Ancestral Plants

A Primitive Skills Guide To Important Edible, Medicinal, and Useful Plants of the Northeast
Volume 1

Written by
Arthur Haines

Foreword by
Mike Douglas

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The author gathering hips of ***Rosa palustris*** (swamp rose) from a tidal shrub swamp in February. The container is a primitive blickey made from the bark of ***Pinus strobus*** (eastern white pine). Though many species of plants are dormant during the winter season, the avid forager is not.

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Dedication

Tom Brown Jr. provided me (and many others) with inspirational accounts of being connected to the earth and the possibilities that exist when people live with (not beside) wild beings. His stories, whether real or fictitious, have guided and enhanced my interaction with the natural world. Tom shared his adventures with Rick, and I shared mine with Chad and Ken, childhood friends to whom this book is also dedicated.

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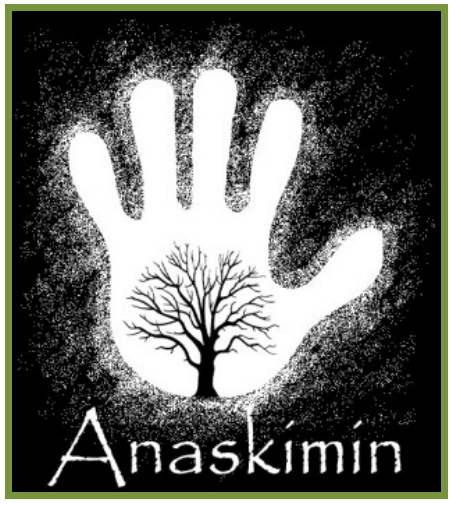

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Warning: Using wild plants can have profound effects on your health. Every attempt by the author has been made to provide complete and accurate information concerning the safety of using the plants discussed in this reference. However, the author, publisher, and printer accept no liability for any loss or injury as a result of use or misuse of ideas, preparations, and suggestions presented in this book. Further, this book is not intended to replace consultation with health and nutrition experts.

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1.0 FOREWORD

Plants, those innocuous life forms that share our breath, hold down the soil, and provide us with clothing, medicine, and food, are all around us. Constantly under foot, their tenacity is inspiring. When we cut them in our lawns, they modify their growth and evade the blades of our mowers. They break through the cracks in concrete sidewalks, recover compacted and nutrient-poor soils, and create the foundation for the rest of life, ourselves included, to gain a foothold on once barren landscapes.

Plants are the original solar panels. Turning sunlight into fuel with efficiency we have strived for, for decades. All that we eat, burn, and generate is due to these diverse, and subtly powerful, beings. Plants are the foot soldiers in the spread of the fragile carpet of life that blankets our planet. Their green hue helps to regulate the temperature of this unique life-supporting world. In fact, against the cold of the universe, it is the plants, or their absence, that dictate the climate of every bioregion. On a deeper level, plants change our mood with their colors, they inspire us toward beauty with their fragrance and inflorescences, they teach us through prickers and oils that cause our skin to blister to be aware of their presence. They mark time with their gifts. Early spring is a celebration of trout lilies, fiddleheads, and coltsfoot flowers, while summer is an explosion of overlapping plant celebrations as they gift us with their fruits in fleeting succession. Autumn is marked by the apples, mast crops of acorn, autumn-olive, and the countless roots and tubers.

In short, knowledge of the plants, their gifts, their rhythms, and how they create an orchestrated banquet set in time to the seasons will empower you to live beyond the confines of the kitchen cupboard, grocery store, the medical establishment, and the pharmacy. You will be called by their beauty, their taste, their usefulness, and their ability to heal. They will compel you to move off the pavement and into natural places. The plants will entice you to explore fields, the edges of waterways, and wooded areas. As you open your door, every day will bring you new surprises. Tasty buds will give way to fragrant and edible blossoms. Delicious fruits will yield to valuable sources of fiber for making cordage—strings powerful enough to cast the shoots you formed into arrows the season before.

As your plant repertoire grows within you, the plants will begin to change your awareness. Bird song will become more vibrant and informative. You will know the availability of broad-leaved cattail shoots by the song of the red-winged blackbird, the peak of the autumn-olive by the trill of the cedar waxwing, and the availability of northern red oak acorns by the scolding of crows and jays. It is the landscape of plants that will begin to direct your thoughts and movements. Your pace will match that of the rest of the wildlife that forages and utilizes the countless gifts of this diverse kingdom.

The contents of this book might, at first, appear overwehlming. There are thousands of years of ancestral experience and thousands of hours of firsthand experience poured into each species. There are also the countless scientific studies and validation behind each of the plants presented. In as much as possible, direct and firsthand experience is the basis

for what is written. Each plant covered has been selected for its value, availability, and the diversity of materials it provides.

The author, Arthur Haines, is a tenacious botanist, a well-respected primitive skills practitioner, and a good friend. I started my journey in the world of ethnobotany with Arthur in a university experimental forest seeking the elusive Indian cucumber root. That was in 1990. Now, 19 years later, our bond of friendship has strengthened with our shared knowledge and experiences. Having successfully staved off numerous infections and ailments, even MRSA, by using the plants available to us right out our door, we have been able to encourage and support each other on a fabulous journey. It is a journey we hope you will join us on. It is the experience of countless lifetimes and the excitement of new discoveries every day. Nothing will ground you and further your own awareness and skills in the out-of-doors as effectively as a deep and rooted knowledge of your local plants, learning what they provide, and practicing how to utilize them for yourself and your community.

Mike Douglas
Director
Maine Primitive Skills School

2.0 INTRODUCTION TO USING WILD PLANTS

Plants were immensely important to primitive people. They supplied them with many things needed for survival: food, clothing, medicine, fibers for cordage, lubricants, hafting materials, fire, raw materials for weapons, poisons for fishing and repelling insects, and much more. This has not changed in today's world. People still rely on plants for their everyday survival and comfort. The main difference is the majority of the populace today does not know how to identify, collect, and process plants for the things it needs. They are dependent on food stores, pharmacies, clothing stores, etc. For some, this level of dependence on growers and manufacturers is the norm. They have been raised with it all their lives and assume it to be part of living in the modern world. For others, this lack of self-reliance may plant a seed within them that will grow into a desire to understand how our ancestors lived without the use of synthetic and highly processed materials. They may wish to learn how those who passed before them fed and clothed their families, kept themselves warm, created tools and weapons, and remedied illnesses. They did all of this, and more, without polluting the soil, the water, or the air. For those of you in this second category, this book is written for you. It is a starting place and a reference for your journey in learning ancestral life skills.

2.1 How to Use This Book

First, it is important to state what this book is not. It is not a field guide. Edible, medicinal, and/or useful plant books, in my opinion, should not attempt to do what has already been done by other guides that specialize in a given topic, namely identification. Field guides and taxonomic manuals focus on plant identification using carefully selected vocabulary and offer a more comprehensive view of the plant diversity found in a given region. This latter fact is very important, because edible plant guides, for example, cover primarily only those plants that have value as food. There may exist several inedible (or even poisonous) species that appear similar to a preferred plant to an aspiring forager, but were not included in an edible plant guide because veteran foragers can easily discern the differences. Therefore, the aspirant may force the identification of the plant in hand to fit one of the species covered in the edible plant guide. However, identification mistakes are not limited to novice plant enthusiasts. I have witnessed medicinal plant experts who are highly respected by the public make gross errors in identification. I strongly recommend that aspiring foragers rely on two types of books for learning about useful plants—one for plant identification and one to look up the uses of the plant once its identity is determined.

This book is also not a recipe book. It does not contain detailed directions for cooking wild plants on a modern stove, pairing them with various store-purchased foods, or flavoring them using a variety of culinary spices. Though I do enjoy incorporating the fruits of my foraging trips into everyday living (and encourage everyone to do so), this book has been written for the neo-aboriginal (i.e., one who procures, processes, and cooks plants using only natural materials that can be acquired on the landscape). Therefore, preparations are limited to eating plants raw, drying in the sun or using wood heat, cooking over coals or flame, baking in pit or stone ovens, or boiling in ceramic,

wood, and hide vessels (the latter two types of vessels utilize heated stones for raising the temperature of the water). There are many books that provide wonderful recipes for pairing wild plants with modern dishes. Further, creative individuals or those experienced with food preparation will not need step-by-step instructions on how to incorporate the plants discussed in this reference into everyday living. Simply learning what part of the plant is edible, what time of year to collect the plant, and basically how it is cooked (e.g., roasting, boiling) will provide them with all the direction they need to include wild plants in their everyday diet.

Lastly, this book is not a replacement for an experienced health care practitioner. Many plant remedies are described in this book, most of them with verified merit. Further, I have personally used plants as medicine for myself and my community (successfully). However, relying on plants as medicine requires both education and experience (or put another way, it requires a deep relationship with plants). These are things that cannot be gained solely by reading a book. Also very important to note, this reference does not cover diagnosis (i.e., correctly ascertaining what is ailing the body), which is necessary to appropriately choose how to treat someone who is injured or ill.

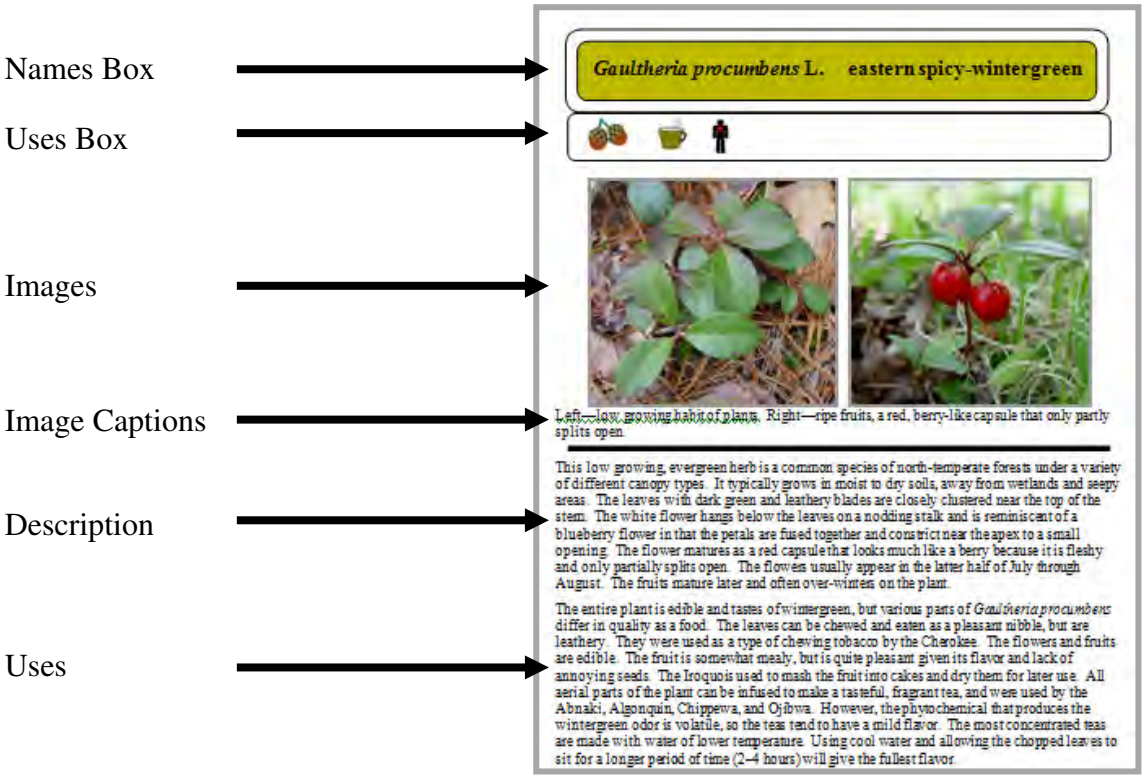
Now, to state what this book is. It is a reference that is designed to teach the uses of a suite of plants that are relatively common in New England, with an emphasis on northern New England. Though there are many books that discuss the edible and/or medicinal virtues of various plants there is, to my knowledge no work that discusses all of the plants uses for this region, including species that provide fiber for cordage, resins for hafting and creating water-tight containers, woods for high quality bows, stalks for friction-fires, etc. In short, this book attempts to lay groundwork for a more holistic understanding of plant uses, an understanding that was possessed by the native people who lived on this continent.

