

# Handbook of Poisonous and Injurious Plants

Second Edition

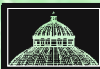
SECOND EDITION

# HANDBOOK OF POISONOUS AND INJURIOUS PLANTS



Lewis S. Nelson, M.D.  
Richard D. Shih, M.D.  
Michael J. Balick, Ph.D.

Foreword by Lewis R. Goldfrank, M.D.  
Introduction by Andrew Weil, M.D.



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## Foreword

This second edition of the *Handbook of Poisonous and Injurious Plants* is a remarkable improvement to a great book. The first edition, *The AMA Handbook of Poisonous and Injurious Plants*, offered a major advance in linking high-quality botany, pharmacognosy, fine graphics, and a limited amount of clinical medicine. The first edition's authors, Kenneth Lampe and Mary Ann McCann, established a standard for quality at the interface between botany and medicine. Their vision, the increasing societal use of herbal preparations, and the investigatory spirit of those working in Poison Control Centers and emergency departments have led to the dramatic intellectual, organizational, and photographic advances seen in this second edition.

In the 20 years that have passed since the publication of the first edition, both Poison Control Centers and emergency departments have dramatically expanded their roles in society with regard to intentional and unintentional poisoning caused by plant exposure. The staff of emergency departments and poison control centers have developed close working relationships that have had salutary effects on clinical care and risk assessment in our country and throughout the world.

The authors of this second edition represent a fusion of clinical and botanical worlds. Drs. Lewis Nelson and Richard Shih are both physicians educated in emergency medicine and medical toxicology, and Dr. Michael Balick is a botanist trained in the study of useful and harmful plants. Their collaborative efforts have created a handbook that meets the clinician's needs. This text has enhanced the previous edition's botanical rigor with that of pharmacognosy and clinical medicine. This second edition is created to assist the clinician in addressing the needs of a poisoned child or adult. The authors have created a rigorous approach that starts with the physician addressing the patient's signs and symptoms by symptom complexes. In a structured fashion, the text suggests common plants that might lead to the development of the symptom complex and describes the mechanisms of action of the implicated toxin, additional clinical manifestations, and specific therapeutics for each presentation. The photographs of frequently encountered and clinically important plants are elegantly presented to permit the clinician to assist in the evaluation of potential toxic plant ingestions.

The botanical descriptions of the several hundred cited potentially toxic and injurious plants are precise, detailed, and ideally suited for all of us (clinicians and nonclinicians) who venture into the outdoors. This book will obviously be a vital resource not only for the staff of emergency departments and Poison Control Centers but also for many generalists. The barriers between botanists and physicians are so effectively broken down that the unreasonable fears and ignorance about plant ingestions are substantially alleviated. The authors' efforts should be pleasurable reading for all who enjoy investigating the beauty and unknown characteristics of our natural environment.

This book is a demonstration of how successful a cooperative venture can be among rigorous thinkers and investigators from different intellectual domains. This text will expand our understanding of nature while permitting more expeditious and higher-quality clinical care.

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## Acknowledgments

Many people contributed to the production of this book. It is a revision of the wonderful work of Kenneth F. Lampe and Mary Ann McCann, originally published in 1985 by the American Medical Association (AMA) as *The AMA Handbook of Poisonous and Injurious Plants*. Several years ago, that organization solicited a revised version of the book, and when this revision was completed, we learned that it was no longer within the subject matter published by that organization. Given our interest in seeing this volume appear in print, we requested that it be released for publication elsewhere, and the AMA was kind enough to agree to the release. One significant difference in this second edition is that toxic mushrooms are not discussed by us. Since the original publication, many fine books on mushrooms and their toxicity and management have appeared, such as *Mushrooms: Poisons and Panaceas: A Handbook for Naturalists, Mycologists, and Physicians* (Denis R. Benjamin, W.H. Freeman & Company, 1995), *Hallucinogenic and Poisonous Mushrooms: Field Guide* (Gary P. Menser, Ronin Publishing, 1996), and *National Audubon Society Field Guide to North American Mushrooms* (Gary A. Lincoff, Knopf, 1981), and given their depth and scope, we decided not to include this topic in the second edition.

The subject matter in this book reflects a partnership between botany and medicine, and many specialists were consulted from each area. We are grateful to Willa Capraro and Tom Zanoni for their contributions to the botanical side of the manuscript, updating some of the nomenclature and taxonomy used in the book. Irina Adam and Rebekka Stone Profenno worked diligently to secure and organize the photographs and drawings that appear in the book. The United States National Herbarium at the National Museum of Natural History (NMNH) kindly provided elements of the newly accessioned photographic collection of the late Harvard Professor Richard A. Howard, noted international authority on the botany of toxic plants, in order that they be available for this book. We thank George E. Russell of the NMNH for collaboration in that endeavor. Elizabeth Pecchia produced manuscript copy of the original book, and it was through her patient and capable labors that we were able to work from a typewritten copy of the original text. Some of the plant descriptions were based on information from Steven Foster and Roger Caras's book *Venomous Animals & Poisonous Plants* (The Peterson Field Guide Series, Houghton Mifflin



Company, New York, 1994), *Hortus Third* (L.H. Bailey and E.Z. Bailey and The Staff of the Liberty Hyde Bailey Hortorium, Macmillian Publishing Co., New York, 1976), and *Manual of Vascular Plants of Northeastern United States and Adjacent Canada*, Second Edition (Henry A. Gleason and Arthur Cronquist, The New York Botanical Garden, Bronx, New York, 2004), and we are most grateful to the authors of these important works. In contemporary times, websites are also valuable scholarly resources, and in working on this book botanical data were gathered from W<sup>3</sup>TROPICOS of The Missouri Botanical Garden (<http://mobot.mobot.org/W3T/Search/vast.html>), IPNI—The International Plant Names Index (<http://www.ipni.org/index.html>), and The New York Botanical Garden Virtual Herbarium (<http://sciweb.nybg.org/science2/VirtualHerbarium.asp>), as well as from numerous other sites on individual plants or images as necessary.

