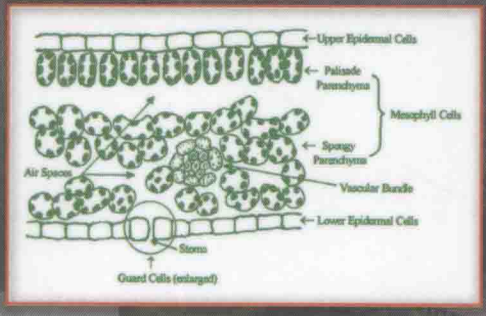
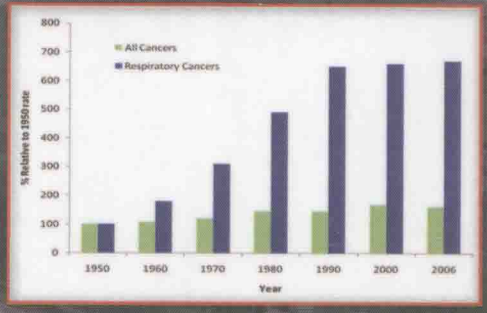
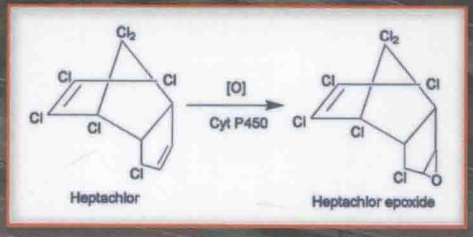
Third Edition

ENVIRONMENTAL TOXICOLOGY

Biological and Health Effects of Pollutants







Ming-Ho Yu
Humio Tsunoda
Masashi Tsunoda

CRC Press
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CRC Press
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Boca Raton London New York

CRC Press is an imprint of the
Taylor & Francis Group, an **informa** business

CRC Press
Taylor & Francis Group
6000 Broken Sound Parkway NW, Suite 300
Boca Raton, FL 33487-2742

Printed in the United States of America on acid-free paper
Version Date: 20110617

International Standard Book Number: 978-1-4398-4038-2 (Hardback)

Library of Congress Cataloging-in-Publication Data

Yu, Ming-Ho, 1928-
Environmental toxicology : biological and health effects of pollutants / Ming-Ho Yu, Humio Tsunoda, Masashi Tsunoda. -- 3rd ed.
p. ; cm.
Includes bibliographical references and index.
Summary: "Written primarily as a textbook for upper-level undergraduate and beginning graduate students, this book provides fundamental knowledge concerning the biological and health effects of pollutants on living systems. Also able to serve as a reference for professionals, the book stresses the chemical and biological characteristics of major pollutants found in the air, water, and soil, and their impacts on the health and wellbeing of humans, animals, and plants. This new edition is greatly expanded and updated, includes a color insert, and contains a new chapter on Occupational Toxicology"--Provided by publisher.
ISBN 978-1-4398-4038-2 (hardcover : alk. paper)
1. Environmental toxicology. 2. Environmental health. I. Tsunoda, Humio, 1930- II. Tsunoda, Masashi. III. Title.
[DNLM: 1. Environmental Pollutants--toxicity. 2. Environmental Exposure--adverse effects. WA 671]

RA1226.Y79 2012
615.9'02--dc23 2011020078

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Preface to the Third Edition

Many changes have occurred since the second edition of this book was published. Some of the changes include further global warming, growing world population, advancing technology and world economy, and expanding industrialization. Yet other changes include worsening air and water pollution, acid rain, and depletion of the ozone layer. In this volume, the information covered previously is updated or expanded.

I welcome Professor Humio Tsunoda and Dr. Masashi Tsunoda as coauthors. Together, they contributed a new chapter, "Occupational Toxicology" (Chapter 14). I am convinced that the material covered in the chapter enriches the content of this volume.

This book is written primarily as an introductory textbook for upper-level undergraduate and beginning graduate students majoring in environmental science, environmental toxicology, environmental health, and related fields. It is hoped that students as well as professionals interested in knowledge concerning the health and biological impacts of pollutants on living systems will find this volume a useful text or source book.

To assist with the students' studies, review questions are placed at the end of each chapter. A *Solution Manual* has also been prepared separately.

Acknowledgments

I wish to express my sincere appreciation to my former advisers and mentors: the late Professor Ho Fang-Kai at National Taiwan University and Professor Gene W. Miller and the late Professor D.K. Salunkhe at Utah State University. Their guidance and kind help have contributed much to my teaching and research career. I am indebted to my wife, Ervena, for her support and encouragement, and I thank my three children, Albert, Christina, and Charlie, for their technical assistance. I thank Joseph Clements and his associates at CRC Press/Taylor & Francis Group for their patience and assistance.

Ming-Ho Yu

About the Authors

Dr. Ming-Ho Yu is professor emeritus at Huxley College of the Environment, Western Washington University. He taught environmental toxicology and environmental health at the university from 1970 to 1997. He received his BS from National Taiwan University in Taipei, Taiwan, and MS and PhD from Utah State University in Logan, Utah. He undertook postdoctoral study at Utah State University and the University of Alberta in Canada. While teaching at Western Washington University, Dr. Yu took a year of sabbatical leave and pursued research as a visiting professor at the Department of Hygiene and Public Health at Iwate Medical University in Japan. He also spent a summer as visiting professor to conduct research at the Institute of Whole Body Metabolism in Chiba, Japan.

Dr. Yu served as the vice president and president of the International Society for Fluoride Research (ISFR) from 1986 to 1996 and is the associate editor of *Fluoride*, the official publication of the society. He is a founding coeditor of *Environmental Sciences*, a journal published in Tokyo, Japan. He was also coeditor of *Environmental Fluoride 1985*, published by Elsevier Science in 1986. Dr. Yu is the author of *Environmental Toxicology—Impacts of Environmental Toxicants on Living Systems* and *Environmental Toxicology, 2nd Edition, Biological and Health Effects of Pollutants* and is coauthor of *Introduction to Environmental Toxicology,* editions 1–4, published by CRC Press.

Dr. Humio Tsunoda, professor emeritus at Iwate Medical University in Morioka, Japan, received his PhD from Hokkaido University in Japan. He received his MD by passing a national examination. He was a professor and chair in the Department of Hygiene and Public Health at Iwate Medical University for 27 years. Between 1997 and 2007, Professor Tsunoda served as a member of the Science Council of Japan, specializing in the area of environmental health. He received a Green Cross Award from the Japan Industrial Safety and Health Association, and awards for distinguished service from the Ministry of Construction; the Ministry of Labor; the Japanese Association of Rural Medicine; Japan Society for Atmospheric Environment; and Japanese Society for Occupational Health. In 2010, Professor Tsunoda received the Order of the Sacred Treasure, Gold Rays with Neck Ribbon from the government of Japan.

Dr. Masashi Tsunoda is an associate professor at the Department of Preventive Medicine and Public Health, Kitasato University School of Medicine in Japan. He received a PhD in social medicine from Niigata University in Japan, an MPH from the University of Pittsburgh, and a PhD in toxicology from the University of Georgia. He is a councilor of the Japan Society for Biomedical Research on Trace Elements; an editorial board member of the International Society for Fluoride Research; and a board member of the Japanese Society of Immunotoxicology. He is coeditor of *Kitasato Medical Journal* and a guest reviewer of *Toxicological Sciences.*

Contents