Introduction to Natural Products Chemistry

Edited by
Rensheng Xu
Yang Ye
Weimin Zhao

科学出版社
Science Press

CRC Press
Taylor & Francis Group

Introduction to Natural Products Chemistry

Edited by
Rensheng Xu
Yang Ye
Weimin Zhao

科学出版社
Science Press

CRC Press
Taylor & Francis Group
Boca Raton London New York

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

The original Chinese language work has been published by:
SCIENCE PRESS, Beijing

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

CRC Press is an imprint of Taylor & Francis Group, an Informa business

No claim to original U.S. Government works

Printed in the United States of America on acid-free paper
Version Date: 20110608

International Standard Book Number: 978-1-4398-6076-2 (Hardback)

Introduction to Natural Products Chemistry

Preface

This book is the revision of Science Press of China in 2006. It is one in the series "Basic Modern Chemistry" used to introduce modern chemistry and as a reference book for scientists and graduate students.

China is a country that is rich in natural resources because of its vast territory, diverse geography, and different climates. Traditional Chinese Medicine (TCM) is very important to the health of the Chinese and has been practiced in China for more than 5,000 years. Most TCM products come from plants. Some also come from animals, marine products, and minerals. Natural products chemistry is one of the most developed scientific fields in China and almost every Chinese university has a research or teaching unit for natural products chemistry or chemistry of natural medicines. The discovery of the remarkable antimalarial drug, artemisinin (Qinghausu) and its derivatives from TCM herbs, *Artemisia annua*, encouraged many scientists around the world to study TCM herbs. Chinese scientists have published papers in many well known scientific journals including *Nature, Science, Journal of the American Chemical Society, Tetrahedron, Journal of Natural Products, Phytochemistry*, as well as many journals in China.

This book has collected the most important research results of natural products chemistry in China. It covers the basic principles of isolation, structure, characteristics, and the current research techniques of structure elucidation with wet chemistry and spectroscopic analyses (UV, IR, MS and NMR, especially 2d-NMR, HMBC and HMQC), bioactivity, biosynthesis, and chemical synthesis. These concepts are illustrated with examples from the authors' own scientific experiments. All the authors are scientists from Shanghai Institute of Materia Medica, Chinese Academy of Sciences; Shanghai Institute of Pharmaceutical Industry; College of Pharmacy, Fudan University; and Chinese Pharmaceutical University. They are professors and experts in their fields.

Many thanks to Dr. Wenwen Ma and Mr. Michael Zahn of Washington State, USA, for reviewing the English version and providing editorial help.

Editors

2010 May

Contributors

Preface

Ren-Sheng Xu, Professor of Shanghai Institute of Materia Medica, Chinese Academy of Sciences.

E-mail: rsxu09@gmail.com

Chapter 1 Introduction

Ren-Sheng Xu, Professor of Shanghai Institute of Materia Medica, Chinese Academy of Sciences.

Chapter 2 Extraction and Isolation of Natural Products

Wei-Min Zhao, Professor of Shanghai Institute of Materia Medica, Chinese Academy of Sciences.

E-mail: wmzhao@mail.shcnc.ac.cn

Chapter 3 Chemistry of Fungal Products

Zhi-Hong Xu, Visiting professor at Duke University, Department of Chemistry, USA

E-mail: Zxu9@yahoo.com

Chapter 4 Alkaloids

Ren-Sheng Xu, Professor of Shanghai Institute of Materia Medica, Chinese Academy of Sciences.

Yang Ye, Professor of Shanghai Institute of Materia Medica, Chinese Academy of Sciences.

E-mail: yye@mail.shcnc.ac.cn

Chapter 5 Sesquiterpenoids

Zhong-Liang Chen, Professor of Shanghai Institute of Materia Medica, Chinese Academy of Sciences.

E-mail: zlchen70@hotmail.com

Chapter 6 Diterpenoids

Zhi-Da Min, Professor at Chinese Pharmaceutical University, College of Chinese Medicines.

E-mail: ZHDMIN32@hotmail.com

Chapter 7 Saponins

Wei-Min Zhao, Professor of Shanghai Institute of Materia Medica, Chinese Academy of Sciences.

Chapter 8 Amino-acids and Peptide

Chang-Qi Hu, Professor at Fudan University, College of Pharmaceutical Sciences.

E-mail: huchangqi@gmail.com

Jie-Cheng Xu, Professor of Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences.

Chapter 9 Flavonoids
De-Yun Kong, Professor of Shanghai Institute of Pharmaceutical Industry.
E-mail: deyunk@yahoo

Chapter 10 Anthraquinones
Yang Lu, Professor at Jiaotong University, Department of Chemistry.
E-mail: huaxue@shsmu.edu.cn

Chapter 11 Coumarins
Ze-Nai Chen, Professor at Jiaotong University, Department of Chemistry.
E-mail: huaxue@shsmu.edu.cn

Chapter 12 Lignans
Chang-Qi Hu, Professor at Fudan University, College of Pharmaceutical Sciences.
E-mail: huchangqi@gmail.com

Chapter 13 Other Natural Bioactive Compounds
Ren-Seng Xu, Professor of Shanghai Institute of Materia Medica, Chinese Academy of Sciences.

Chapter 14 Marine Natural Products
Yue-Wei Guo, Professor of Shanghai Institute of Materia Medica, Chinese Academy of Sciences.
E-mail: ywguo@mail.shcnc.ac.cn
Wen Zhang Associate professor of School of Pharmacy, Second Military Medical University.
E-mail: zhangwen68@hotmail.com

Chapter 15 Structural Modification of Active Principles from TCM
Da-Yuan Zhu, Professor of Shanghai Institute of Materia Medica, Chinese Academy of Sciences.
E-mail: dyzhu@mail.shcnc.ac.cn

Chapter 16 Chemical Synthesis of Natural Products
Wen-Hu Duan, Professor of Shanghai Institute of Materia Medica, Chinese Academy of Sciences.
E-mail: whduan@mail.shcnc.ac.cn

Contents