We are grateful to all the photographers who provided material for this book, in particular, Steven Foster, Richard W. Lighty, Irina Adam, and the late Richard A. Howard, as well as the third author; this group collectively contributed the bulk of the photographs used in this book. Others who provided photographs include Scooter Cheatham, Peter Goltra, Hans-Wilhelm Gromping, Flor Henderson, Andrew Henderson, Fredi Kronenberg, George K. Linney, John Mickel, Michael Nee, Kevin Nixon, Thomas Schoepke, and Dennis Wm. Stevenson. As a collection, these images have greatly enhanced the Second Edition, making it much more user friendly. We are grateful for Bobbi Angell's wonderful botanical illustrations that make the glossary so much more understandable. We turned to the excellent bibliographic resources of The LuEsther T. Mertz Library of The New York Botanical Garden in the search for plates of specific plants that were otherwise not available from the photographers we queried, and are grateful to the entire staff, in particular, Stephen Sinon and Marie Long, for their patient assistance in our search for appropriate illustrations. We thank the Archives of The New York Botanical Garden for use of photographic images from its collections. The New York Botanical Garden's living collections were an important resource for illustrating this book and for understanding the plants we discuss herein, and we are grateful to Carlo Balistrieri, Margaret Falk, Francesca Coelho, Todd Forrest, Jolene Yukes, and Kim Tripp for their help and interest in this project. Dennis Wm. Stevenson was generous in providing information on cycad toxicity and images, and William Buck, Scott Mori, and Michael Nee were kind enough to provide their insight on some of our botanical questions. Richard Schnall and the staff of Rosedale Nurseries allowed us to wander in their nursery and photograph interesting cultivars. Paul Schulick and Tom Newmark of New Chapter, Inc., very kindly made their Costa Rican farm, Luna Nueva, available to us for photographing.

Lewis Nelson and Richard Shih acknowledge Lewis Goldfrank, M.D., who spurred our initial interest in the toxic properties of poisonous plants during our years of medical training under his tutelage. Dr. Goldfrank would regularly bring to our workplace examples of poisonous plants that he found in his garden and enlighten us on the clinical implications of such exposure. We express our deep appreciation to Oliver Hung, M.D., and Richard Hamilton, M.D., both of whom provided insight during both the formative and final stages of book production.

Michael Balick wishes to thank two of the mentors who helped guide him through his graduate and undergraduate studies of useful and harmful plants, the late Richard Evans Schultes at Harvard University and Richard W. Lighty at the University of Delaware. He also wishes to acknowledge the support of the Philecology Trust and the MetLife Foundation, through his appointment as a MetLife Fellow.

Finally, we thank our families for their patience and support during the research and writing of this book. Richard Shih wishes to specifically thank Laura, Catherine, Randy, Anne, Helen, and Chi Kai. Lewis Nelson is grateful to Laura, Daniel, Adina, and Benjamin as well as Myrna and Irwin. Michael Balick thanks Daniel and Tammy Balick and Roberta Lee. They have each given us the most precious contribution—time and understanding—which ultimately resulted in the volume you have before you. We hope you will find it worthy of their sacrifice.

*Lewis S. Nelson, M.D.*

*Richard D. Shih, M.D.*

*Michael J. Balick, Ph.D.*

# Introduction

I studied botany before I studied medicine, having had the good fortune to pursue an undergraduate degree under the direction of the late Dr. Richard Evans Schultes, longtime director of the Harvard Botanical Museum and godfather of modern ethnobotany. Schultes was an expert on psychoactive and toxic plants, especially of the New World tropics. Initially, through his stories of the indigenous lifestyle of Amazonian peoples, and later by helping me undertake fieldwork in this region, he awoke in me a keen interest in the botany of useful plants that led me to become first an investigator and later a practitioner of botanical medicine.

When I moved on to Harvard Medical School, I was dismayed to find that none of my teachers, even of pharmacology, had firsthand knowledge of the plant sources of drugs. Since then I have been continually struck by the lack of awareness of the medicinal and toxic properties of plants in our culture. Examples are unfounded fears of poisoning by common ornamentals such as the poinsettia, exaggerated fears of herbal remedies such as Chinese ephedra, ignorance of the vast medicinal importance of such spices as turmeric and ginger, and lack of awareness of the toxic and psychoactive properties of other spices, for example, nutmeg and mace.

At the root of this problem is the distance that exists between plant scientists and health scientists. Because I am trained in both worlds, I have been very conscious of it all my professional life. This intellectual gap creates difficulties for botanists who want to learn the medical significance of plants with pharmacological effects and for physicians, nurses, and pharmacists who want to learn how plants influence health, whether for good or ill.

By bringing together specialists from both sides of this divide, the present book does a great service. It gives different perspectives on poisonous and injurious plants while remaining grounded in the integrative science of modern ethnobotany. I wish it had been available when I was first practicing medicine and, because of my background in botany, was often asked questions about the harmful potentials of plants and products derived from them.

I meet many people who imagine that most wild plants are dangerous, who think that if you pick and eat plants at random in the backyard or woods you will die. In fact, the percentage of plants that are really harmful is quite small, as is the percentage that are really beneficial. If you wish to get to

know plants, a good place to start is to learn about those that can kill or cause serious harm. This handbook will be an invaluable resource in that educational process.

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## Authors' Note

Poison Control Centers across the United States received more than 57,000 calls relating to plant exposure in 2003 (Watson et al., 2004), of which more than 85% involved children under the age of 6 years. Plant exposures account for the seventh most common form of reported toxic exposure in children (Table 1). This demographic is consistent with the ready availability of plants at home and in public locations and suggests that most plant exposures are unintentional. Similarly, the vast majority of these exposures result in no toxicity, an important fact that should be both settling and troublesome. Although it is likely that the majority of these plant exposures (Table 2) are nontoxic, it is certainly likely that most of these “exposures” were simply that—exposures. That is, no toxin was ingested, or if a small piece of plant was ingested, it was in a quantity insufficient to cause problems. However, the possibility of disregarding as nontoxic the rare patient with a substantial exposure is ever present. For this reason, a comprehensive understanding of the types of toxins present in a plant and the likely clinical manifestations following exposure is critical and the focus of this book.

