

Ethnopharmacology,
Phytochemistry and Pharmacology
Review of
Traditional Chinese Medicine-I

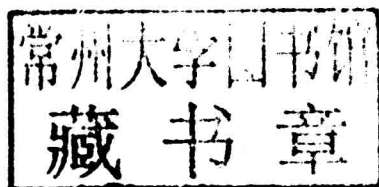
Maoxing Li



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Ethnopharmacology, Phytochemistry and Pharmacology
Review of Traditional Chinese Medicine-I

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Preface

Medicinal plants are - of course - an integral part of our common human history. There can be no doubt that they are an important part of all cultures past and modern. At the same time we now have scientific tools available to us which allow a study of these resources from a multitude of angles - including, for example, pharmacology, clinical research, phytochemistry, toxicology, anthropology, public health and history, to name just a few.

Why do we do all these studies? In part it is in order to understand our own culture and history, but many, including the author of these lines, also think that such research must contribute to a more evidence - based and safer use of such herbal medicines. There are many challenges to overcome and this book offers an overview of key evidence which is available for some of the most important species used in Traditional Chinese Medicine. As always, such research uncovers exciting new pharmacological effects of interesting chemical compounds, but it also highlights potential risks including toxic effects. So, a critical appraisal and review of the available evidence on these species is very welcome indeed. And I want to congratulate Prof. Moaxing Li from the Lanzhou General Hospital of PLA, and his team / collaborators for developing these monographs and for bringing them together in this book. The vast majority of the monographs were published in the Journal of Ethnopharmacology - without doubt today the leading journal in the area of ethnopharmacology / medicinal plant research.

These reviews provide a careful assessment of the scientific evidence on these medicinal plants, and now such research needs to be translated into better products. While the philosophy and many elements of the practice of TCM are unique to the Chinese tradition and philosophy, the fundamental requirements in terms of sustainability, quality and safety are now universal. We want and must make sure that we use safe products, which do not harm patients and ideally, ones for which a good evidence basis exists. Safety is based on two key aspects - the use of species which are general considered to be of low risk (i. e. safe) and good manufacturing along the value chains of these products. Only if both are fulfilled will we get high quality products.

In recent years concerns about adulterations and poor quality have increased tremendously and yes, we have to acknowledge that many products sold with health claims are of poor or inadequate quality. This is also linked to problems with regards to ascertaining a sustainable supply and the overexploitation of resources, is a key problem faced by practitioners of TCM and other medical traditions, So, the review of the evidence provided by Prof Moaxing Li and collaborators is an important but just *a first step* in order secure high

quality products for consumers in China and beyond.

Not only is it a pleasure to congratulate Prof Moaxing Li and collaborators for this exciting initiative, but we all should hope that it leads to such better products and thus a better use of Chinese herbal medicine.

Prof. Michael Heinrich

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Introduction

In human history, people have relied on plants in order to survive numerous diseases. After diverse exploration of their observable effects, our ancestors distinguished the medicinal plants from other ones. This knowledge was recorded categorized, and inherited over centuries in oral or in a few cases written traditions. Today, more than 22, 000 plants have been used as medicine in different cultures of the world.

Thanks to the geographical and climatic diversity in our enormous country, 27000 species of plants are known to be distribute in China. Our civilization, one of the longest and most glorious culture in the world, has developed a unique and the most amazing Traditional medicinal tradition - TCM . People believe TCM not only can be used as medicine to treat diseases, but also as food to nourish and protect our body.

Today more and more researchers find ethnopharmacological clues for developing of new medicine from such local and traditional knowledge. Artemisinin and taxinol were the most famous success in these studies.

In the past decades, the development of chemistry, molecular pharmacology and cell biology has led to a rapid increase in the information available on TCM. At the same time, scientists also showed enthusiasm to study the phytochemistry and pharmacology of samples from the same species or genus coming from different areas. A thorough review of these studies published in different languages and areas is very important and valuable not only for the experts but also for a novice.

The aim of this book is to comprehensive outline the botanical description, ethnopharmacology, phytochemistry, biological activities and toxicology of ten special species or genera: *Leonurus Japonicus* Houtt. , *Eucommia ulmoides* Oliv , *Pedicularis* , *Epimedium* , *Lonicera japonica* Thunb , *Scutellaria* , *Rehmannia glutinosa* , *Oxytropis* , *Phlomis* , *Patrinia* , and to discuss the possible trend for the further study. Information on these plants was gathered via the internet (using Pub Med, Elsevier, Baidu Scholar, Google Scholar, Medline Plus, ACS, CNKI and Web of Science) and libraries for some local books.

