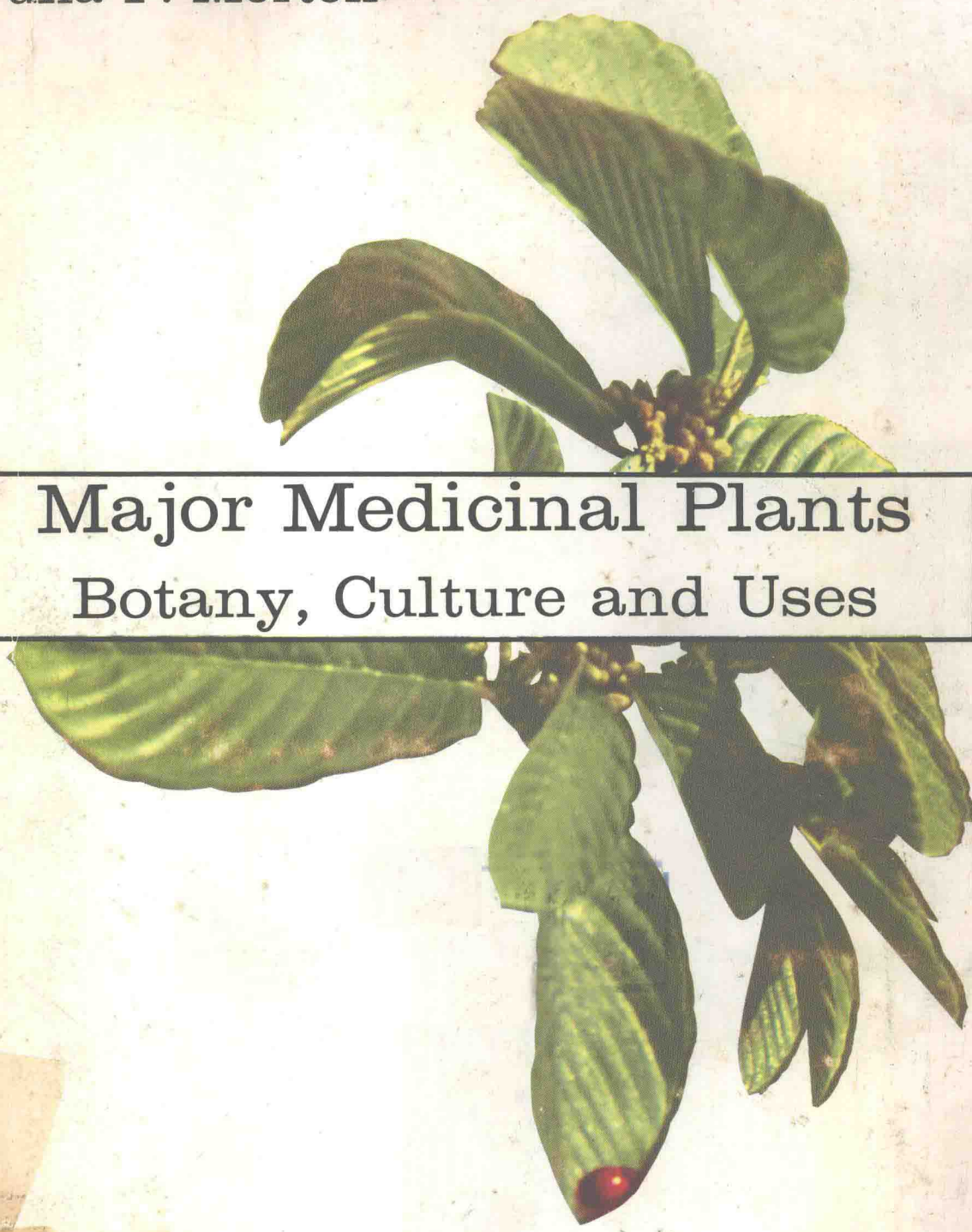


Julia F. Morton



# Major Medicinal Plants

## Botany, Culture and Uses

This modern text describes and illustrates the major natural sources of currently used drugs, their history, areas of production, culture, processing, chemical and medicinal uses, and toxicity. Those plants which provide pharmaceutical aids or adjuncts, and those species which have been dropped from official use in recent years, are also discussed. Without parallel in contemporary professional literature, this volume not only offers the reader a thorough, cogent source of reference for all aspects of medicinal plants, it offers this information in an interesting and articulate manner.

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# Major Medicinal Plants

## Botany, Culture and Uses

*By*

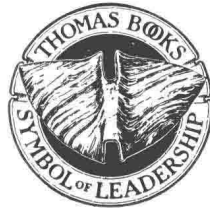
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Upper photo.