Specific identification of a plant may guide management by revealing potential toxins, placing the risk in context, and providing a time frame for the development of clinical findings. Care should be taken to avoid misidentification, a particular problem when plants are discussed by their common rather than by their botanical name. Although management of a patient with an identified exposure is generally preferable to managing a patient with an “exposure to an unknown plant,” many plant-exposed cases are managed successfully without knowledge of the culprit plant. However, adverse events may result by the attempted management of a misidentified plant. Each plant description in Section 5 is accompanied by one or more photographs to help the user of the book to qualitatively and tentatively identify an implicated plant (as well to provide a visual cue to those using the book as a learning tool). Not every specific plant discussed in the book is illustrated, nor are all the horticultural varieties illustrated. Some groups of ornamental plants may have hundreds of cultivars that have been named, each with a slightly different appearance or characteristic. Thus, many of the plants shown in the photographs are representative of the appearance of only a small group of species cultivars within the family or genus that might have toxic properties. The assistance of management

**TABLE 1.** Substances Most Frequently Involved in Pediatric Exposures (Children Under 6 Years) in 2003

<i>Substance</i>	<i>Number</i>	<i>Percent</i>
Cosmetics and personal care products	166,874	13.4
Cleaning substances	121,048	9.7
Analgesics	97,463	7.8
Foreign bodies	92,166	7.4
Topicals	92,091	7.4
Cough and cold preparations	68,493	5.5
<b>Plants</b>	<b>57,778</b>	<b>4.6</b>
Pesticides	50,938	4.1
Vitamins	45,352	3.6
Antimicrobials	35,152	2.8
Antihistamines	32,622	2.6
Arts/crafts/office supplies	31,211	2.5
Gastrointestinal preparations	29,770	2.4
Hormones and hormone antagonists	23,787	1.9
Electrolytes and minerals	22,337	1.8

Data from Watson et al. (2004)

**TABLE 2.** Frequency of Plant Exposures by Plant Type in 2003

<i>Botanical name</i>	<i>Common name</i>	<i>Frequency</i>
<i>Spathiphyllum</i> spp.	Peace lily	3,602
<i>Philodendron</i> spp.	Philodendron	2,880
<i>Euphorbia pulcherrima</i>	Poinsettia	2,620
<i>Ilex</i> spp.	Holly	2,427
<i>Phytolacca americana</i>	Pokeweed, inkberry	1,863
<i>Ficus</i> spp.	Rubber tree, weeping fig	1,612
<i>Toxicodendron radicans</i>	Poison ivy	1,500
<i>Dieffenbachia</i> spp.	Dumbcane	1,324
<i>Crassula</i> spp.	Jade plant	1,146
<i>Epipremnum aureum</i>	Pothos, devil's ivy	1,083
<i>Capsicum annuum</i>	Pepper	1,049
<i>Rhododendron</i> spp.	Rhododendron, azalea	1,047
<i>Chrysanthemum</i> spp.	Chrysanthemum	869
<i>Nerium oleander</i>	Oleander	847
<i>Schlumbergera bridgesii</i>	Christmas cactus	841
<i>Hedera helix</i>	English ivy	769
<i>Eucalyptus</i> spp.	Eucalyptus	727
<i>Malus</i> spp.	Apple, crabapple(plant parts)	703
<i>Nandina domestica</i>	Heavenly bamboo	694
<i>Saintpaulia ionantha</i>	African violet	685

*Note:* This table provides the frequency of involvement of plants in exposures reported to poison centers. These data do not imply actual exposure, poisoning, or any judgment with regard to toxicity. Several of the plants on the list pose little, if any, ingestion hazard.

Data from Watson et al. (2004)

algorithms and of books that help in plant identification is always appreciated, although this is unlikely to replace the assistance of a trained professional who is able to correctly identify plants. This person may typically be a professional botanist or a horticulturist, although some nurseries (Rondeau et al., 1992), which are more readily available, may have adequate expertise, particularly for common plants. A positive identification of an individual plant is most likely when a freshly collected part of the plant containing leaves and flowers or fruits is presented to the knowledgeable botanist or horticulturist. Poison Control Centers generally have relationships with the botanical community should the need for plant identification arise. Section 1 (Botanical Nomenclature and Glossary of Botanical Terms) provides an overview of botanical terms to ensure that the interaction between the botanical and medical communities is clear and efficient; this is critical to ensuring both safe and timely communication to meet the exacting demands of a clinical situation.

As most exposures result in little or no toxicity, the initial management of most incidents involving children who are asymptomatic should be expectant. This approach includes observation, at home or in the hospital as appropriate, depending on the nature of the exposure, and supportive care. For example, patients with several episodes of vomiting may benefit from an antiemetic agent and oral rehydration or, occasionally, intravenous fluids. Perhaps the greatest paradigm shift since the publication of the earlier edition of this book is the current deemphasis of aggressive gastrointestinal decontamination (see Section 4). Syrup of ipecac, for example, is almost never recommended, and orogastric lavage should be reserved for those patients with a reasonable likelihood of developing consequential poisoning. This group should include the minority of patients exposed to plants. Although oral activated charcoal is effective at reducing the absorption of many chemicals, its benefit following the vast majority of plant exposures has never been specifically studied. However, given the extremely low risk of administration of oral activated charcoal to an awake patient who is able to drink spontaneously, its use should be considered in patients with plant exposures. For complete information on the initial decontamination of the poisoned patient, call your regional Poison Control Center or refer to a textbook of medical toxicology, emergency medicine, or pediatrics.

Sections 2 ("Poisons, Poisoning Syndromes, and Their Clinical Management"), 3 (Plant-Induced Dermatitis [Phyto dermatitis]), and 4 (Gastrointestinal Decontamination) include descriptions of the clinical findings and focused descriptions of management strategies for patients with plant poisonings. Although very few antidotes are available to treat the effects of the innumerable toxins available in plants, rarely are antidotes actually necessary. Much of our understanding of poisoning syndromes derives from toxicity associated with the

use of purified plant toxins as pharmaceuticals (e.g., morphine from *Papaver somniferum*). The amount of a toxin present in a plant is unpredictable, whereas the amount in a tablet is always defined. There is generally a lower concentration of “toxin” in the plant than there is of “drug” in a tablet. However, this by no means should minimize the clinical concern following exposure to a plant containing a consequential toxin, such as *Colchicum autumnale*, which contains colchicine.