The suite of plants covered in this reference was intentionally chosen to provide a range of food, medicine, and other uses that would be important to those who actively (or aspire to) camp/live in a more primitive or rustic fashion. Learning the plants in this book will provide people with a source of food through the growing season from very different plant communities (e.g., deciduous forests, lake shores, upland fields, coastal beaches). The included plants cover a range of medicinal uses, such as antiseptics and anti-inflammatories for wounds and pain management, sedatives for promoting relaxing sleep, astringents and anthelmintics for intestinal disorders, and alteratives for restoring vitality to various organs. Species that are ideal for fire making, fiber, basketry, bows, arrows, dyes, and many other uses are also covered.

I will stress here and elsewhere in this book that YOU MUST READ ALL OF THE INTRODUCTORY MATERIAL (sections 2–5). I deliberately omit a glossary so that people will not simply start using this book without understanding what I am trying to accomplish with this reference (and how it will be accomplished). The introductory sections lay out the necessary vocabulary and explain the format of the book. Further, they provide an understanding of why various facts and observations have been included in different discussions and why some information you may have read elsewhere is excluded.

2.2 Format of Pages

The following is an explanation of the page layout, including the various symbols used to denote best uses of a plant. Each plant discussion is presented in the format described below.



NAMES BOX—Within this brown-yellow box two names for each plant are listed. The first, on the left side of the box, is the scientific name. Scientific names are either Latin or Greek (or a mixture of both) and are composed of three parts. The first part (which is italicized and has the first letter capitalized) is the genus. The second part (which is also italicized) is the specific epithet. The third part is the authority (which is not italicized). The authority is a listing of one or more authors (or abbreviations of author's names) who are those responsible for publishing the name of the plant as we currently use it. A single common name is also provided for readers not acquainted with scientific names. Scientific names and common names follow Haines (*Flora Novae Angliae*, in prep.). They are used throughout the text in order to accurately refer to the plants discussed in this reference. Users of this reference are encouraged to become familiar with the use of scientific names in order to become more proficient in taxonomy and better utilize the available ethnobotanical information (much of which uses scientific names as its primary manner of indexing species).

USES BOX—Within this clear box is a listing of the best uses for a given plant. The phrase "best uses" is meant to describe medium to high quality uses for a plant. Therefore, every known use of a plant may not be listed because some of the uses I consider to be inferior (especially when compared with other species that are available). Therefore,

experienced readers may notice omissions in this category of what they expected to find. The following symbols are used in this reference:

 This symbol indicates edibility of the plant, though it may often be only certain portions of the plant at certain times of the year. A variety of edible plants are presented, ranging from those that are very flavorful to barely palatable.

 This symbol indicates that the plant can be used to make teas or some type of beverage, primarily through infusion of a specific part of the plant. It will be reserved for those species that have relatively pleasant tasting tea (i.e., insipid or distasteful medicinal plants generally taken as tea are not included here).

 This symbol indicates that the plant in question has medicinal uses. Specific directions for what part of the plant is used and how it should be administered is provided in the text.

 This symbol indicates that the plant has use for binding or building mulit-purpose cord. Generally this indicates that the plant has fibers that can be extracted and wrapped into cordage. Sometimes the plant will possess some part that can be used with little preparation (e.g., highly flexible roots, strong inner bark).

 This symbol indicates that the plant has important uses for fire building. These may include suitable wood or stems for spindles and fire boards, excellent tinder material, or durable cordage for the bow or strap drill.

 This symbol indicates that the plant has flexible stems, branches, bark, or roots that are desirable for weaving material in basketry (including mats, containers, and fish traps). In many cases, the portion of the plant used for basketry has a window of time in which it can be collected.

 This symbol indicates the plant has important uses for archery. Such uses include high quality bow woods, shafts for arrows, strong cordage suitable for bow strings.

 This symbol indicates miscellaneous uses for plants not covered by the above symbols (e.g., dyes, mordants, lubricants, hafting material, smoking mixtures, repellents).

IMAGES—At least two images of the topic plant are provided to acquaint readers with the morphology of the leaves, flowers, fruit, and/or other useful parts. I have endeavored to provide users of this reference with images of the underground organs when such parts of the plant are used for food or medicine because these are often lacking in other ethnobotany references.

DESCRIPTION—The first paragraph of text for each plant is largely reserved to provide a basic description of the plant's morphology (i.e., its outward characteristics), as a way of insuring you understand full well which species I am referring to. Sometimes common names can be very misleading, and scientific names change from those a person may be familiar with as a result of biosystematic studies and nomenclatural issues. Also included is an account of where the plant grows (i.e., its habitat and common associated species). When important, the timing of flowering is also provided (for those species that possess flowers). As flowering time differs significantly throughout New England due to the range of latitude, proximity to the coast, and elevation, a range has been provided that is meant to cover low- to mid-elevation areas from northern Connecticut and western Massachusetts through the southern half of Maine, New Hampshire, and Vermont. If you live in coastal Connecticut and Rhode Island or northern Maine, you may need to subtract or add (respectively) as much as 7–10 days from/to the dates listed. High-elevation areas can set development back even more substantially. Because scientific names of plants sometimes change when new information is learned about their identity and relationships, commonly used previous names are provided. These formerly used scientific names are referred to as synonyms. When names and derivations are known, the traditional Passamaquoddy Indian names are given (obtained from the writings of Fredda Paul and Leslie Wood; Kuwesi-medicine News). This group of Native Americans lived in eastern Maine and New Brunswick.

USES—The manner in which the plant can be used is described in the remaining paragraphs. The first paragraph is devoted to edible uses. The parts of the plant, time of year, and method of preparation are provided, as well as nutritional information (when known). Dates provided for collection of different stages of the plant are formatted as described in Description (see above). The second paragraph is devoted to medicinal uses. Phytochemical constituents (when known) are provided along with the known or suspected actions of those chemicals. The last paragraph is devoted to utilitarian uses (e.g., dyes, friction-fire woods, fibers for cords, hafting materials, insect repellents). As there is often disagreement over those plants that are true dyes vs. those plants that are stains (this especially confounded by the modern usage of the term "stain"), I here use the term dye inclusively for any plant that is used to color fibers, woods, or ceramics.

And finally, for those seeking documentation for various statements presented in this reference, a note about supporting references or, more specifically, the lack thereof. This book is meant partly to be an experiment to create a larger community of people who are interested in positively interacting with plants. I have intentionally omitted references in an effort to stimulate communication and discussion. If there is any statement in this book for which you wish to determine the source of the data (e.g., personal experience, reliable literature, personal communication with experts in the field), please contact me

using information on my website (see the title page of this book). I will be more than happy to make your acquaintance and share sources for further learning.

3.0 FOOD

Probably the number one reason people wish to learn about useful plants is to gain knowledge of those species that are edible. Collecting plants for food in a responsible manner is a rewarding pastime for several reasons, aside from obvious benefits such as exercise, money savings, and safety (you will know the source of your food and have complete control over its preparation). Harvesting plants from the landscape has been done by humans for countless millennia and, one can argue, is fundamentally built into our being. The body's abilities to carry out metabolic processes, heal from injury or sickness, and defend itself from pathogens have evolved concurrently with a diet that is very different from the one most experience today (it is estimated that 70% of our current diet is made up of items that aboriginal people rarely or never ate). Our relatively recent reliance on agribusiness to provide the bulk of our nutrition has not undone our need for wild foods. Many of today's chronic illnesses, including coronary heart desease, dental problems, allergies, arthritis, various skin ailments, certain vision problems, and obesity, are the result of poor diet that relies too heavily on refined sugars, overly processed grains, and cage-reared, grain-fed animals. Extensive research shows that hunter-gatherer societies were free from many ailments that commonly plague people eating a modern diet. If you have not read "Traditional Foods Are Your Best Medicine" by Ronald Schmid (1997; Healing Arts Press), I strongly encourage you to do so. It may well change your life.

There is a substantial body of evidence that wild plants are usually more nutritious than their cultivated counterparts. For example, *Zizania aquatica* (southern wild rice) grains contain higher concentrations of protein, magnesium, phosphorous, potassium, and vitamins B_1 and B_2 than *Oryza sativa* (cultivated rice). *Spinacia oleracea* (spinach), a vegetatable commonly touted as having some of the highest concentrations of pro-vitamin A, is easily surpassed by many common wild plants. *Spinacia oleracea* has 8100 units of pro-vitamin A (beta carotene) for every 100 grams of leaves, but, for the same weight of material, *Alliaria petiolata* (garlic-mustard) has 19,000 units in its basal leaves, *Chenopodium album* (common goosefoot) has 14,000 units in its young shoots, *Leucanthemum vulgare* (ox-eye daisy) has 12,000 units in its early season basal leaves, *Plantago major* (common plaintain) has 10,000 units in its early season leaves, and *Viola sororia* (woolly violet) has 20,000 units in its early spring leaves (and this is only a partial list of the species assayed that surpass *Spinacia oleracea*). This comparison can be done for other vitamins (especially C and E) with similar results.

