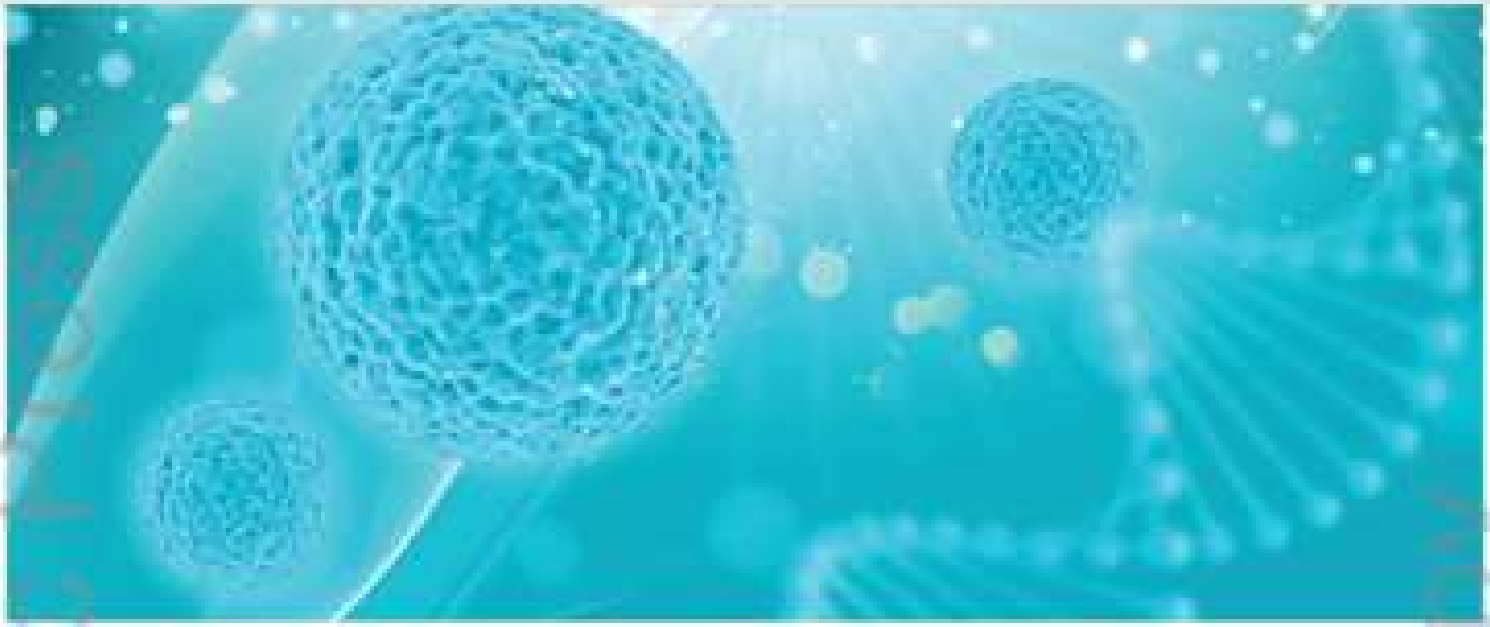

Drug Development for Cancer and Diabetes

A Path to 2030

Editors

K. Saravanan | Chukwuebuka Egbuna | Horne Iona Averal
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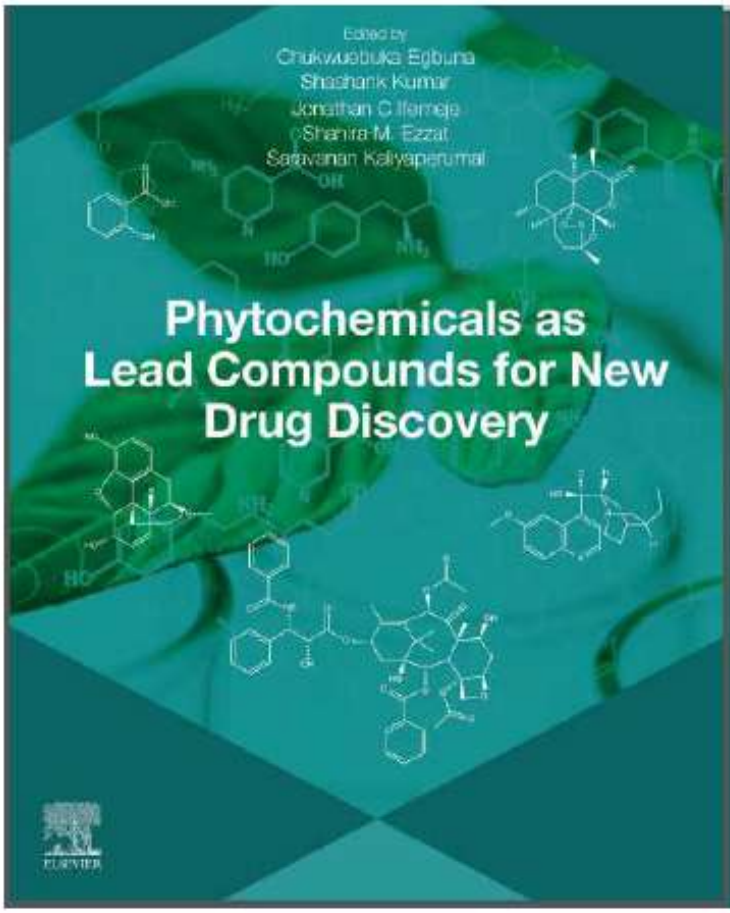
APPLE ACADEMIC PRESS