As already suggested, there is little adequate evidence to precisely direct the management of any specific plant poisoning. The limited knowledge relates to the wide diversity of available plants and the limited quality of available case data (e.g., did they eat it?). The cost and effort associated with proving an exposure (e.g., toxin levels in blood) makes this task (unfortunately but appropriately) of low priority to the physician involved with the care of the exposed patient. As with many other clinical situations, bedside care of patients with toxic plant exposures should be managed primarily based on their clinical manifestations and responses to therapy and only secondarily on the basis of the toxin to which they are presumably exposed. The dictum has been and remains “Treat the patient, not the poison”. . . . but don't ignore the poison.

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- Rondeau ES, Everson GW, Savage W, Rondeau JH. Plant nurseries: A reliable resource for plant identification? *Vet Hum Toxicol* 1992;34:544–546.
- Watson WA, Litovitz TL, Klein-Schwartz W, et al. 2003 Annual report of the American Association of Poison Control Centers Toxic Exposure Surveillance System. *Am J Emerg Med* 2004;22:335–404.





**SECTION 1.**

**Botanical Nomenclature and  
Glossary of Botanical Terms**

# Botanical Nomenclature

Before the work of Carolus Linnaeus (1707–1778), the botanist who established the binomial system of plant nomenclature, a plant sometimes had a name that consisted of many descriptive words. Linnaeus helped to standardize botanical nomenclature by establishing a genus and species name for each plant, followed by its designator. A clinical report involving a plant must always include the plant's botanical (binomial) name, which consists of both the genus and the species, for example, *Duranta repens*. By convention, both are italicized or underlined. *Duranta* is the name of the genus and the first letter is always capitalized. A genus (the plural of which is genera) may be composed of a single species or several hundred. The second part of the binomial, in this case *repens*, is the particular species within the genus, and it is always in lowercase letters. It is important to include the name of the person (often abbreviated) who named the particular species, as part of the scientific name, to minimize confusion between similar or related plant species. For example, in the case above, the complete name, which would allow the most precise identification, is *Duranta repens* L.; L. is the accepted abbreviation for Carolus Linnaeus.

Over time, as botanists continue to revise the classification systems of their specific plant families or groups to reflect additional knowledge and a more natural, evolutionarily based system, plants are periodically moved into different genera or sometimes families. A species may be split into several species or varieties, or lumped together with plants of other species to comprise a single species, all based on the expertise of the taxonomist utilizing characteristics from other specialties ranging from gross morphology to molecular biology. One shortcoming of this fluid system is that scientists can have differing opinions as to how to classify a specific plant. To limit confusion with regard to nomenclature, when previously employed names are changed as part of a more recent taxonomic study, they become recognized as synonyms. In this book, the most common current synonyms are included in parentheses with an equal sign, for example, *Duranta repens* L. (= *D. plumferi* Jacq.). Some species are divided further into subspecies (ssp.), varieties (var.), cultivated varieties (cultivars (cv.)), and forms (fo.); for example, *Philodendron scandens* C. Koch & H. Sello ssp. *oxycardium* (Schott) Bunt. In this instance, the plant was first named *Philodendron oxycardium* by Heinrich Schott, but was reevaluated and then transferred to become a subspecies of *Philodendron scandens* by George Bunting. Hybrid names are

indicated by an  $\times$  (multiplication symbol), as in *Brugmansia*  $\times$  *candida*. Horticultural names are not italicized but are capitalized and set in single quotation marks, for example, *Ilex glabra* cv. 'Compacta.' A printed work can never be fully up to date from a taxonomic standpoint because taxonomists are constantly refining the classification systems of the groups on which they work. At the same time, there may be a significant volume of medical literature based on an "older" name, and thus, for most efficient and rapid use of the information in this volume, some of the older names used in the first edition are retained.

Associations of like genera are placed in a family. The family name is not italicized, but the initial letter is always capitalized. Botanists have changed the status of some families to reflect a more natural evolutionary lineage, either by incorporating them into other families and dropping their original designation or by creating entirely new families. Since the publication of the original edition of this *Handbook*, family names for some of the genera have been changed, but in this new edition the older name has been maintained to facilitate rapid consultation of the toxicological literature, and the new name is added in parentheses, for example, Umbelliferae (= Apiaceae). We also head many of the poisoning syndromes in Section 2 with the name of the genus followed by the word "species" (spp.) to indicate that there are several to many species in this genus having toxic properties.

If an individual species cannot be found, but the genus is listed, it should be assumed, conservatively, that the species has a potential for toxicity similar to another member of that genus. To a lesser extent, such an association may exist for members of the same family (Table 3). These relationships are far from exact, and inconsistencies in the clinical presentation or therapeutic response of an exposed patient should prompt immediate consultation with a Poison Control Center or other expert source. The botanical nomenclature used in this book has been derived from various sources, as well as the opinions of specialist reviewers.

There are no rules for establishing common names of plants. Common names can be highly misleading and may erroneously suggest toxicity or the lack of toxicity. For example, a plant known as a "pepper" plant could be the sweet pepper commonly eaten as a vegetable (*Capsicum annuum* L. var. *annuum*); or one of the extremely hot, virtually "inedible" peppers (particularly when eaten in quantity and certainly depending on the person's palate) used as a decorative houseplant in that same species but containing significant quantities of capsaicin; or the spice plant from which we derive black pepper (*Piper nigrum*); or the pepper bush (*Leucothoe* species) containing grayanotoxins; or the pepper tree (*Schinus molle*) with triterpene-containing berries; or any number of other species with "pepper" as part of its common name. Another