Compared with cultivated plants, wild plants often contain significantly more phenols, which increase antioxidant activity. Along with higher concentrations of various vitamins, wild plants contribute significantly to protection from cancer and atherosclerosis. Further, wild plants contain more omega-3 fatty acids, essential fats that are necessary for health. It is estimated that the modern diet has a ratio of omega-6 to omega-3 fatty acids of 10:1 (even varying to as high as 20:1). The hunter-gatherer diet has a ratio of roughly 2:1 for these essential fatty acids. This increased intake of omega-6

fatty acids in contemporary diets is partly the blame of amplified use of vegetable oils from such plants as *Zea mays* (corn), *Helianthus annuus* (sunflower), *Carthamus tinctorius* (safflower), and *Glycine max* (soybean). This has resulted in increased inflammation, blood viscosity, vasospasm, and vasoconstriction, which collectively contribute to arthritis, high blood pressure, and increased risk of heart and brain diseases (e.g., heart attack, stroke). Omega-3 fatty acids, on the other hand, have many positive features, including anti-inflammatory, anti-arrhythmic, hypotensive, and hypolipidemic properties (reducing swelling, restoring proper rhythm to the heart, lowering blood pressure, and reducing total cholesterol, respectively). In addition to their ability to protect the human body from cancer, wild fruits also often have less sugar than cultivated fruits, making them a healthier choice for those who must monitor sugar intake.

An added advantage of wild plants is cold hardiness, which translates to an increased length of season during which they can be harvested compared with garden-grown fruits and vegetables. Spring greens are available in mid- to late April, long before seeds of cultivated species can even be placed in the ground in New England. This increased length of season also manifests itself in the fall. Many species of wild plants with pleasant tasting greens, roots, and tubers are available for collection until the ground freezes or is covered by snow (which often means that foragers can be active until early December or later).

Also, reasons exist for harvesting wild foods that are less tangible, but important nonetheless. These include respect for life and connection to the landscape. Taking a life, which we must do to live, is an act many people in developed countries are far removed from. They purchase food from stores as if it were a product fabricated from non-living components. Many fail (or choose not) to realize that the food they eat, whether it be plant or animal, was a living creature that had as much right to life as any other organism on the planet. That creature, be it a mammal capable of complicated behaviors and thoughts, or a plant that responds to sunlight and soil moisture through its growth patterns, was not a willing participant in the harvest. Taking a life for one's self, rather than relying on someone else to do their dirty work, provides a connection to the circle of life and can cultivate a deep sense of respect for living creatures. It also provides a realistic view of our place in the the natural world. As people gain interest in foraging for food, they begin to pay close attention to the plants they see and keep note of their stages of development. As the seasons come and go, they begin to become connected to the landscape in a way primitive people were. They look forward to the time of the emergence of their favorite greens or the ripening of desired fruits. Rather than driving down familiar roads with their minds filled with busied thoughts that prevent them from perceiving what is going on around them, they begin to notice more. They can finally understand that we are not alone on this planet, and that their actions affect everything around them. This connection, however you choose to perceive it (e.g., literally, figuratively, spiritually), is something that primitive people understood—in a way that makes modern humans appear unaware, arrogant, and thoughtless.

As a final thought regarding less tangible benefits of foraging for wild food, please consider the following statements. Except for taking a relaxing walk or enjoying a place to swim, many people in developed countries interact with their local landscape mainly in

a negative manner. They clear space to make dwellings and lawns, discharge household and septic waste, and emit smoke or exhaust from heating appliances. They often do not acquire their food, clothing, building materials, and fuel from local areas (these primarily transported from distant sources). They take and pollute, but often do not give. They influence the open space around them without thought for the consequences. It is important that people also interact in beneficial ways. It is actually much easier to do than probably realized. Collecting leaves and fruits, digging in the earth for tubers, and harvesting dead stalks for fibers or friction-fire material are all actions that can positively affect wild plants. For example, Native Americans were known to increase numbers of food plants, even though they were performing lethal collection of underground parts. This was accomplished by timing collections so that the mature seeds fell to the freshly tilled earth, which was an ideal germination site. The simple act of harvesting dead plant stalks for fibers inadvertently carries seeds further than they may have dispersed otherwise, helping the individual plants move to suitable places for growth. Many, many more examples exist where human use benefits plants. Conscientious human interaction with plants, such as foraging in a careful and sustainable manner, can actually insure the survival of a plant species (think of important food crops and how their value to people has virtually guaranteed their continued existence in some form). This can happen only when people get out of their homes, take time to roam over the local landscape, learn the plants and animals that live there, and become part of the web of life. Through participation in local ecology, people come to realize the value of open space and how important it is to them (even if used only occasionally or during times of need).

For further study regarding foraging for plants with authors that I recommend, see the following books:

Samuel Thayer. 2006. The Forager's Harvest. Forager's Harvest.
Nancy Turner. 1975. Food Plants of British Columbia Indians. Part 1/Coastal Peoples. British Columbia Provincial Museum.
Nancy Turner. 1978. Food plants of the British Columbia Indians. Part 2/Interior Peoples. British Columbia Provincial Museum.
Christopher Nyerges. 1999. Guide to Wild Foods and Useful Plants. Chicago Review Press.
Kelly Kindscher. 1987. Edible Wild Plants of the Prairie: An Ethnobotanical Guide. University Press of Kansas.
Euell Gibbons. 1966. Stalking the Healthful Herbs. David McKay Co., Inc.

3.1 Collecting Protocols

Collecting wild plants is, to me, a sacred act that is to be done with care and respect. Slowing one's pace during wild harvesting is important for safety (e.g., to insure correct identification of material), creates a superior finished product, and is better for the health of the plant. For example, cleanly pinching off shoots at the ground level rather than hurriedly tearing the plants from the ground (roots and all) preserves the underground organs of perennial species and is non-lethal to the plant. Harvesting affects the individual plants, whether it is collecting the fruits or the subterranean bulbs—any

collection makes an impact on the plant. Being thankful for what you take from the landscape is, in my opinion, the minimum return gift to the ecosystem.

Though many aspects of respectful collecting are obvious, they still bear mentioning. When making lethal collection of plants (e.g., underground organs, shoots of annual species), it is important to collect only a small portion of the population. This is both considerate to the plant population as well as good practice—one wants to leave plants to continue the population in successive years so food, medicine, and materials can be gathered again. Further, plants need to be left in place for the animals who utilize them as food and shelter, and for other people in our global community who may need them more than us. Clean cuts are preferred when gathering shoots and branches. A little work with a stone or metal blade can go a long way in keeping the plant safe from pathogens. Long tears and splits create more openings for harmful organisms to enter the plant. Leaving some fruits behind (or even facilitating their dispersal) is also beneficial as this is one mechanism some plants use to increase the size of their colony (along with vegetative means). Further, it is important to non-human consumers of the fruits (e.g., birds, insects, mammals). When collecting with friends, be systematic about the collecting area so that the same terrain isn't passed over several times. One forager may be careful about leaving many leaves or shoots behind and an unobservant partner may not see the signs of previous collection and remove additional material from the same plants. I often use natural items, such as logs and animal trails, to divvy up areas and prevent multiple gatherings from the same spot.

It is clear that Native Americans (and other aboriginal cultures) were very careful in their harvesting, thereby insuring plants would continue to be present to produce the food, medicine, and materials needed for living. In fact, there is an increasing body of evidence that shows that the activity of hunter-gatherer societies actually increased the abundance of certain plants, despite the fact these plants were gathered year after year. Various practices allowed Native Americans to steward populations of plants. For example, waiting until seed is produced before collecting bulbs allowed the gatherer to plant the seeds in the loosened soil after the bulb was collected, mitigating the lethal collection of underground organs. While this example may have self-serving motivation, other examples do not. Native Americans would frequently collect the small fruits and seeds of various plants by knocking the flower arrays and catching the falling material in a basket. This act also served to scatter the plant progagules, showing how human activity had a place in the life history of some plant species. This information flies in the face of a hands-off approach to land preservation where humans are completely denied access to protected areas. Some Native Americans feel that the decline of certain plants is the result of a lack of human interaction with the plant (along with habitat loss, etc.).

Commercial harvesting of wild foods is becoming increasingly popular, especially with interest in wild plants increasing as people learn about the health benefits of traditional diets. If you purchase wild foods from vendors, question them about their collecting ethics. Refusing to purchase food from vendors who gather too much of the resource will send a strong message. If you are a commercial harvester, do realize that focusing on financial return is short-sighted—excessive collection will ultimately reduce the numbers and/or extent of the plant population and create dwindling returns. Unsustainable

harvesting serves only to harm the local community by extirpating wild food (and medicine) resources. People need to be persuaded to think long-term—the generations of unborn children will be thankful.

3.2 Identification

Plant identification is a crucial skill for those interested in foraging for edible, medicinal, and useful plants. Unfortunately, most people unknowingly go about this critical task in the wrong way. Learning to identify plants is best learned from a trained taxonomist, one who studies identification and classification. There exists a unique vocabulary for describing plant shapes, structures, and growth forms that is very difficult to gain an understanding of from books alone. These terms are important because they concisely describe various concepts and are not influenced by general use (such as multiple meanings or regional differences). For example, an inexperienced person might use the word "smooth" to describe the surface of a leaf or stem. But the question still remains as to why the plant is smooth feeling. Is it because it is devoid of hairs (i.e., glabrous) or because it has neatly arranged hairs laying against the surface of the plant (i.e., sericeous) or is it because it lacks bumps or other raised features (i.e., smooth)? As you can see from the preceding example, the word smooth has one meaning in normal life but a very specific meaning in plant taxonomy.

Assuming that one has enough mastery of plant vocabulary to use whatever guide or manual he or she chooses, confident identification of an unknown plant can be seen as having several steps.

1. Examine the plant carefully. Note important items that are used for plant identification (e.g., leaf type, leaf arrangement, margin of leaf blades, petal color, type of fruit) as well as interesting or unusual features that might be diagnostic for that species.

2. Key out the plant via the system used by the manual or guide in hand. For novice guides, this may preliminarily begin by sorting the plants based on general flower color. For expert manuals, this may be a lengthy dichotomous key, which is a series of paired statements that leads one to the identity of the plant.

3. Once the identity of the plant has been determined, consider it a first hypothesis. Confirm your hypothesis by reading the description (whatever it may be in the book being used) and the geographical range statements. Make sure that the description matches your plant well and that the plant is reported to occur in your region or state.

4. If possible, confirm your hypothesis with other sources. These may include another plant identification guide, a person skilled in plant identification, or comparison with museum specimens. Remember, your well-being depends on the accuracy of your identification.

It is important to note that some species of plants are extremely variable and their growth form can be influenced by soil nutrients and moisture, elevation and exposure to wind, sunlight intensity, and many other factors. Pay close attention to those characters used by experts to identify plants and note those that they do not use. For example, the height of

a plant can be a product of soil fertility. Therefore, the tall plants at the base of a forested slope are not necessarily a different species from short ones found on the open balds higher up. Though the presence or absence of hairs on the stems and leaves can be a very important trait in one group of plants, it may be meaningless in another group (i.e., a given species may show different forms, some that have hairy foliage and some that lack hairs altogether on the foliage, but it is still the same species). Learning the different faces that a given plant species can show takes time. Further, becoming familiar with plants in their different stages of development (e.g., early shoot, flowering stem, fruiting plant) takes seasons to learn.