Back row: Desenex® (undecylenic acid — from castor oil), Atropine Sulfate, Beladonna tincture, Cas-Evac® (cascara sagrada), Quinine Sulfate, Quinidine Sulfate, Agoral® (agar, tragacanth and acacia), Metamucil® (psyllium hydrophilic muciloid), Senna Laxative.

Second row: Colchicine, Quinine Sulfate, Velban® (vinblastine sulfate), Ephedrine Sulfate, Tincture of Benzoin Compound, Senokot® (senna), Thymol.

First row: Ouabain, Pilocarpine HCL, Reserpine, Colchicine, Podophyllum Resin, Juniper Tar (cade oil), Papase® (proteolytic enzymes from *Carica papaya*), Caroid (proteolytic enzyme), Donnatal® (hyoscyamine sulfate, atropine sulfate, hyoscine hydrobromide).

Lower photo.

Back row: Digoxin®, ergot, menthol, camphor.

Front row: Tylenol® (codeine), ipecac, Empirin® (caffeine), cocaine, menthol, glycyrrhizin, Vicks® (ephedrine sulfate, camphor, menthol, methyl salicylate, eucalyptol).

MANY DRUG PRODUCTS ON THE SHELVES OF MODERN PHARMACIES CONTAIN ACTIVE INGREDIENTS WHICH MAY BE DERIVED FROM PLANTS.

Photographed at the Rivera Pharmacy, Coral Gables, Florida, through the courtesy of Nathan Tartak, M.S. Pharm., Proprietor.

# Major Medicinal Plants

# Foreword

It has always been my habit over the past twenty years to cast a jaundiced eye on virtually any book bearing the title, "Medicinal Plants," either directly or indirectly. The reason for this is that, to authoritatively treat the subject, one must have a broad understanding of at least botany, chemistry and pharmacology in order to place the information in proper perspective. With the exception of college textbooks on the subject, during the past twenty years, there has been only one such book printed in America that could be considered as authoritatively written, and that was *Green Medicine*, by Margaret Kreig, published initially in 1964. We now have what I would consider to be the second authoritative book written on the subject of medicinal plants during the past two decades, i.e. *Major Medicinal Plants: Botany, Culture and Uses*, written by Doctor Julia F. Morton.

One might ask why such a book is needed, and what advantages does it offer over textbooks used by pharmacy students that surely must cover the material in this book. In order to answer these questions, it is necessary to digress somewhat from the central theme of this introduction.

Pharmacognosy is the study of drugs and other economic products obtained from natural sources. Fifty years or more ago, the subject was centered around the theme of utilizing morphological and histological features of plant and animal drugs as aids in their identification. This was during the presynthetic drug era, when the medical profession was completely dependent on drugs from plants and animals, or those of mineral origin. One needs only to look through some old pharmacopoeias to determine how true the statement is. Thus, it was important for the pharmacist to know, at that time, how to determine the purity and identity of crude drugs, or powdered crude drugs, since often they were subject to adulteration, either accidental or intentional. There was no other means available at that time to determine this, thus pharmacognosy as a descriptive science realized its most prestigious era.

However, as synthetic organic chemistry came into being and the first synthetic drugs were introduced into medicine, the use of crude drugs and extracts of crude drugs became less important. This lessening of importance of crude drugs was paralleled by a decreased need for the pharmacy student to study traditional pharmacognosy. However, as in any changing science, the practitioners of pharmacognosy began to realize a necessity for change in their discipline in regard to approach and outlook.

It should be pointed out that initially what we know now as pharmacology, pharmacognosy and medicinal chemistry were formerly taught collectively under the title of *Materia Medica*. As each of the three sciences developed, they branched out and became independent entities.

Thus, pharmacognosy has developed slowly into a dynamic science based on botany, chemistry, biochemistry and pharmacology. It now includes information on the sources of major natural products, methods for isolating the active principles, the chemistry of the active principles, the biosynthesis of these principles and their uses, side effects and interactions with other substances that may be administered concurrently with subsequent detrimental effects. Even though pharmacognosy has changed its face completely, it is a subject in the pharmacy curriculum that is perhaps berated more often than any other, has consistently had to defend its existence in the curriculum over the past twenty years, and indeed has been eliminated from the curriculum of many colleges of pharmacy in the United States. Initiation of this de-emphasis has been primarily through the efforts of a handful of pharmaceutical administrators and non-academic bureaucrats who have proclaimed that the practice of pharmacy must change from a product-oriented outlook to patient-orientation. This has resulted in the inclusion of a large component of "clinical" instruction in the curriculum that in many places has replaced pharmacognosy as well as other basic science courses. The ironic nature of the situation is that the "clinical" instruction forced on the students, while probably justified in one sense, is oriented toward the hospitalized patient (or institutionalized patient) and not the ambulatory patient who will be seen most frequently in the community pharmacy setting by 80 to 90 percent of the practitioners. It will be the larger latter group who will use the material in Doctor Morton's book to greatest advantage in maintaining their professional competence in natural drug products.