**TABLE 3.** Examples of Plants Producing Systemic Poisoning in Humans Arranged by Family and Genus

<b>Amaryllidaceae</b> <i>Amaryllis</i> <i>Hippeastrum</i> <i>Clivia</i> <i>Crimum</i> <i>Galanthus</i> <i>Hymenocallis</i> <i>Lycoris</i> <i>Narcissus</i> <i>Zephyranthes</i>	<b>Berberidaceae</b> <i>Caulophyllum</i> <i>Podophyllum</i>  <b>Boraginaceae</b> <i>Echium</i> <i>Heliotropium</i>  <b>Calycanthaceae</b> <i>Calycanthus</i>	<b>Euphorbiaceae</b> <i>Aleurites</i> <i>Euphorbia</i> <i>Hippomane</i> <i>Hura</i> <i>Jatropha</i> <i>Manihot</i> <i>Pedilanthus</i> <i>Ricinus</i>
<b>Anacardiaceae</b> <i>Schinus</i>	<b>Campanulaceae</b> <i>Hippobroma</i> <i>Lobelia</i>	<b>Ginkgoaceae</b> <i>Ginkgo</i>
<b>Apocynaceae</b> <i>Acokanthera</i> <i>Adenium</i> <i>Allamanda</i> <i>Nerium</i> <i>Pentalinon</i> <i>Thevetia</i>	<b>Caprifoliaceae</b> <i>Lonicera</i> <i>Sambucus</i> <i>Symphoricarpos</i>	<b>Guttiferae</b> <i>Calophyllum</i> <i>Clusia</i>
<b>Aquifoliaceae</b> <i>Ilex</i>	<b>Celastraceae</b> <i>Celastrus</i> <i>Euonymus</i>	<b>Hippocastanaceae</b> <i>Aesculus</i>
<b>Araceae</b> <i>Arum</i> <i>Alocasia</i> <i>Anthurium</i> <i>Arisaema</i> <i>Caladium</i> <i>Calla</i> <i>Colocasia</i> <i>Dieffenbachia</i> <i>Epipremnum</i> <i>Raphidophora</i> <i>Monstera</i> <i>Philodendron</i> <i>Spathiphyllum</i> <i>Symplocarpus</i> <i>Xanthosoma</i> <i>Zantedeschia</i>	<b>Compositae</b> <i>Senecio</i>	<b>Iridaceae</b> <i>Iris</i>
<b>Araliaceae</b> <i>Hedera</i>	<b>Coriariaceae</b> <i>Coriaria</i>	<b>Leguminosae</b> <i>Abrus</i> <i>Baptisia</i> <i>Caesalpinia</i> <i>Cassia</i> <i>Crotalaria</i> <i>Gymnocladus</i> <i>Laburnum</i> <i>Leucaena</i> <i>Pachyrhizus</i> <i>Robinia</i> <i>Sesbania</i> <i>Sophora</i> <i>Wisteria</i>
<b>Asclepiadaceae</b> <i>Calotropis</i> <i>Cryptostegia</i>	<b>Cornaceae</b> <i>Aucuba</i>  <b>Corynocarpaceae</b> <i>Corynocarpus</i>  <b>Cucurbitaceae</b> <i>Momordica</i>  <b>Cycadaceae</b> <i>Cycas</i>  <b>Ericaceae</b> <i>Kalmia</i> <i>Leucothoe</i> <i>Lyonia</i> <i>Pernettya</i> <i>Pieris</i> <i>Rhododendron</i>	<b>Liliaceae</b> <i>Allium</i> <i>Aloe</i> <i>Bulbocodium</i> <i>Colchicum</i> <i>Convallaria</i> <i>Gloriosa</i> <i>Ornithogalum</i> <i>Schoenocaulon</i> <i>Scilla</i> <i>Urginea</i> <i>Veratrum</i> <i>Zigadenus</i>

TABLE 3. *Continued*

<b>Loganiaceae</b> <i>Gelsemium</i> <i>Spigelia</i> <i>Strychnos</i>	<b>Ranunculaceae</b> <i>Aconitum</i> <i>Actaea</i> <i>Adonis</i> <i>Anemone</i> <i>Caltha</i> <i>Clematis</i> <i>Helleborus</i> <i>Pulsatilla</i> <i>Ranunculus</i>	<b>Solanaceae</b> <i>Atropa</i> <i>Capsicum</i> <i>Cestrum</i> <i>Datura</i> <i>Brugmansia</i> <i>Hyoscyamus</i> <i>Lycium</i> <i>Nicotiana</i> <i>Physalis</i> <i>Solandra</i> <i>Solanum</i>
<b>Loranthaceae</b> <i>Phoradendron</i> <i>Viscum</i>	<b>Rhamnaceae</b> <i>Karwinskia</i> <i>Rhamnus</i>	<b>Taxaceae</b> <i>Taxus</i>
<b>Meliaceae</b> <i>Melia</i> <i>Swietenia</i>	<b>Rosaceae</b> <i>Eriobotrya</i> <i>Malus</i> <i>Prunus</i> <i>Rhodotypos</i>	<b>Thymelaeaceae</b> <i>Daphne</i> <i>Dirca</i>
<b>Menispermaceae</b> <i>Menispermum</i>	<b>Rutaceae</b> <i>Poncirus</i>	<b>Umbelliferae</b> <i>Aethusa</i> <i>Cicuta</i> <i>Conium</i> <i>Oenanthe</i>
<b>Myoporaceae</b> <i>Myoporum</i>	<b>Sapindaceae</b> <i>Blighia</i> <i>Sapindus</i>	<b>Verbenaceae</b> <i>Duranta</i> <i>Lantana</i>
<b>Oleaceae</b> <i>Ligustrum</i>	<b>Saxifragaceae</b> <i>Hydrangea</i>	<b>Zamiaceae</b> <i>Zamia</i>
<b>Palmae</b> <i>Caryota</i>	<b>Scrophulariaceae</b> <i>Digitalis</i>	
<b>Papaveraceae</b> <i>Chelidonium</i>		
<b>Phytolaccaceae</b> <i>Phytolacca</i> <i>Rivina</i>		
<b>Polygonaceae</b> <i>Rheum</i>		

problem associated with common names is that they can sometimes lead to the assumption that plants are related—either botanically or toxicologically. For example the “hellebore,” *Helleborus niger* L., is in the family Ranunculaceae, but it bears no relationship to the “false hellebore,” *Veratrum viride* Aiton, a member of the family Liliaceae; the former species contains toxic glycosides and saponins and the latter contains toxic alkaloids. The botanical (binomial) nomenclature is essential for ensuring proper plant identification.