As a final note, do not try to force the plant in hand into the identification you desire. People sometimes focus on a single morphological character that is correct for the plant being sought (e.g., fruit color, leaf arrangement, specialized habit), ignoring all the other characters that are in contradiction with the correct identification. Confirm as many features as you can (i.e., as much as your botanical vocabulary allows), and then ask other people. Again, learning plants is a slow process, due, in part, to the large number of species and the specialized vocabulary necessary for accurately describing structures. Do not try to circumvent careful study.

3.3 Safe Collecting and Consumption

Safe collecting refers to both careful identification (see section 3.2) and making sure the plant tissue is free of contaminants (biological or synthetic). Much like the food we purchase, contaminants that are present in the soil, water, and air around the plant may be taken and stored in various plant organs, posing a threat to human health.

Avoid collecting plants from open rights-of-way. These include railroads, powerlines, and automobile roads. Herbicides are routinely used to maintain open rights-of-way, though mechanical cutting does occur in some areas. Roadsides, especially those that are heavily used, can be contaminated with automotive fluids and lead (from times when leaded fuels were used), as well as rubber particles, rust, and de-icing chemicals in northern areas. It is wise to leave wide margins for moderately and heavily used roads. A swath of trees between the road and collecting site can go a long way in protecting the foraging site from dust from the road. Further, be uphill of these road beds, so that groundwater flow isn't bringing petroleum-based fluids and other contaminants toward your favorite collecting spot. If you do collect from such areas, washing the plants becomes critical for safety (to remove lead-contaminated dust).

Avoid collecting in urban areas and those areas downstream/downhill of mills. City streets, parking lots, and waste areas are often heavily contaminated with automobile runoff and dryfall (e.g., dust from cars, mills, and machinery). Also be aware of the drainage system when collecting in wetlands, as some of the streams and groundwater that feed swamps and marshes may originate in urban areas.

It also bears mention to be sure that plants are clean of soil particles. Sand and other gritty material can be damaging to the enamel of teeth. Plants that are short and/or grow close to the ground are those most frequently in need of a good rinsing. Rain splashes

dirt onto the foliage and wind blows dust and other material onto the plant. Plants with hairs on the leaves and stems generally are most in need of washing, as the hairs trap the soil particles.

Despite their nutritional superiority, wild plants are, in some ways, no different from cultivated plants when it comes to personal tastes and, more importantly, allergies. Though many people are familiar with the potentially serious allergic reaction suffered by some in response to *Arachis hypogaea* (peanuts), there are many other food allergies. These include *Zea mays* (corn), *Solanum lycopersicon* (tomatoes), *Persea americana* (avocados), *Glycine max* (soybeans), and *Coffea arabica* (coffee), some of which are considered fairly innocuous foods. When eating a species of wild plant for the first time, caution is advised. Try small samples of the foods and preferably taste them cooked (even if the plant is edible raw). Cooked foods are safer to consume than raw foods, because some toxic and allergenic compounds are be neutralized by heat. If the food agrees with your body (i.e., no stomach or intestinal upsets are experienced), then proceed with a larger sample or an uncooked sample the next time the given plant is consumed.

Remember that wild plants are often genetically diverse, much more so than cultivated plants, because they are not a single cultigen grown over large regions for a specific purpose (e.g., food, fiber, soil binder). Therefore, different plants may have slightly different tastes. Some may be more bitter, others sweeter. If you don't like the flavor of a wild plant, don't write off that species (just yet). You may well find that the same species of plant collected from a different location or at a different time in the year may agree with your taste buds. Refrain from developing prejudice, it will help you in the long run with developing a good relationship with wild plants.

Humans have evolved eating wild plants and there is little doubt that our taste buds are a valuable tool for screening those plants that are unsafe to eat (but see below). Many phytochemicals produced by plants have the specific purpose of deterring herbivores from consuming the stems, foliage, fruits, etc. These different phytochemicals act on the herbivorous organism in various ways, such as rendering the plant unpalatable, causing gastrointestinal upset, or creating high sensitivity to ultraviolet radiation (among many other actions). Often we can perceive these phytochemicals as extremely bitter, acrid, burning, or otherwise unpleasant flavors. Plants that produce highly objectionable flavors probably should not be consumed, as this is the body's first line of defense against accidental poisoning, a defense that has evolved through many millennia of foraging by primitive people. However, this statement must be tempered by the fact that those foods that are considered to be pleasant tasting are much a product of culture. For example, the typical American diet is practically bereft of bitters. We know that the primitive diet consisted of many foods that are bitter (even if only seasonally, such as in many leaf foods). Bitters are known to stimulate appetite, increase flow of saliva and digestive fluids, promote the flow of bile, assist in detoxifying the liver, and stimulate self-repair mechanisms in the intestinal tract (all of which are beneficial to the body). Given the prevalence of bitter tastes in wild plant foods, the aspiring and veteran forager should become accustomed to this taste.

Survival foods are a special class of wild plants that should be mentioned. These are foods that are reserved for survival situations and should not be collected and consumed on a regular basis. Survival foods generally fall into one of three classes—plants that are distasteful (but non-toxic), plants that are rare in a region, and plants that possess phytochemicals that can damage body organs if consumed over a long period of time. Distasteful plants are an obvious survival food because they will not be consumed unless one is hungry enough to eat them. Rare species are plants that are to be conserved within a region because they are limited in number and/or highly susceptible to over-collecting. Each state possesses a Natural Heritage Program (or similar agency) that creates and maintains a list of rare species (this can be accessed online by visiting the NatureServe website). Plants that possess phytochemicals that can harm the body when eaten in quantity and/or over extended periods of time are best reserved for occasional consumption, such as medicinal use of *Symphytum officinale* (common comfrey) and *Tussilago farfara* (coltsfoot). Both of these herbs contain pyrrolizidine alkaloids that can damage the liver given enough time and material. However, both appear to be very safe when used on an infrequent basis.

3.4 Methods of Collecting

Primitive people had ingenious ways of harvesting plants and processing the materials they gathered. Many plants can simply be gathered with the hands. Even plants that are armed with thorns and prickles often require nothing more than slowing one's pace to move in and through the plants without injury. Underground parts, such as bulbs, corms, and rhizomes, when the hands alone are insufficient, can be unearthed using a digging stick. This tool can merely be a rigid, pointed stick, or it can be carved to a flattened, spade-like tip and a cross-piece for a comfortable handle. Stone, bone, or shell blades, which often cut better when serrations are added, are indispensible for cutting stalks of plants and scoring bark or branches of woody plants so they can be broken more cleanly (unscored branches often tear and leave unsightly scars on the plants). High branches on fruit-bearing trees can be pulled down using a berry hook. This tool is a long pole with a downward curved spur (such as a curved branch or a lashed-on piece forming a hook-like end) for pulling down branches, making collection of high fruits easier. Containers, whether they be solid bark containers or woven baskets, are crucial for carrying one's spoils to the camp or home. Final processing of certain nuts may need smooth hammerstones and bone picks for extracting nut meats. For drying fruits in the sun, smooth, stones, sheets of bark, animal hides, and various woven mats can be used. For filtering fruit pulp and seeds, I prefer a flat or dish-shaped basket made from tightly woven branches (this is more durable and can be used over and over compared with some other types of filtering systems). Be creative. Freeing one's self from electricity and modern appliances is very rewarding and may have real life-saving implications during times of food shortage or power outage.

4.0 MEDICINE

Coping with and recovering from illness, injury, and debility have always been a part of being human. And for these complaints, plants have served as the major source of medicine. Historically, about 80% of medicines were derived from plant components. Even today, in a time when the "miracle of modern medicine" pervades the manner in which we try to heal people, 40% of medicines still contain plant-derived ingredients. Those living in the modern world are slowly becoming aware of the vast array of natural treatments available. These treatments can be free of purchase and, in large part, are free of the many side-effects and contraindications that come with prescription medications. Unfortunately, just as edible plant books are rife with inaccuracies, so too do many herbal medicine books contain information that is based on superstition or religious doctrine. This makes it difficult for people to learn about valid plant remedies. Therefore, my study has focused primarily on medicinal uses with some level of verified efficacy (and those are largely the uses that are presented in this book).

Plants have a tremendous amount to offer people who are combating various illnesses and infections. In fact, the over-reliance on modern medicine along with the loss of botanical medicine knowledge have created a situation in which some people suffer (or even perish) from curable ailments. Antibiotics present an excellent example of over-dependence on modern medicine. ***Staphylococcus aureus*** is a common bacterium that lives on our skin and in our noses. It is capable of causing many types of infections and diseases (e.g., impetigo, cellulitis, pneumonia, meningitis). Penicillin has been used as an antimicrobial to kill this organism. But, even in the early half of the 1900s, resistance to penicillin was being observed. In 1945, it was noted that 14% of ***Staphylococcus aureus*** was resistant to penicillin. By 1950, the figure had increased to 59%. And by 1995, 95% of this bacterium was resistant. Though some of this resistance is the product of over-use of antibiotics and improper use (e.g., failure to take the full course of a prescribed antibioitic), it is also the fault of modern practice and its view of medicines. Contemporary researchers are always seeking the "magic bullet" chemical that has the highest activity against various harmful (or potentially harmful) organisms. This often leads them to isolate or synthesize a single chemical for various medications. Penicillin is a single mycochemical (i.e., a chemical molecule produced by a fungus). It is much easier for a bacterial population to achieve resistance to this relatively simple antimicrobial medication than to gain resistence to ***Allium sativum*** (garlic) that utilizes whole plant preparations. The reason is very simple—plants (and other medicinal organisms) usually do not contain a single active chemical; rather, they contain a suite of related chemicals that act in a synergistic fashion within the body. ***Allium sativum*** contains at least 35 active phytochemicals (e.g., ajoene, allicin, aliin, allixin, allyl methyl thisulfinate, dimethyl disulfide). It is very difficult for bacteria to develop resistance and avoid the impact of numerous phytochemicals and their complex interactions. For this very reason, whole plant preparations, which might involve leaves, flowers, fruits, roots, or rhizomes, will be used in this reference (note: the phrase whole plant preparation does not imply the entire plant is used for making medicine; rather it means that no elaborate means are used to extract and isolate specific phytochemicals).

Worse yet are the deaths of people from known (i.e., predictable) side effects. One estimate places the number of people dying each year from recognized side effects of prescription drugs at 400,000. Further, thousands more die from unpredictable side effects or preventable medication errors. Though herbal remedies can have side effects, these rarely amount to more than a stomachache. This is because the therapeutic range of most plant medicines is relatively broad (i.e., a relatively large difference exists between the minimum amount needed to effect a change in the physiology of the body and the maximum amount that can be safely used). This is not the case with many prescription drugs.

