki who have contributed to this English compilation. This work was supported by Grant-in-Aid for Scientific Research C 157399, B 248309 and A 440162.