Common names are included throughout this book only to facilitate in the identification of a particular plant in question. Many common names are no longer in use and others have been developed, but there is no way to verify contemporary use except by interviewing the inhabitants of a region and record-

ing their responses. Thus, for a compilation of common names in this text we depended on the literature. The common names of native species from the United States and Canada are taken from Kartesz and Kartesz (1980). Names for West Indian species and Guam were selected from the floras listed in the references. Common names for cultivated plants were taken primarily from *Hortus Third*. In addition to floras, Hawaiian names are from Neal (1965), Cuban names from Roig y Mesa (1953), and Mexican names from Aguilar and Zolla (1982). Many less-common, older names for plants in the United States were selected from Clute (1940). When bolded, the common name connotes the most widely employed name in contemporary use in the United States.

Care must be exercised when evaluating poisonous plant literature. In some instances, information on the toxicity of plants in grazing animals is extrapolated to predict that which may occur in humans. Unsubstantiated plant lore has passed through generations of textbooks; we have attempted to remove as much lore as possible. Even evaluations based on human case reports, which act as the foundation for this book, may be flawed by erroneous identification of the plants or inappropriate attribution of the clinical effects to the plant.

# Glossary of Botanical Terms

This list of botanical and horticultural terms is provided to aid in understanding the plant descriptions found in the text. The terms have mostly been taken from two primary references, *Manual of Vascular Plants of Northeastern United States and Adjacent Canada*, Second Edition (Henry A. Gleason and Arthur Cronquist, 1991) and *Hortus Third: A Concise Dictionary of Plants Cultivated in the United States and Canada* (Liberty Hyde Bailey and Ethel Zoe Bailey, Revised and Expanded by The Staff of the Liberty Hyde Bailey Hortorium, 1976). Some definitions have been modified from the original for ease of use and understanding by the nonbotanist, and the reader is urged to consult a botanical textbook if greater detail is required. The botanical illustrations are by Bobbi Angell.

**Alternate:** Arranged singly at different heights and on different sides of the stem—as in alternate leaves.



**Annual:** Yearly; a plant that germinates, flowers, and sets seed during a single growing season.

**Anther:** The portion of the stamen of a flower that contains the pollen, usually having two connected pollen sacs.

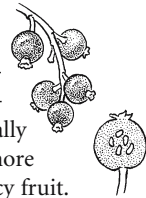
**Aril:** A specialized, usually fleshy outgrowth that is attached to the mature seed; more loosely, any appendage or thickening of the seed coat.



**Bark:** Outer surface of the trunk of a tree or woody shrub.

**Bearded:** Bearing a tuft or ring of rather long hairs.

**Berry:** The most generalized type of fleshy fruit, derived from a single pistil, fleshy throughout, and containing usually several or many seeds; more loosely, any pulpy or juicy fruit.



**Biennial:** Living 2 years only and blooming the second year.

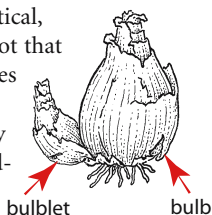
**Blade:** The expanded, terminal portion of a flat organ such as a leaf, petal, or sepal, in contrast to the narrowed basal portion.

**Bony:** Hard surface as in a bone.

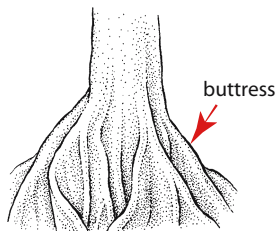
**Bract:** Any more or less reduced or modified leaf associated with a flower or an inflorescence that is not part of the flower itself.

**Bulbil, bulblet:** Diminutive of bulb; one of the small new bulbs arising around the parent bulb; a bulblike structure produced by some plants in the axils of leaves or in place of flowers.

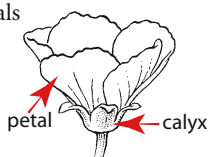
**Bulb:** A short vertical, underground shoot that has modified leaves or thickened leaf bases prominently developed as food-storage organs.



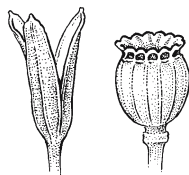
**Buttress:** Flattened support structures at the base of the trunk of certain types of trees, particularly in the tropics.



**Calyx:** All the sepals of a flower, collectively.



**Capsule:** A dry, dehiscent fruit composed of more than one carpel.



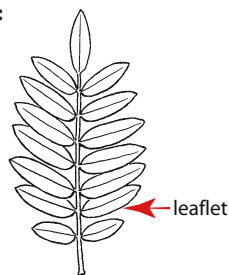
**Carpel:** The fertile leaf of an angiosperm that bears the ovules. The pistil (female part of the flower) is made up of one or more carpels, where the seeds normally are found.

**Climbing:** Growing more or less erect without fully supporting its own weight, instead leaning, scrambling, twining, or attaching onto some other structure such as a tree or wall.

**Coarse:** Rough, as in the texture of a leaf.

**Compound leaf:**

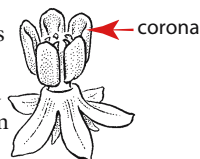
A leaf with two or more distinct leaflets.



**Cone:** A cluster of sporophylls or ovuliferous scales on an axis; a strobilus, as in pine or cycad cones.

**Corolla:** All the petals of a flower collectively.

**Corona:** A set of petal-like structures or appendages between the corolla and the androecium (male element of the flower).



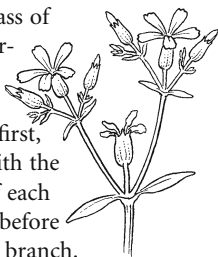
**Creeping:** Growing along (or beneath) the surface of the ground and rooting at intervals, usually at the nodes.

**Cultivar:** A horticultural variety originating from a cultivated plant, possessing interesting or important characters such as color, smell, taste, or disease resistance that make it worthy of distinction through naming.