Among my important contentions with modern medicine include its failure to see the human as an entire organism. Ailments are seen as entities separate from the body that are to be assaulted with all manner of medication, often with little empathy for what harm that medication does to the remainder of the body. Because of this philosophy, modern medicine cures the ailment but often fails to heal the underlying cause(s). Herbal practice sees the human as a total organism that has an innate ability to overcome infection, repair trauma, and restore balance. To that end, many plant remedies seek to improve the body's ability to heal by invigorating various internal processes, without causing additional harm. Further, the end goal is to heal the person and prevent recurrence of the malady (often using multiple methods, including nutrition, stress reduction, emotional support, meditation, etc.). These are important and fundamental differences between western (i.e., allopathic) medicine and natural medicine.

Despite many advantages, herbal medicines are not for everyone. Though there are many examples of plant medicines actually being more effective than synthetic medications, many herbal remedies need more time and more doses before a cure is achieved. For those of you who are unaccustomed to tolerating any pain or discomfort, you may find some plant medicines to be too slow in their action. However, please remember that pain is your body's mechanism of warning you a problem exists. The inflammation and discomfort that comes with a sprained ankle help keep a person from overusing (and slowing the healing) of the ankle. Hence, there is a practical reason to reduce, but not completely eliminate, the pain associated with various traumas.

To complete this brief introduction to plant medicines, I feel it is important not only to mention the advantages and disadvantages of this method of healing (see above) but also to write (again) about our connection with plants. Many aboriginal cultures had a deep reverence for plants, this having been fostered from millennia of healing illness and disease. They had many stories about the generosity of plants for curing ailments. Their manner of collecting, storing, and using medicinal plants followed a close set of beliefs that included tremendous gratitude for plants. Ceremonies were held to demonstrate their thankfulness. I believe this mindset to be as important today as it was then. I also believe that herbal remedies are more effective when they are administered and taken by those who harbor interest, respect, and admiration for plants. Their minds and hearts are in a different place, which perhaps allows them to be more receptive to the remedy. Gratitude can be shown in many ways; it need not always involve elaborate prayer and ceremony. You can choose how you wish to communicate the connection, but I encourage you to do so. It is a small price to pay for the gift of medicine.

4.1 Guidelines for Plant Medicine

This section, like all of the introductory sections of this book (sections 2–5), is very important. BE SURE TO READ THIS SECTION CAREFULLY BECAUSE YOUR SUCCESS USING HERBAL REMEDIES AND YOUR WELL-BEING DEPEND ON IT. Successful use of plants as medicines relies on several common-sense principles. These include correctly diagnosing the ailment, accurately identifying the medicinal plant, faithfully following a remedy plan (see section 4.3, Routes of Administration), and using material that has been stored properly. Proper diagnosis, which involves correctly identifying what is wrong with the body and why the ailment occurred, bears further mention. It is difficult to accomplish without a good understanding of anatomy and physiology (detailed diagnosis is one of the valuable features that modern medicine has given the healing arts). Given that plant medicines have a specific action on the human body, if you do not diagnose the ailment correctly, you will be unable to correct the illness with the given plant. Self-diagnosis has its benefits, especially given that no one understands your body as well as you do, considering you have lived within that body your whole life! However, it may be best to have a trained expert perform the diagnosis for you. Do not consider this reference a substitute for expert medical help, especially when it comes to traumatic injuries and acute ailments.

Remember that plant medicines generally act in a slow and gentle manner to support the body's fight against illness or injury. If you do not notice rapid improvement in a condition, do not assume that you need to take more of a given medication. It is possible (though very difficult with most plants) to take too much of an herbal remedy and cause harm. Because plant medicines have a slow onset of action, one needs to be prepared for improvement to occur over the long term for some ailments (which often also requires changes in diet, exercise, and lifestyle to avoid re-occurrence of the ailment). Be mindful that plant medicines are no different from prescription medications in that not all remedies work for each person. You may well need to try a different plant preparation because of your body's physiology. Plants can do amazing things for our health, but anyone running on a 21st century mindset will never endure to see their benefits.

Warning: I strongly encourage pregnant women and parents of children under the age of six years to thoroughly research any plant remedy to determine its safetly for the fetus and child, respectively. These are stages in the human life that are particularly susceptible to even small doses of pharmacologically active substances. Real harm can be caused by improper use of medicinal plants.

For further study regarding medicinal plants I recommend the following books:

David Hoffman. 2003. Medical Herbalism. Healing Arts Press.
David Hoffman. 1987. The Herbal Handbook. Healing Arts Press.
Phyllis Balch. 2002. Prescription for Herbal Healing. Avery.
Simon Mills. 1991. The Essential Book of Herbal Medicine. Penquin Books.
Simon Mills and Kerry Bone. 2005. The Essential Guide to Herbal Safety. Churchill Livingstone.
Stephan Buhner. 1999. Herbal Antibiotics. Storey Publishing.

Michael Moore. 2003. Medicinal Plants of the Mountain West. Museum of New Mexico Press.
Rosemary Gladstar. 2001. Rosemary Gladstar's Family Herbal: A Guide to Living with Energy, Health, and Vitality. Storey Books.
James Duke. 1997. The Green Pharmacy. St. Martin's Paperbacks.

4.2 Herbal Actions

Herbal actions refer to how plants act on the human body. Many plant actions cause a change in the physiology of the person (e.g., diaphoretic, antispasmodic, nervine), whereas others (especially external remedies) support the body without directly changing its working order (e.g., antiseptic, anthelmintic, astringent). The following herbal actions will be referenced throughout this book and are explained here so that they do not need to be fully described each time they are mentioned.

ALTERATIVES are herbal remedies that help restore proper functioning to the body or a specific organ. Alteratives work in various ways; often they alter the body's metabolism so that tissues and/or organs can deal with a range of functions (e.g., eliminating wastes, acquiring nutrition). Examples include ***Arctium lappa*** (skin), ***Verbascum thapsus*** (respiratory system), ***Urtica dioica*** (skin and digestive system), ***Trifolium pratense*** (skin and nervous system), and ***Rumex crispus*** (digestive system and skin).

ANALGESICS can reduce the severity of pain or completely abate it. They are also sometimes referred to as anodynes. These preparations work in various ways (depending on the phytochemical). For example, salicylates block the synthesis of cyclooxygenase-2 (COX-2), a necessary enzyme for inflammation response (inflammation is often responsible, in part, for the pain experienced in many ailments). Examples include ***Betula alleghaniensis***, ***Lactuca canadensis***, and ***Salix discolor***.

ANTHELMINTICS kill or expel worms from the digestive tract. They are sometimes also called vermifuges or antiparasitics. Examples include ***Artemisia vulgaris*** and ***Juglans cinerea*** (the first not discussed in this reference).

ANTICATARRHALS help the body remove excessive catarrh, which is mucus associated with sinus cavities, ears, and throat. Excessive mucus is often a response to infection. Anticatarrhals work in different ways. Some make the mucus more watery so that it is easier to expel, others slow the secretion of mucus altogether. Examples include ***Sambucus nigra*** and ***Solidago canadensis***.

ANTI-INFLAMMATORIES help reduce swelling (i.e., edema). In doing so, they often alleviate the pain associated with localized edema. Remember that inflammation is a natural reaction of the body to combat infection and injuries. Suppressing this process can be detrimental to the well-being of the body. Anti-inflammatories generally fall into one of three groups: aspirin-type chemicals (i.e., salicylates), steroids, and miscellaneous unidentified mechanisms. Examples include ***Salix discolor***, ***Viburnum opulus***, and ***Gaultheria procumbens*** for the first group; ***Dioscorea villosa*** and ***Panax quinquefolius***

for the second group (neither discussed in this reference); and *Matricaria discoidea* and *Menyanthes trifoliata* for the third group (the latter not discussed in this reference).

ANTILITHICS help prevent the formation of stones in the urinary system and can also assist the body with excreting stones. Antilithics work best in concert with demulcents (see below) to relieve pain associated with irritated membranes. Examples include *Eutrochium maculatum* and *Urtica dioica* (the first not covered in this reference).

ANTIMICROBIALS are plants that destroy micro-organisms. Antimicrobial remedies frequently act as poison against specific organisms (e.g., antibacterial, antifungal, antiviral). Examples include *Allium tricoccum*, *Arctium lappa*, *Plantago major*, *Thuja occidentalis*, and *Thymus pulegioides* (the last one not discussed in this reference).

ANTINEOPLASTICS inhibit and fight the growth of tumors (including benign, potentially malignant, and malignant). They function in many different ways depending on the species (e.g., inhibiting replication of tumor cells, preventing the unwinding of DNA in tumor cells, blocking a critical aspect of metabolism within tumor cells, damaging the DNA of tumor cells). Examples include *Allium tricoccum* and *Vaccinium angustifolium*.

ANTISEPTICS halt the continued growth of pathogens in or on the body. Antiseptic treatments play a crucial role in wound and infection management. Some plants are organ specific (e.g., *Solidago canadensis* is a urinary tract antiseptic). Examples include *Pinus strobus*, *Quercus rubra*, and *Trillium erectum*.

ANTISPASMODICS are able to alleviate cramps or spasms in the body by relaxing the muscles responsible for these actions. Antispasmodics are often specific to a particular organ in the body. Many antispasmodics are also sedatives (i.e., they calm the nervous system as well). Examples include *Matricaria discoidea* and *Mentha canadensis* for the digestive system; *Viburnum nudum* for the muscular system and female reproductive system; and *Daucus carota* for the urinary system.

ASTRINGENTS are able to tighten, bind, or otherwise draw together tissues in/on the human body. Various astringents are capable of working on mucous membranes or on the skin; therefore, they have many applications, depending on where they are applied. Externally, astringents can reduce inflammation, irritation and pain, and help form a protective barrier against pathogens. Internally, they can reduce inflammation and the severity of diarrhea. Astringent action is often the result of tannins. Examples include *Equisetum arvense*, *Plantago major*, *Quercus rubra*, and *Rhus typhina*.

CARMINATIVES help remove gas from the digestive tract, helping to settle the system and potentially ease griping pains due to gas. Examples include *Arctium lappa* and *Mentha canadensis*.

CHOLAGOGUES stimulate the production and flow of bile from the gallbladder. Bile is utilized by the body in the digestion of fat as well as being a natural laxative that aids in cleansing the intestinal tract. Bile flow is also beneficial to the liver; therefore, many cholagogues are also hepatics (see below). Because bitter tasting herbs stimulate bile

production, many bitters are cholagogues. Examples include *Rumex crispus* and *Taraxacum officinale*.

DEMULCENTS are those plants that are rich in mucilage. Mucilage has the ability to coat and sooth inflamed internal tissues such as mucous membranes and the linings of the intestinal tract. Note that demulcents are internal medicines. When mucilage-rich herbs are used on the skin, they are referred to as emollients (see below). Examples include *Plantago major*, *Tussilago farfara*, and *Verbascum thapsus*.

DIAPHORETICS are herbal remedies that induce sweating. Increasing the rate of sweating has a cleansing effect on the body as well as assisting with water loss (which can be beneficial when dealing with inflammation). Some diaphoretics work by dilating the capillaries near the skin, which stimulates the sweat glands. Because diaphoretics aid in cleansing the body, they facilitate the waste removal performed by the kidneys. Examples include *Eupatorium perfoliatum*, *Mentha canadensis*, and *Sambucus nigra* (the first not covered in this reference).