Concurrent with the de-emphasis on teaching students about natural drug products has been an alarming increase in the awareness and concern of many people in this country about the side effects of synthetic drugs and a desire to learn more about the efficacy and safety of "natural drugs." With the current state of affairs of pharmaceutical education, our students in most instances are not prepared to advise their patients on such matters. How then will our students, who become pharmaceutical practitioners, prepare themselves to effectively do this?

The most obvious place to seek such information is in textbooks. At the present time, there is only one current American textbook on pharmacognosy, and from a quick glance through this book, it becomes obvious that it is not written to answer many of the questions that will be asked



the practitioner regarding natural products. To ask the practitioner to take the time to search the scientific literature for the required information would be to ask an impossibility. Thus, it would appear that Doctor Morton's book will fill this void and will be an invaluable ancillary textbook for any pharmacognosy course; it should be a required reference book in every pharmacy in the United States.

Perhaps at this time it would be of interest to point out to the reader just why the material in this book, or information on natural drug products in general, is important to the practitioner or pharmacy as well as medical practitioners in general.

Most people think that practically all drugs currently used are prepared synthetically. Such is definitely not the case. For example, it is now known that of the 1.532 billion new and refilled prescriptions dispensed from community pharmacies in the United States in 1973, 25.2 percent contained one or more active constituents still extracted from higher plants (seed plants). Microbial products accounted for 13.3 percent of the prescriptions and animal-derived drugs for about 2.7 percent. What is truly amazing is that during the period 1959-1973, drugs from higher plants maintained an amazingly consistent figure of about 25 percent of the total prescriptions dispensed in the United States. It has been calculated that, in 1973, drugs from higher plants alone cost the American public some three billion dollars. Further, as we add up all of the prescriptions derived from natural sources, they account for almost 50 percent of all prescriptions dispensed. It is difficult to comprehend, then, why the subject taught in pharmacy schools that have been entrusted with educating future pharmacists in this important aspect of their profession is being relegated to obscurity.

But even perhaps of more importance is the recent surging interest on the part of the American public to learn more about the use of natural crude drugs, and it is reasonable that they will turn to either the pharmacist for this knowledge or seek out knowledgeable books on the subject. For this reason, it becomes more important that this authoritative treatise on medicinal plants has been painstakingly written by Doctor Morton. In effect, she has taken up where pharmacognosy textbooks have left off. Virtually every plant drug in use today or from which useful drugs are being derived is discussed, as well as those plant drugs which were once used extensively but are of lesser importance today.

Finally, not only should this book be available in every pharmacy in the United States but many physicians will want to include it in their library of reference materials. It should be a required secondary textbook in all pharmacognosy courses taught in colleges of pharmacy. I suspect,



however, that it will be most popular with the laity who desire authoritative and accurate information on plant drugs, which will now be available to them for the first time.

Norman R. Farnsworth, Ph.D.

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cago, Illinois*

A great deal of useful information on the subject of currently employed medicinal plants will be found within the covers of this book. Particularly useful will be the sections dealing with the botany of each species considered, as well as the production of crude drugs from the whole plant, seeds, roots or other parts.

Over the years, many plants have "supplied" medical materials for use by mankind. A list of such plants would be an almost endless one. From time to time, certain plant drugs have lost favor or, in some cases, their uses have changed. Some drugs of plant origin have been abandoned because they did not prove as valuable as was hoped. However, there are outstanding examples of newly-discovered plant medicines which have proved to be safer than and/or superior to those displaced. Reserpine, the tranquilizer from *Rauwolfia*, is a prominent example of a plant drug that came into wide use some years ago. Another genus that now plays an important role in modern medicine is *Catharanthus*. The search for new medicinal plants goes on and on as it has for centuries during man's history. Exploration and investigation have broadened to cover the globe.

During recent decades, emphasis in research and teaching of material on natural products has undergone gradual change until, at the present time, natural product chemistry seems to dominate the subject. Of course, the biological and biological-activity phases are also considered, but with less emphasis than in the past.