CRC Press
Taylor & Francis Group



Phytochemicals as Lead Compounds for New Drug Discovery

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Phytochemicals as Lead Compounds for New Drug Discovery presents comprehensive coverage of the recent advances in the discovery of phytochemicals from medicinal plants as models for the development of new drugs and chemical entities. Functional bioactive compounds of plant origin have been an invaluable source for many human therapeutic drugs and have played a major role in the treatment of diseases around the world. These compounds possess enormous structural and chemical diversity and have led to many important discoveries. The book presents fundamental concepts and factors affecting the choice for plant-based products, as well as recent advancements being the subject of drug discovery and FDA drug candidacy acceptance criteria. It also details the various bioactive lead compounds and molecular targets for a range of life-threatening diseases including cancer, diabetes, and neurodegenerative diseases.

Written by a global team of experts, *Phytochemicals as Lead Compounds for New Drug Discovery* is an ideal resource for drug developers, biochemists, pharmaceutical, food and medicinal chemists, nutritionists and specialists, chemical ecologists, taxonomists, analytical chemists, and other researchers in these fields. It will also be very valuable to professors, students, and researchers in this domain.

Key Features

- Presents fundamental concepts and factors affecting choice for plant based products
- Details the FDA drug candidacy acceptance criteria, including bottlenecks and way forward
- Highlights recent advances in computational-based drug discovery
- Focuses on the discovery of new drugs and potential upgrade ranges for the treatment of chronic diseases of worldwide importance

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PRACTICAL INVERTEBRATE ZOOLOGY:

A MANUAL FOR STUDY OF MAJOR INVERTEBRATES

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2019

Phytochemistry

Volume 1

Fundamentals, Modern Techniques, and Applications

Editors

Chukwuebuka Egbuna • Jonathan Chinenye Ifemeje
Stanley Chidi Udedi • Shashank Kumar

AAP APPLE ACADEMIC PRESS
CRC CRC Press Taylor & Francis Group

Apple Academic Press Inc.
3333 Mistwell Crescent
Oakville, ON L6L 0A2
Canada

Apple Academic Press Inc.
9 Spinnaker Way
Waretown, NJ 08758
USA

Phytochemistry, Volume 1: Fundamentals, Modern Techniques, and Applications

International Standard Book Number-13: 978-1-77188-759-5 (Hardcover)
International Standard Book Number-13: 978-0-429-42622-3 (eBook)

Phytochemistry, 3-volume set

International Standard Book Number-13: 978-1-77188-762-5 (Hardcover)
International Standard Book Number-13: 978-0-429-42627-8 (eBook)

Library and Archives Canada Cataloguing in Publication

Phytochemistry / edited by Chukwuebuka Egbuna, Jonathan Chinenye Ifemeje, PhD, Stanley Chidi Udedi, PhD, Shashank Kumar, PhD.