DIURETICS increase the volume of urine secreted from the body. Therefore, these herbs promote waste elimination. There are basically two ways that herbs exert a diuretic effect: stimulating blood flow to the kidneys and decreasing water reabsorption by the kidneys. The first group is characterized by caffeine-containing herbs such as *Camellia sinensis* (black tea) and *Coffea arabica* (coffee). Examples of the second group include *Achillea millefolium*, *Daucus carota*, and *Taraxacum officinale* (the first not covered in this reference).

EMETICS cause vomiting. Though formerly used as part of a cleansing ritual (along with purgatives), emetics are sometimes used as remedies for accidental poisoning. Emetics often work through irritation of the stomach or the central nervous sytem. Examples include *Asclepias syriaca*, *Lobelia inflata*, and *Robinia pseudoacacia* (the second not covered in this reference). Those plants that help allay the sensation of needing to vomit are referred to as anti-emetics.

EMMENAGOGUES stimulate menstrual activity and/or flow. This term is also sometimes applied to herbs that have a tonic effect on the uterus. Such plants would help normalize menses and strengthen the uterus. Examples include *Caulophyllum thalictroides*, *Mitchella repens*, and *Rubus idaeus* (the first not covered in this reference).

EMOLLIENTS are herbs that are rich in mucilage capable of softening the skin. Note that emollients are external medicines. When mucilage-rich herbs are taken internally, they are referred to as demulcents (see above). Examples include *Plantago major* and *Symphytum officinale* (the latter not covered in this reference).

EXPECTORANTS help clear the lungs of mucus. Expectorants usually work to clear excess mucus in one of two manners: irritating the lungs or relaxing the lungs. Phytochemicals in the former group (irritating) irritate the lining of the bronchioles to facilitate clearing of material. Examples include saponin-rich plants such as *Leucanthemum vulgare* and *Viola cucullata*. Plants of the latter mannter (relaxing) facilitate clearing the lungs by thinning

the mucus material and are often rich in mucilage. Examples include *Symphytum officinale*, *Tussilago farfara*, and *Verbascum thapsus* (the first not covered in this reference).

FEBRIFUGES lower abnormally high temperatures (i.e., they aid in treating fevers and hyperthermia). These remedies are also referred to as antipyretics. Note that treating fevers immediately is not always the best course of action, as a fever is often the body's response to infection. An abnormally high body temperature is unbearable for some pathogens and allows white blood cells to rapidly proliferate. Our society is often quick to treat fever, but some research shows that aggressive treatment may be detrimental. Febrifuges can work in a number of ways. For example, diaphoretics (see above), which increase sweating, can also help lower the temperature of the body. Herbs that dilate the capillaries near the surface of the skin also will assist ridding the body of excessive heat. Examples of febrifuges include *Achillea millefolium*, *Rhus typhina*, and *Salix discolor* (the first not covered in this reference).

HEPATICS are plants that are beneficial to the liver and are capable of strengthening, toning, or otherwise promoting the health of this organ. Some hepatics also promote the flow of bile (i.e., they are also a cholagogue; see above), while others are hepatoprotective due to their ability to alter cell membranes (which slows the amount of toxins penetrating the cells) or alter protein synthesis (which stimulates cell regeneration). Examples of hepatics include *Chelone glabra*, *Rumex crispus*, and *Taraxacum officinale* (the first not covered in this reference).

HYPNOTICS are plants that help induce a deep, restful state of sleep. These remedies are able to promote a healing state through various methods, including relaxing the muscles, easing psychological tension, and/or depressing the central nervous system. Examples include *Matricaria discoidea*, *Mentha canadensis*, and *Valeriana officinalis* (the last not covered in this reference).

HYPOTENSIVES are capable of lowering an abnormally high systemic blood pressure. Many hypotensives are central nervous system sedatives. Examples include *Allium tricoccum*, *Scutellaria lateriflora*, and *Urtica dioica* (the second not covered in this reference).

LAXATIVES are remedies that actively promote bowel movements. They often work either through stimulating more powerful contractions in the large intestine or by action on the liver. Examples include *Juglans cinerea*, *Rumex crispus*, and *Iris versicolor* (the last not covered in this reference). Treatments more powerful than laxatives are termed cathartics.

NERVINES are plants that are capable of affecting the central nervous system (CNS) in a beneficial manner. We can categorize these plants as those that stimulate the CNS, suppress the CNS, or simply act as a tonic to strengthen or restore vitality to the CNS. Therefore, those plants that are CNS sedatives are also a type of nervine. Examples of nervines include *Matricaria discoidea*, *Hypericum perforatum*, and *Scutellaria lateriflora* (the last two not covered in this reference).

PARTURIENTS are tonics for the uterus. They strengthen and tone this organ to facilitate an uncomplicated childbirth. Examples include *Mitchella repens* and *Rubus idaeus*.

RUBEFACIENTS are herbs that are applied to the skin and promote vasodilation (i.e., opening the capillary beds to increase blood flow). Rubefacients have a role in the healing of local injuries by bringing blood to the area, thus promoting cleansing and nourishment. Examples of rubefacients include members of the mustard family, such as *Amoracia lapathifolia* and *Brassica nigra* (the former not covered in this reference).

SEDATIVES are plants that have a suppressant action on the central nervous system (CNS), helping to calm nervous tension and promote relaxation. There are other terms for herbs with sedative action, each having a slightly different meaning. For example, hypnotics (see above) are CNS sedatives that promote a deep, often healing, state of sleep. Nervines (see above) are plants that affect the CNS but can be stimulants or sedatives (i.e., some nervines are also sedatives). Examples of sedatives include *Matricaria discoidea*, *Mentha canadensis*, and *Valeriana officinalis* (the last not covered in this reference).

STIMULANTS speed up some aspect of the physiology of the subject. Many stimulants work on specific systems (rather than stimulating the entire body). Examples include *Taraxacum officinale* (digestive system), *Allium tricoccum* (respiratory system), and *Morella caroliniensis* (circulatory system; this species not covered in this reference).

STYPTICS are types of astringents (see above) that are used externally to stop bleeding. They work by contracting blood tissue to seal damaged blood vessels. The term styptic is also commonly applied today to herbal remedies that stop external bleeding by promoting coagulation (this action properly referred to as antihemorrhagic). Examples of styptics include *Achillea millefolium* and *Equisetum arvense* (the former not covered in this reference).

TONICS are plants that are capable of supporting and strengthening the body or various organs. Many medicinal plants listed in this reference are tonics to some degree. Examples of cardiotonics (i.e., tonics affecting the heart) include *Allium tricoccum* and *Crataegus macrosperma*.

VULNERARIES are used for wound management due to their ability to aid with healing injuries. Though they can be defined in various ways, vulneraries listed in this reference will be used in an external sense (i.e., applied to the skin). Preferably, vulneraries should combine the following properties: antiseptic (see above), emollient (see above), and promoting cell growth and repair. A vulnerary that is simply an emollient should be combined with an antiseptic herb. Examples include *Equisetum arvense*, *Plantago major*, and *Stellaria media*.

4.3 Routes of Administration

The method by which medicine is delivered to the body is referred to as the route of administration. In the primitive setting, people are often limited in the means by which medically active phytochemicals can be extracted from plants. Though oil and alcohol extractions are possible, these methods generally require extended periods to create the medium for extraction. Therefore, the methods discussed below are those that can be accomplished relatively simply and do not require long periods of time. Dosages will also be discussed in this section under each type of administration.

COMPRESSES are external remedies that use an absorbent material (e.g., cloth, buckskin, plant fibers, dry moss) to apply a decoction or infusion (see below) to the skin to relieve painful bruises, achy joints, or superficial irritations (e.g., rashes, stings). Compresses, which are sometimes called fomentations, can be applied hot or cold, depending on the ailment. Sometimes bark of certain trees (inner bark against the skin) can be applied as a compress (e.g., *Betula papyrifera*—paper birch). Many plants that can be used as an external wash can be used as a compress. Compresses are best applied twice daily (morning and evening). Hot compresses should be applied as hot as possible without burning the skin and allowed to sit until cool (at which time they can be replaced with another hot compress). Cold compresses should be held in place for 10–20 minutes, or longer if no irritation occurs from the medicine.

EXTERNAL WASHES are infusions or decoctions (see below) that are allowed to cool (if made using heated water) and applied to the skin as a warm or cold rinse. Washes are usually used for wound cleansing, allergic rashes, and other minor skin maladies. Washes are often most effective when applied three times daily (morning, noon, and evening), though they are generally safe to apply repeatedly throughout the day whenever symptoms (e.g., itching, discomfort) are present.

DECOCTIONS are similar to infusions (see below) in that they use water to extract the target phytochemicals from plant material. However, decoctions are usually used for dried roots and bark, materials that can be very firm and are more difficult to extract medicine from. Decoctions are usually made by heating water to 100 degrees Celsius (212 ° Fahrenheit) and then placing the plant material in the water for 10–15 minutes while the heat is maintained. The longer time in heated water softens the tough plant material and draws out the medicinal components. In this reference, unless otherwise stated, decoctions are made by placing 10–15 ml (2–3 teaspoons) of dried material in 235 ml (one US cup) of water (i.e., one prepared cup equals one dose). When using fresh material, due to the water content, use about 2–3 times this volume (about two times when attempting to extract volatile and aromatic compounds, about three times when extracting other types of phytochemicals). A decoction should be taken three times daily (morning, noon, and evening). Children between the ages of two and six should be given ¼ this dose. Children between the ages of six and 12 should be given ½ this dose. Note: use common sense when determining the proper dosage for children, considering also weight, health, and the strength of the herbs being used.

INFUSIONS are hot or cold drinks that are made by pouring water onto plant material and left to sit for a period of time to extract the target phytochemicals. Usually this is heated water that is poured over dried and chopped plants and allowed to "infuse" for 5–10 minutes (when people drink tea, they are usually drinking infusions). Infusions are most appropriate for leaves, flowers, and other material that is not extremely tough or woody (see decoction). Further, they are most appropriate for herbs with water-soluble constituents. In this reference, unless otherwise stated, infusions are made by placing 10–15 milliliters (2–3 teaspoons) of dried material in 235 ml (one US cup) of water (i.e., one prepared cup equals one dose). When using fresh material, due to the water content, use about 2–3 times this volume (about two times when attempting to extract volatile and aromatic compounds, about three times when extracting other types of phytochemicals). Infusions should be taken three times daily (morning, noon, and evening). For children under the age of 12, follow the guidelines provided under decoction.