**Cuttings:** Small pieces of stems or roots that can be put in soil to develop into a complete plant.



**Cyme:** A broad class of inflorescences characterized by having the terminal flower bloom first, commonly also with the terminal flower of each branch blooming before the others on that branch.



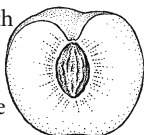
**Deciduous:** Falling after completion of the normal function. A deciduous tree is one that normally loses its leaves at the approach of winter or the dormant season.

**Dehiscent:** Opening when mature, exposing or releasing the contents, as in a fruit releasing its seeds.

**Dicotyledons:** One of the two major divisions of the angiosperms (a group characterized by having ovules borne in ovaries) bearing two (or rarely more) cotyledons or seed leaves, comprising most of the familiar seed plants.

**Divided:** Cut into distinct parts, as a leaf that is cut to the midrib or the base.

**Drupe:** A fleshy fruit with a firm endocarp (“pit” or “stone”) that permanently encloses the usually solitary seed, or with a portion of the endocarp separately enclosing each of two or more seeds.



**Ellipsoid:** Elliptical in long section and circular in cross section (applied only to three-dimensional bodies).

**Elliptic:** With approximately the shape of a geometric ellipse (applied only to flat bodies).



**Erect:** Upright.

**Escaped:** As in an introduced plant species that has escaped from cultivation into the wild.

**Evergreen:** Remaining green throughout the winter, as in a tree that keeps its leaves throughout the year.

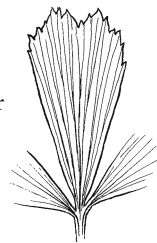
**Feathery:** Feather shaped in outline, as in leaves.

**Female flowers:** Referring to flowers that are pistillate, having pistils but no stamens.

**Filament:** The stalk of a stamen, that is, the part that supports the anther.

**Finely toothed leaves:** Leaves with small serrations on the edges.

**Fishtail-shaped:** As in leaflets of some palms that have a somewhat irregularly triangular or “fishtail” outline.



**Fleshy:** Thick and juicy; succulent.

**Floral bracts:** Greatly reduced leaf associated with a flower, usually at its base.

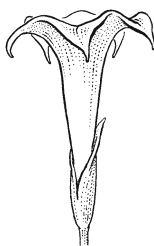
**Floral branches:** Branches or axes on which flowers are formed.

**Flower:** An axis bearing one or more pistils or one or more stamens or both.

**Fruit:** A ripened ovary along with any other structures that may ripen with it and form a unit with it.

**Fruit pulp:** Fleshy material inside of a fruit, often the part that is eaten by humans or animals.

**Funnel-form:** Shaped like a funnel, as in a flower.



**Furrowed (stems):** Having longitudinal channels or grooves along the stem.

**Glaucous:** Covered with a fine, waxy, removable powder that imparts a whitish or bluish cast to the surface, as in a prune or a cabbage leaf.

**Globose:** More or less spherical.

**Glossy:** Shiny.

**Head:** A cluster of flowers crowded closely together at the tip of a floral stem.

**Herb:** A plant, either annual, biennial, or perennial, with the stems dying back to the ground at the end of the growing season, and without woody stems.

**Herbaceous:** Adjectival form of herb; also, leaflike in color or texture, or not woody.

**Hilum:** The scar of the seed at its point of attachment.



**Horticultural varieties:** As in cultivars.

**Hybrid:** A plant that results from a cross between two parent species that are genetically different.

**Indehiscent:** Remaining closed at maturity.

**Inflorescence:** A flower cluster of a plant; the arrangement of the flowers on the axis.

**Juvenile leaves:** A younger form or shape of the leaves of a plant, which change when the plant reaches maturity.

**Lacy leaves:** As in the shape of leaves with many tears or cuts.

**Lance-shaped:** As in leaves that are several times longer than broad and widest below the middle, tapering with convex sides upward to the tip.

**Latex:** A colorless, white, yellow, or reddish liquid, produced by some plants, characterized by the presence of colloidal particles of terpenes dispersed in water.

**Leaflet:** An ultimate unit of a compound leaf. (see **Compound leaf**)

**Leathery:** Thick and leatherlike in texture, as in a leaf.

**Lobe:** A projecting segment of an organ, too large to be called a tooth, but with the adjoining sinuses usually extending less than halfway to the base or midline.

**Mature fruit:** A fruit that has ripened; often a different color from when it was young.

**Midrib:** The main rib or longitudinal vein (an externally visible vascular bundle) of a leaf or leaflet.

**Milky latex:** White-colored sap of a plant.

**Monocotyledons:** One of two major divisions of the angiosperms (a group of plants characterized by having ovules borne in ovaries), bearing only one cotyledon or seed leaf, for example, the grasses, lilies, bromeliads, orchids, and palms.

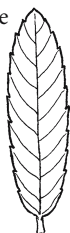
**Native:** Having its origins in a particular geographic area, as in a plant native to the Western United States.

**Naturalized:** Thoroughly established in a particular geographic region, but originally coming from another geographic area.

**New World:** Pertaining to the Western Hemisphere, particularly the Americas, as in a plant native to that region.

**Nut:** A relatively large, dry, indehiscent fruit with a hard wall, usually containing only one seed.

**Oblong:** Shaped more or less like a geometric rectangle (other than a square).

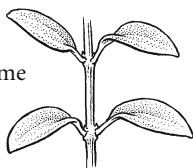


**Obovate:** Similar to ovate but larger toward the tip of the leaf.



**Old World:** Pertaining to Europe, Asia, and Africa, as in a plant native to that region.

**Opposite:** Situated directly across from each other at the same node or level, as in the leaves or leaflets of some plants; situated directly in front of (on the same radius as) another organ, as stamens opposite the petals.