Includes bibliographical references and index.
Contents: Volume 1. Fundamentals, modern techniques, and applications.
Issued in print and electronic formats.
ISBN 978-1-77188-759-5 (v. 1 : hardcover).--ISBN 978-0-429-42622-3 (v. 1 : PDF)

1. Botanical chemistry. I. Egbuna, Chukwuebuka, editor

QK861.P65 2019 572'.2 C2018-904824-7 C2018-904875-1

CIP data on file with US Library of Congress

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CHAPTER 23

GAS CHROMATOGRAPHY–MASS SPECTROMETRY ANALYSIS AND IN VITRO ANTICANCER ACTIVITY OF *TECTONA GRANDIS* BARK EXTRACT AGAINST HUMAN BREAST CANCER CELL LINE (MCF-7)

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ABSTRACT

This chapter presents an investigation of the presence of secondary metabolites in the ethyl acetate extract of *Tectona grandis* bark extract and the cytotoxic effect against MCF-7 cell lines. Phytochemical compounds were determined by gas chromatography–mass spectrometry (GC-MS) analysis. The cytotoxic activity, morphological assessment of cell death, potential of mitochondrial membrane potential and deoxyribonucleic acid (DNA) damage pattern were evaluated by MTT assay, acridine orange/ethidium bromide (AO/EB) staining technique, JC-1 staining method and comet assay, respectively. GC-MS chromatogram showed the presence of five major phytochemical compounds in ethyl acetate extract of *T. grandis* bark which includes flavonoids, phenols, and tannins. The inhibition concentration (IC_{50}) of ethyl acetate extract of *T. grandis* bark was calculated as 1.57 mg/mL for MCF-7 cell line and induced significant DNA damage. Thus, the present study concludes that the ethyl-acetate extract of *T. grandis* bark possesses potent antibreast cancer activity.

Chapter 15

Antiviral phytocompounds for drug development: a data mining studies

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Chapter outline

15.1 Introduction

A huge number of pathogens, especially the viruses have the capacity to adjust themselves according to the new trends of human society. The population explosion, globalization, and sex revolution have collectively caused an increase in the incidence and prevalence of viral diseases. By the year 2020, it is projected that viral diseases will become the deadliest of all the pandemics in human history. Therefore, virus poses a continuous threat to human health and the global economy. Viruses have efficient means to survive and broadcast in a number of varieties of hosts such as birds, insects, fish, humans, and other mammals and various cell types with respect to their host distribution, genomic organization, and clinical presentations. Virus may possess DNA or RNA as genome and may follow diverse routes for replication, transcription, and translation processes. Clinically, they may present themselves as self-resolving, localized infections or may attain several forms to affect the whole body. Although belonging to various classes, viruses follow similar general pathway for causing pathogenesis in the host. Repetitive replication of viruses results in the appearance of clinical features. Although there has been an increase in the number of approved antiviral agents, yet these drugs cover a very narrow range of viruses. Moreover, an increased incidence of resistance to these antivirals further decreases their therapeutic potential [1,2].

Plants form a fundamental part of many medicinal systems under practice today. Around 50% of prescribed drugs are either produced from plants or are derivatives of plant products [3]. Plants represent a large, untapped, potential source of antiviral agents. Although there has been relatively few studies seeking antiviral agents from plants, those studies have revealed an unexpectedly frequent occurrence of antiviral activity in plants. A large number of compounds of varied chemical structures isolated from medicinal plants have been shown to possess antiviral activity. Thus, this chapter made an attempt to explore various antiviral compounds from plants for the development of antiviral drugs.

Phytochemicals as Lead Compounds for New Drug Discovery. https://doi.org/10.1016/B978-0-12-817890-4.00015-9

PHYTOCHEMISTRY

Volume 2

Pharmacognosy, Nanomedicine, and Contemporary Issues

Edited by

Chukwuebuka Egbuna

Shashank Kumar, PhD

Jonathan Chinenye Ifemeje, PhD

Jaya Vikas Kurhekar, PhD

APP APPLE ACADEMIC PRESS

Apple Academic Press Inc.
3333 Mistwell Crescent
Oakville, ON L6L 0A2
Canada

Apple Academic Press Inc.
9 Spinnaker Way
Waretown, NJ 08758
USA

International Standard Book Number-13: 978-1-77188-760-1 (Hardcover)

International Standard Book Number-13: 978-0-429-42619-3 (eBook)

International Standard Book Number-13: 978-1-77188-762-5 (3-volume set, Hardcover)

International Standard Book Number-13: 978-0-429-42627-8 (3-volume set, eBook)

CHAPTER 23

TOXIC PLANTS AND PHYTOCHEMICALS

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ABSTRACT

Poisonous plants produce toxic compounds when in contact with living organisms such as plants, animal, and microorganism are capable of eliciting undesirable aftermath effects even death. These compounds include anticholinergic, severe gastrointestinal (GI) irritants, cardiac glycosides, central nervous system stimulants/hallucinogens, and cyanogens. Some of

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