INGESTION is the simplest way to enjoy therapeutic benefits of plants. However, eating plants is not necessarily the most efficient way to extract phytochemicals because the body must digest the material. For this reason, infusions and decoctions are often used because they are usually able to speed the uptake of phytochemicals into the body (though they are still relatively slow compared with many modern methods). Further, some plant materials are difficult for the body to digest and the active phytochemicals may not be extracted by the body. Therefore, using ingestion as a route of administration is best for species that are considered to be nutritious food. Dosages for ingestion follow normal rules of healthful nutrition—eat a varied diet of conscientiously grown or harvested plants and animals (i.e., do not eat large volumes of a single food for a long period of time).

MOUTH RINSES AND GARGLES are oral rinses used for problems with gums, the throat, and oral mucous membranes. They are made by taking an infusion or decoction (see above) into the mouth and swishing or gargling the solution for 30 seconds and then discarding it (i.e., spitting it out). This type of oral treatment should be taken twice daily (morning and evening), though for certain types of ailments (e.g., injuries to gums, tongue, or inner cheeks that are slow to heal), it may be wise to use dilute antiseptic rinses after each meal.

PILLS are dry preparations of herbs that are taken orally. In a primitive setting, pills can be made by grinding dried plant material using a smooth stone (e.g., mano and metate). For ease of absorbtion by the body, the material should be ground as fine as possible. The ground material can then be rolled into cooked bread of some kind (the bread can be made by various types of flour; often these will be ash cakes) or covered with fat. Alternatively, something more akin to actual pills can be constructed. The ground material can be combined with another dried and finely ground plant that is high in mucilage (e.g., *Tilia americana*). Adding about 10% of the mucilage-rich herb (i.e., 1 part mucilage-rich herb to 9 parts medicinal herb) with a tiny bit of water to slightly wet the mixture allows one to roll the material together like dough into pea-sized pills (for ease of swallowing). Such pills can be used immediately or be dried in the sun or near a fire and kept for a short period (depending on temperature and humidity). Dosage for pills is usually about 1–2 grams (0.04–0.07 US ounces). Four pills, each about the size of

a pea, should be ingested three times a day (morning, noon, and evening). Pills have some of the same drawbacks as ingestion (i.e., the body may not be able to digest and fully break down the ingested plant tissue, so little therapeutic benefit may be derived). However, they are generally more effective than ingesting fresh material (except in the case of volatile oils), because the material has been ground finely and drying of the material has broken cell walls, both allowing for better digestion of the plant constituents.

POULTICES are mashed or ground masses of plant material that are applied externally, typically to treat wounds and other minor skin maladies. Fresh material can be ground or chewed and applied as is. Dried material is wetted enough so that it sticks together and is then applied. Poultices should be applied fresh morning and evening.

SMOKING is an effective way of delivering medicinal compounds to the lungs. Because of the problems associated with regular use of tobacco, many people react negatively to this method of administering herbal remedies. However, infrequent use of smoking in a celebratory or medicinal manner is not detrimental to lung health and function. Dried plant material can be placed in a pipe, rolled in dried leaves, or (less effectively) placed in a shell or ceramic container and burned with hot coals. Typically the lungs are filled with smoke 6–10 times for a single dose. Each dose should be taken three times daily (morning, noon, and evening).

A final note about using medical plants concerns the taste of those that are administered orally. Many important and effective species for healing have very bitter, rank, or otherwise distasteful flavors (these often the result of terpenes and/or alkaloids). In some cases, plant species can present such unpleasant experiences for those not accustomed to such things, that the injured or sick are unwilling to consume the preparations. Though I prefer to experience all the facets of the plant (including offending flavors), I understand that not everyone is willing to take this approach. Often a minor amount of some pleasant tasting species (e.g., various species of mints, including *Mentha canadensis*—American wild mint and *Mentha spicata*—spearmint) added to the preparation or a small amount of maple syrup helps take the edge off an unpleasant flavor. Be careful not to add too much of these materials, as they may alter the effectiveness of the medicine.

4.4 Phytochemical Classification

Throughout the discussion of medicinal plants, the pharmacologically active chemicals are presented (when known). Knowledge of these compounds does not make the remedies work better, nor is it meant to reduce the use of whole-plant preparations to the "magic bullet" chemical. However, some readers may find interest in understanding what we have learned about different types of phytochemicals and their effect on the body. These chemicals are generally classed into one of five different categories: carbohydrate, lipid, polyphenol, terpene, and alkaloid. As some chemicals defy easy classification and can even be placed into different categories (by different authors), the classification of David Hoffmann (2003; Medical Herbalism, Healing Arts Press) is followed here and described below.

ALKALOIDS are phytochemicals that are amines (i.e., molecules with nitrogen as a key component). They are usually derivatives of amino acids, are crystalline solids, and typically have a bitter taste. Alkaloids are usually insoluble or weakly soluble in water, while their salts are weakly soluble. Alkaloids fulfill several functions in plants, including defense (they are poisonous to specific herbivores, often insects) and protection from harmful compounds (alkaloids sometimes represent the end product of detoxification). They also provide reserves of nitrogen or other elements necessary for survival. Alkaloids are some of the most pharmacologically active compounds in plants. Specific examples include pyrrolizidine alkaloids (in ***Tussilago farfara***), daucine (in ***Daucus carota***), and palustrine (in ***Equisetum arvense***).

CARBOHYDRATES, also known as saccharides, are sugars and starches and are some of the most abundant biological molecules. They fulfill many functions, including energy storage, transport of food, and structural support. Simple carbohydrates are polymers of glucose only (e.g., cellulose, a universal molecule in plants). Water solubility of carbohydrates is related to the size of the molecule. Smaller carbohydrates (e.g., monosaccharides) are more soluble in water than larger carbohydrates (e.g., polysaccharides). Prolonged heating of plant material can be helpful for extracting larger molecules (i.e., polysaccharides). Gums and mucilages are also classified as carbohydrates. Specific examples of carbohydrates include cellulose (in many plant tissues), inulin (in ***Arctium minus***), glucosinolates (in ***Brassica nigra***), and mucilage (in ***Tussilago farfara***).

LIPIDS include fats, oils, and phospholipids. They consist largely of long hydrocarbon chains (hydrocarbons are molecules of mainly hydrogen and carbon) with different molecules at one or both ends (such as methyl or carboxyl groups). Lipids are used by plants for energy storage, as components of cell membranes, and as messenger molecules for signal transfer. They are generally insoluble in water. Long-chain alcohols and waxes are also classified as lipids. Specific examples include gamma-linolenic acid (in ***Oenothera biennis***) and allicin (in ***Allium tricoccum***).

POLYPHENOLS are phytochemicals that are composed of one or more phenol groups. A phenol group is made up of an aromatic benzene ring with one or more attached hydroxyl (i.e., oxygen and hydrogen) groups. Examples of polyphenols include tannins, flavonoids, and lignins. Polyphenols are soluble in water and are known to contribute significantly to the color, taste, and flavor of many plants. Specific examples include salicin (in ***Salix discolor***), kaempferol (in ***Lactuca canadensis***), juglone (in ***Juglans cinerea***), and various tannins (in ***Quercus rubra***).

TERPENES, also known as isoprenoids, are a large group of hydrocarbons that form the basis of resins and essential oils (among other phytochemicals). They are formed from isoprene units made up of five-carbon units. Terpenes have a wide variety of functions in plants, including growth regulators, defense secretions, and attractants for pollinators. Terpenes generally have low solubility in water. In addition to resins and essential oils, saponins, many bitter principles, and alcohols are also terpenes. Specific examples of terpenes include menthol (in ***Mentha arvensis***), sarsapogenin (in ***Smilax rotundifolia***), thujone (in ***Thuja occidentalis***), and valerenic acid (in ***Valeriana officinalis***, not covered in this reference).

5.0 USES

For the uses presented in this book, I have tried to present the best (i.e., most important) uses of a given plant based on my own experiences and research. For this reason, some ways in which plants can be used may not be listed. For example, I have successfully created coals using the wood of *Acer rubrum* (red maple) in a bow drill set. However, it is by no means a choice wood compared with the many other options available in New England. Therefore, I do not include under this species its use as a friction-fire material.

Without a doubt, I have introduced some biases based on the region where I most typically work (New England) and those primitive skills that I have pursued more passionately. Therefore, I have solicited the opinions of other veteran primitive skills instructors, foragers, and herbalists in the preparation of this reference. If you believe that I have missed an important primitive use of a given plant, contact me so it can be added to future editions.

The following books were primary references used for identifying which Native American groups used a particular plant:

Frances Densmore. 1928. How Indians Use Wild Plants for Food, Medicine, and Crafts. Dover Publications.
Charlotte Erichsen-Brown. 1978. Medicinal and Other Uses of North American Plants. Dover Publications.
Kelly Kindscher. 1987. Edible Wild Plants of the Prairie: An Ethnobotanical Guide. Unversity Press of Kansas.
Daniel Moerman. 1998. Native American Ethnobotany. Timber Press.

For further study regarding useful plants (including neo-aboriginal uses), I recommend the following books:

Paul Campbell. 1999. Survival Skills of Native California. Gibbs Smith Publisher.
John and Geri McPherson. 1993. "Naked into the Wilderness": Primitive Wilderness Living and Survival Skills. Prairie Wolf.
John and Geri McPherson. 1996; "Naked into the Wilderness–2": Primitive Wilderness Skills, Applied and Advanced. Prairie Wolf.
Steven Watts. 2004. Practicing Primitive. Gibbs Smith Publisher.
David Wescott, editor. Primitive Technology: A Book of Earth Skills. Society of Primitive Technology.
David Wescott, editor. Primitive Technology II: Ancestral Skills. Society of Primitive Technology.
Larry Olsen. 1973. Outdoor Survival Skills. Pocket Books.
Tom Brown Jr. 1983. Tom Brown's Field Guide to Wilderness Survival. Berkley Books.
Tom Brown Jr. 1984. Tom Brown's Guide to Living With the Earth. Berkley Books.

6.0 THE PLANTS

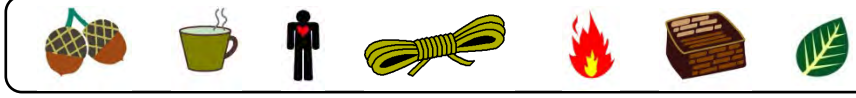
The remainder of this book discusses the practical ethnobotanical aspects of wild plants of the northeastern United States. Most are native to North America, but a significant number have been intentionally or unintentionally introduced from other continents, mainly Europe and Asia. Though some of the plants discussed herein are cultivated for ornament, food, or medicine, all of them grow outside of cultivation on the New England landscape.

The plants are arranged alphabetically within sections defined by their habit. Habit is a term that describes aspects of a plants life history and its form. Five groups are recognized in this reference: tree, shrub, liana, herb, and vine. Trees, shrubs, and lianas are all woody plants, meaning they have bark, secondary growth (i.e., the stems grow thicker each year), and above-ground living material through the winter season (e.g., winter buds, cambium layer). Trees are tall species frequently exceeding 6 meters (20 feet) and usually have a single stem or a few stems together near the base. Shrubs are often shorter than 6 meters (or at least reach reproductive maturity prior to reaching this height) and frequently arise from many stems, sometimes even forming colonies. Lianas differ from trees and shrubs in that they do not support their own weight, rather they trail over the ground or climb onto and over other plants by means of tendrils or twining growth. Herbs and vines are herbaceous plants, which means they lack bark, do not have secondary growth, and often die back to the ground at the end of the growing season (i.e., living material is all below-ground during the winter, except for evergreen species). Herbs support their own weight or sprawl over the ground, whereas vines trail extensively over the ground or climb onto other vegetation.