The common structure of the reviews for every genus includes: Introduction (1) , Botanical description (2) , ethnopharmacology (3) , Phytochemistry (4) , Biological activities (5) , Toxicity (6) , Future perspectives and conclusion (7) , and References (8). In the first part, the common knowledge and study were introduced. In the second part, the distribution, botanical description, medicinal material description were summarized according to flora and record. In the third part, the recorded in local and traditional uses as a medicine, nourishment, an invigorator or a roborant, were reviewed. In the fourth part, the isolated

and identified chemical compounds were categorized with their structures and source (the part or species of plants). At the same time, the structures of the major compounds with high contents or high activities are included. In the fifth part, the data about bioactivities of the extracts or compounds, *in vivo* experiments or *in vitro* experiments, and animals or cells, are presented analyzed, and assessed according to different functions. The relationship of these bioactivities and the species' ethnopharmacology was especially presented. In the sixth part, the serious attention was paid to any information about the toxicity of the extracts or compounds. In the seventh part, the data about modern pharmacological and ethnopharmacological, and the species phytochemistry are reviewed in order to assess their potential as new medicine. At the same time, limitations, methodological problems and new methods are discussed and suggested for further investigation. The references form the last part of each monograph (organized alphabetically).

The ten medicinally important species or genera reviewed in this book were specially selected, some of them are widely used in TCM, and others are indigenous to China, especially in the Qing-zang Plateau. These plants have a long tradition of use, have therapeutically relevant effects on modern diseases, such as hepatopathy, diabetes, cancer, inflammation, immunodeficiency, ageing, and highlight the chemical diversity of such medicines. We hope this book will be beneficial for the wider public to understand the plant-based medicines and specifically of the ones used in TCM. For a novice it will serve as an outline of their chosen study object, and for researchers it will hopefully spark some ideas for future invention.

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Ethnopharmacology, phytochemistry and pharmacology of *Leonurus japonicus* Houtt

1.1 Introduction

Leonurus japonicus Houtt. (Labiatae), commonly called Chinese motherwort, is an herbaceous flowering plant native to several regions in Asia, including China, Korea, Japan and Cambodia. It has escaped cultivation to become naturalized in other parts of the world, including South and North America as well as Europe and Africa ([Http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?407691](http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?407691)). For thousands of years in China, the aerial part of *Leonurus japonicus* has been primarily used to treat menoxenia, dysmenorrhea, amenorrhea, lochia, edema of body, oliguresis, sores, ulcerations and other diseases in women and was thus named “Yi Mu Cao” (Chinese: 益母草), meaning literally “beneficial herb for mothers.” Since 1990, *Leonurus japonicus* has been listed in the Pharmacopoeia of the People’s Republic of China, and more than 300 prescriptions containing *Leonurus japonicus* have been used to treat various diseases in China, especially those specific to women (Cai, 2005). Modern pharmacological studies show that the active components in *Leonurus japonicus* possess wide pharmacological actions, such as effects on the uterus as well as cardioprotective, anti-oxidative, anti-cancer, analgesic, anti-inflammatory, neuroprotective and anti-bacterial actions. Most of these actions are consistent with those for *Leonurus japonicus* in traditional medicine.

Because of the marked effects on women’s health and diseases, researchers began focusing attention on *Leonurus japonicus*, extensively studying its chemical components. Alkaloids, diterpenes, flavones, spirocyclic nortriterpenoids, phenylethanoid glycosides, sesquiterpene glycosides, essential oils and other compounds were the main components isolated and studied. Among them, stachydrine has been the most studied and shows the best bioactivity. According to the Pharmacopoeia of China, stachydrine is now used as the official indicator to monitor the quality of the herb and of the preparations with *Leonurus japonicus* (Committee for the pharmacopoeia of P. R. China, 2010).

In this review, we examine the advances in the ethnopharmacology, phytochemistry, pharmacology and toxicology of *Leonurus japonicus* as well the increasing data that support the utilization of *Leonurus japonicus* as a novel drug. Considering that *Leonurus japonicus* has many synonyms (<http://www.theplantlist.org>), we use *Leonurus japonicus* as the name of