The widespread attention being given drug plants in modern times is evidenced by the extent and diversity of scientific reports—the bibliography of this volume consists of over six hundred references. Students and others will find this feature a valuable guide to the literature. Throughout the book, the user will glean much timely information pertaining to the technology of the production of medicinal and related materials of natural origin as well as by-products of economic botanical interest.

In the category of pharmaceutical aids or adjuncts, the marine algae are presented, followed by those higher plant forms—embracing many *taxa* (categories) of seed plants—which, while not strictly medicinal, make significant contributions to health care. The numerous illustrations add greatly to the book's instructional value.

Though this volume is not a textbook of pharmacognosy and is not intended to be, it embodies essential, up-to-date, practical knowledge of the botany and culture of plants studied in pharmacognosy, and the environmental conditions and systems of handling and processing which determine the availability, quality and utility of the ultimate healing agent. To any person who is likely to be approached concerning information on any of these matters or is professionally or non-professionally interested in this field, this book will be invaluable.

Maynard W. Quimby, Ph.D., F. L. S.

*Professor Emeritus*

*Department of Pharmacognosy*

*School of Pharmacy*

*University of Mississippi*

# Introduction

This book is not meant to be a textbook in pharmacognosy but is intended to supplement such texts. Its aim is to give to teachers and students, growers or potential growers, dealers and consumers more information on the botany, culture, harvesting and handling of medicinal plants and their products than can be found in any other single source.

There are many factors in drug crop production that determine the feasibility of cultivation, economic importance to the producing areas, variation in quality and potency, availability on the market, competitive status and fluctuations in selling price. This statement would apply, of course, to any agricultural endeavor, but the medicinal plant industry is probably subject to more variable conditions than any other. In spite of the impact of this industry on the well-being of mankind, there is little popular communication of its problems and methodology—in contrast to the wealth of readily available information on food plant cultivation, for example.

Much of the professional and technical knowledge of medicinal plant exploitation is inaccessible, and that which has been reported represents a lag behind developments within the industry. It is clearly impossible to keep fully abreast of the findings of phytochemists and other investigators whose latest discoveries may be presented at scientific meetings or submitted to technical journals even as manuscripts such as this go to press, for chemical studies and clinical trials of traditional or new natural products go forward every day in an ever-continuing effort to improve health care and reduce hazards of drug administration.

Therefore, no great claims are made here for scope and currency. This book embodies an effort to bring together a concise account of the physical aspects of each of the major medicinal plants currently in use in the United States, along with a brief outline of their chemical constituents and their past and present therapeutic uses. Where applicable, toxicity is explained and also other economic uses and by-products. In some few cases, it will be seen that the medicinal “crop” itself is a by-product of a plant which is grown for an entirely different purpose, e.g., steroid extraction from the fiber plant, *Agave sisalana*.

Plants which have, in relatively recent years, fallen into disuse, appear in Table I, in the Appendix. Many others, employed in the distant past, have been abandoned or unrecognized officially for many decades and need not be mentioned. It should be realized, though, that numerous “ob-

solete" medicinal plants are still used in formulating patent medicines, some persist today in domestic or "folk" use in rural areas, and quite an array is being distributed by "health food" outlets as beverage or curative materials.

Plants which are solely or mainly pharmaceutical adjuncts—functioning as lubricants, vehicles or flavors—are relegated to Table II. Various spices are included in pharmacognosy textbooks as having carminative activity, but this is not sufficient reason to classify them here as medicinal plants; to include all the aromatic natural materials capable of such action would be unreasonable.

As this work is focused on the plants which provide therapeutic agents rather than on their applications, the species are presented in natural botanical sequence by family. This arrangement is desirable for all readers because it keeps together those plants which have or should be expected to have similar properties and cultural and other requirements.

Inasmuch as most of the commercial growing of medicinal plants takes place abroad, much of the field and processing detail has been derived from foreign sources. European chemists are very active in medicinal plant research and in patenting improved methods of extraction and purification of active principles. It will be noted that, in many instances, I have referred to and listed in the Bibliography only the English abstract of foreign articles as published in *Chemical Abstracts* (CA) or *Biological Abstracts* (BA), for I have no facility for translating the languages of central and eastern Europe or the Far East. Nevertheless, all of the literature—complete texts, reprints or abstracts—drawn upon in the preparation of this volume is presently in the subject files or on the reference shelves of the Morton Collectanea of the University of Miami.

J. F. MORTON

October 17, 1976

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