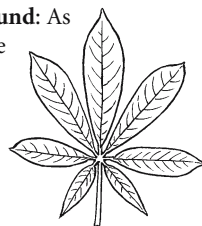


**Ovate:** Shaped like a long section through a hen's egg, with the larger end toward the base.



**Ovule:** A young or undeveloped seed.

**Palmately compound:** As in a leaf with three or more lobes arising from a common point.



**Panicle:** A branching indeterminate inflorescence, usually broadest near the base and tapering upwards.



**Pantropical:** Found throughout the tropical regions.

**Pedicellate:** Borne on a pedicel (stalk of a single flower in an inflorescence).

**Pendant:** Hanging, as in pendant racemes of flowers.

**Perennial:** A plant living more than 2 years.

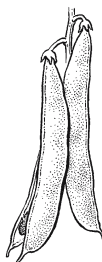
**Petal:** A member of the inner set of floral leaves, usually colored or white and serving to attract pollinators.

**Pistil:** The female organ of a flower, ordinarily differentiated into an ovary, style, and stigma.

**Pit:** Hardened covering enclosing seed or seeds in a fruit, as in a peach.

**Pleated:** When young, as in a leaf, folded several times along the length.

**Pod:** Any kind of dry, dehiscent fruit.



**Prickle:** A sharp outgrowth from the epidermis or bark.



**Propagated:** As in multiplying a plant through making cuttings and planting them.

**Pubescent:** Bearing hairs (trichomes) of any sort.

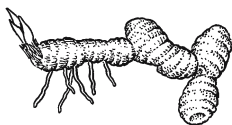
**Raceme:** A more or less elongate inflorescence with pedicellate flowers arising in a sequence from the bottom up from an unbranched central axis.



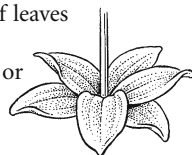
**Recurved petals:** Flower petals that are curved downward or backward.

**Resinous:** Containing resin.

**Rhizome:** A creeping underground stem.



**Rosette:** A cluster of leaves or other organs arranged in a circle or disk, often in a basal position.



**Runner:** A long, slender, prostrate stem rooting at the nodes and tip.

**Sap:** Liquid contained within the stem.

**Scale:** Any small, thin, or flat structure.

**Scaly:** Covered with scales or bracts.

**Scorpioid cyme:** A coiled inflorescence with flowers developing alternately to left and right in a zigzag fashion.



**Seed coat:** Outside coating of a seed.

**Seedpods:** As in a fruit or pod containing seeds.

**Sepal:** One of the outermost set of floral leaves. (see **Calyx**)

**Serrate:** Toothed along the margin with sharp, forward-pointing teeth.



**Serrated leaf:** Saw toothed, with teeth pointing forward toward the tip of the leaf.

**Showy:** Conspicuous and ornamental.

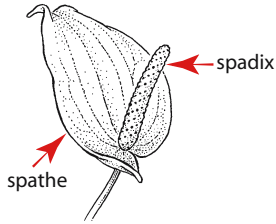
**Shrub:** A woody plant that remains low and produces shoots or trunks from its base.

**Silky:** A covering of fine, soft hairs.

**Simple leaf:** A leaf with the blade all in one piece (although it may be deeply cleft), not compound.

**Sinus:** The cleft between two lobes or segments of a leaf.

**Spadix:** The thick or fleshy flower spike of certain plants, usually surrounded by or subtended by a bract, as in the Araceae.



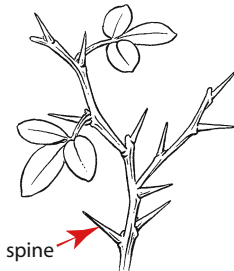
**Spathe:** A large, usually solitary bract subtending and often enclosing an inflorescence; the term is used only in the monocotyledons.

**Spearhead-shaped:** As in a leaf shaped like the head of a spear.

**Spike:** A more or less elongate inflorescence, with sessile (lacking a stalk) flowers attached directly by their base.



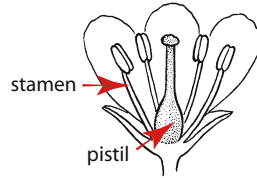
**Spine:** A firm, slender, sharp-pointed structure, representing a modified leaf or stipule; more loosely, a structure having the appearance of a true spine.



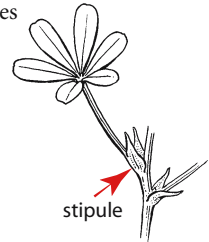
**Sporophyll:** A modified leaf that bears or subtends the spore-bearing cases in certain plants such as ferns and cycads.

**Sprays:** Clusters of flowers.

**Stamen:** The male organ of a flower, consisting of an anther usually on a filament.



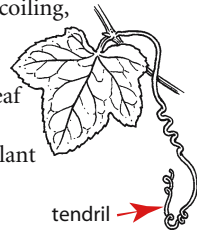
**Stipule:** One of a pair of basal appendages found on the leaf petiole of many species.



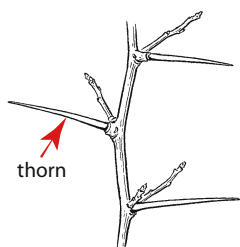
**Strap-shaped, straplike:** As in a long, narrow, thick leaf.

**Strobilus:** A cluster of sporophylls or ovule-bearing scales on an axis, such as in a cone.

**Tendril:** A slender, coiling, or twining organ (representing a modified stem or leaf or part thereof) by which a climbing plant grasps its support.



**Terminal clusters:** As in flowers clustered at the end or tip of a branch.



**Thorn:** A stiff, woody, modified stem with a sharp point.

**Throat:** The opening or orifice of a fused corolla or calyx, or the somewhat expanded part between the proper tube and the limb; in grasses, the upper margins of the sheath.

**Tooth:** Serration, as on the edge of a leaf (plural, teeth).

**Tuberous:** Thickened like a tuber, as in roots.

**Variigated:** Differently colored areas, as in a leaf with streaks, marks, or patterns of various colors on its surface.

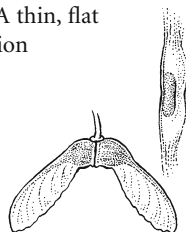
**Variety:** A subdivision of a species ranking lower than a subspecies.

**Velvety:** With erect, straight, moderately firm hairs, such as on a stem or leaf.

**Warty:** Covered with wartlike structures.

**Weed:** A plant that aggressively colonizes disturbed habitats or places where it is not wanted.

**Winged fruit/seed:** A thin, flat extension or projection from the side or tip of a seed.



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