I chose to arrange the plants in groups defined by habit due to similarities in form, use, and timing of collection. For example, trees have inner bark that can be extracted for food, medicine, dye, etc. All tree barks can be peeled with more ease during the summer season and, therefore, these species have similarities in timing of collection.

I encourage readers to use the information in this reference as a guideline for study. Do not assume that my research and experience has found all possible methods of performing various tasks. In other words, I do not want the information I have chosen to include to stifle curiosity and creativity. An example will illustrate this point well. *Fagus grandifolia* (American beech) is a tree with hard wood suitable for tools and hunting weapons. Knowing this, I had never attempted to use the wood in a friction-fire set assuming it would be very difficult to create an ember. During one primitive camping trip, a friend of mine decided to use this species as part of a bow drill set crafted from the landscape. Both the spindle and hearth board were made of this tree, and the set produced an ember. It was a valuable lesson and shows the importance of experimentation. I encourage everyone to find out for themselves what works best for them in their region. Further, don't wait until you desperately need the knowledge of wild plants—spend time collecting, processing, eating, healing with, and making things from plants. Nothing can replace actual time spent in the field learning the particulars of each species through the seasons.

Abies balsamea (L.) P. Mill. balsam fir



Left—branch with needle-like leaves. Right—winter buds coated with resin.

This tree is a common species over much of northern New England, especially at the higher latitudes and elevations. It has flat leaf blades with prominent, pale, longitudinal stomatal bands on the undersurface (which appear as white or gray lines running the length of the leaf), winter buds coated with resin, and leaves that expand to a circular disk where they attach to the branch and branchlets. All of these features are useful identification characters. The seed cones of *Abies balsamea* do not fall to the ground intact. Instead, the cones fall apart while still attached to the tree, dropping scales and seeds from the axis of the seed cone. This tree was called puhpukhawihq (pronounced boo-pook-HAH-weekw) by the Passamaquoddy Indians. In their language, puhpukhawihq means blisters with sap.

The tender, young, yellow-green leaves that appear in spring (late May through early June) of *Abies balsamea* can be eaten raw and are relatively pleasant. The leaves become tough and leathery as the season progresses but can still be gathered for teas. Adding a palmful of fresh leaves that are rolled vigorously between hands (to bruise the foliage) to a cup of boiling water makes a refreshing drink and is available year round (the leaves can also be dried for making infusions). The winter buds can be used for this purpose as well. The young seedling shoots can be eaten raw and are rich in vitamin C. The inner bark can be gathered and eaten raw or cooked, or dried and ground into flour (similar to many other gymnosperms; see *Pinus strobus*). The inner bark flour is best mixed with other, more neutral-tasting flours (this improves palatability).

The resin within the bark blisters contains several pharmacologically active terpenes, including β-pinene, δ-3-carene, and α-pinene. These chemicals are antiseptic and analgesic on wounds, blisters, burns, and other sores. The Abenaki, Algonquin, Cree, Iroquois, Ojibwa, and Penobscot are some of the Native Americans to use *Abies balsamea* for these purposes. Tea can be made from the leaves to clear the chest and treat colds and coughs. However, I find using the fresh winter buds to produce a more potent infusion. The inner bark can also be used as a bandage because it is flexible and contains the antiseptic resin. It can be held in place with a thinner strip of bark used as a lace.

The inner bark can be used to make weak cordage for general purposes; however, other evergreens (e.g., *Pinus strobus*, *Tsuga canadensis*) have much stronger inner bark when tensile strength and abrasion resistance are important. The bark is best collected in late spring and summer (i.e., June, July, August), at which time it can be separated from the wood with ease. The inner bark can then be immediately separated from the outer bark by split separation (i.e., carefully controlling the split to run as desired through the length of the material). The inner bark can be left as broad, flat strips and used for weaving (a better use than cord due to its inherent weakness). It will lose most of its flexibility when dry; therefore, it is best used fresh, kept moist until use, or rehydrated by soaking in water prior to use. The bark is naturally high in tannins and can be used for bark-tanning hides (e.g., white-tailed deer). The bark contains mainly catechol tannins, which are more astringent and tan more quickly than some bark tan solutions. The wood of *Abies balsamea* is relatively soft and makes excellent friction-fire materials and is one of my favorite choices for friction-fire sets. The resin collected from the bark blisters, in addition to its medicinal properties, can be used as a lubricant for bow drills. However, it is relatively thin and dissipates quickly. Roots that are about the diameter of a pencil (ca. 7–10 mm thick) make good and quickly fashioned cords for bow drills (similar to several other evergreen trees). The roots should be uniform in diameter, without abrupt bends, and have the bark removed. The Malecite people also used the small rootlets for sewing.

Acer saccharum Marsh. sugar maple




Left—leaf blade with rounded sinuses and sparsely toothed margins. Right—flowers, which appear in the spring prior to leaf expansion, with hairy flower stalks.

This is a common forest tree throughout much of New England, found primarily on moist upland soils. More specifically, *Acer saccharum* grows on rich, sometimes rocky, slopes and high terrace floodplain forests (those that are infrequently inundated by high-water events), as well as being a common component of northern hardwood forests (a transitional plant community between the oak-hickory-pine forests to the south and the boreal forests to the north). *Acer saccharum* can be identified by its leaf blade with rounded sinuses, sparsely toothed margin, and very pale undersurface. There are several closely related species, but they largely have similar uses.

The sap of *Acer saccharum* contains sucrose and can be collected and drunk as a slightly sweet beverage or boiled for a considerable period to yield a sugary syrup. In typical years in New England, the sap begins to flow somewhat consistently in early March. Sap flow ends in late March or early April, after about four weeks of flow. Cold nights (i.e., below freezing) with warm days stimulate the highest rate of sap flow. Consecutive days of above-freezing weather can stanch the flow of sap until colder nights return. As a sweetener, maple syrup has several excellent qualities over many commercial sweeteners, including its contribution of vitamins and minerals—maple syrup supplies significant amounts of manganese, vitamin B_2 (also called riboflavin), and zinc, as well as lesser amounts of magnesium, calcium, and potassium. The Native Americans in the Great Lakes region (Chippewa) used a blade to score the bark and then inserted a wooden spile into the tree below the cut to direct the flowing sap into a container of *Betula papyrifera* (paper birch) bark placed on the ground. I have used spiles from *Sambucus nigra* (black elderberry; see that species) and containers made from the bark of *Pinus strobus* (eastern white pine). Trees should not be tapped unless they are at least 25 cm (10 inches) in diameter, and only very large trees (i.e., greater than 50 cm in diameter) should receive more than one tap. Boiling the sap to create thick syrup requires extended heating—about 40 liters of sap are needed for a single liter of syrup. In a primitive situation, freezing can be used to concentrate

the sap. The ice that forms over the surface of the sap is water and does not contain sugar. Therefore, removing the ice that forms over the sap concentrates the sugars in the fluid. However, this method will reduce the sap only to a point because the sap will not freeze easily after it reaches a certain sugar concentration. Simmering the sap will be needed to further reduce the water content to the desired viscosity. If the sap is not reduced enough, it will not keep very well (i.e., mold will grow on the surface). If the sap is reduced too much, sugar crystals will precipitate out of the solution. Commercial syrup is reduced until it boils at 3.9 degrees Celcius (7.1 degrees Farenheit) higher than water (something very difficult to measure without modern tools). Therefore, I tend to err on the side of making the syrup a little too thick so that it preserves well. Syrup of the desired consistency will "sheet" when dribbled from a spoon rather than drip quickly like water. The finished syrup can be further reduced and allowed to harden into maple sugar or worked with a wooden ladle to granulate the highly concentrated sap to create sugar. The sap of *Acer saccharum* was used by the Algonquin, Cherokee, Dakota, Iroquois, Malecite, Menominee, Micmac, Mohegan, and Potawatomi, among others. Other species can be used as well (e.g., *Acer rubrum*—red maple), but for most it requires collecting and heating even more sap as the sugar concentration is less than that of *Acer saccharum* (e.g., it requires about 60 liters of *Acer rubrum* sap to make one liter of syrup). Trees of a given species vary greatly in the amount of sap they produce and somewhat in the sweetness of their sap (differences can be noted between trees only a few meters apart). Plants that are heavily shaded by evergreen trees may produce only drops of sap during the season. Generally, large diameter stems positioned with good exposure to the sun will produce the most sap. A good tree of *Acer saccharum* can be expected to produce somewhere between 15 and 60 liters of sap per tap. Maples offer additional foods. When the leaves begin to expand from the winter buds, they can be eaten raw or cooked. Though not unpleasant tasting, the leaves are not particularly good either and have an unusual drying sensation within the mouth. I prefer the spring leaves of *Acer rubrum* (red maple) to those of *Acer saccharum*, the former species appearing in late April and early May on nonflowering trees. The conspicuous fruits with a pair of wings can be eaten but are somewhat astringent. Boiling them in a change of water can improve the taste. The fruits of *Acer saccharinum* (silver maple), primarily a species of low riparian forests, are, in my opinion, the best tasting fruits (in fact, they are quite pleasant raw). The inner bark can also be collected and used as a food in the same fashion as many species of gymnosperms (e.g., *Abies*, *Picea*, *Pinus*).

Native Americans used decoctions of the inner bark as remedies for colds and coughs. It was also used as a diuretic and expectorant. The Mohegan and Potawatomi used *Acer saccharum* in these manners. The inner bark of *Acer negundo* (Meskwaki, Ojibwa) and *Acer pensylvanicum* (Iroquois, Ojibwa) was also used as an emetic.

The wood of *Acer saccharum* is suitable for white wood self bows and is worked in similar fashion as *Fraxinus americana*. Small, pole-sized individuals (3–6 cm in diameter) can be made into survival-type bows, while those of larger diameter can be split by various methods. The Micmac are one tribe that used this tree for making hunting weapons.

Betula alleghaniensis Britt. yellow birch

Left—Bark on mature stem. Right— Pollen-bearing flowers (these are formed in the summer, overwinter, and open to release the pollen the following spring).

Synonym: *Betula lutea*. *Betula alleghaniensis* is a common tree over much of northern New England and is found in many different plant communities, including moist, upland forests and forested swamps. It is easily recognized by its silver to yellow, exfoliating bark, wintergreen-scented branchlets (the fragrance is present year-round), and leaf blades with 12–18 pairs of primary lateral veins (most birches have 12 or fewer pairs of lateral veins). A related species, *Betula lenta* (cherry birch), with close (i.e., nonexfoliating), dark bark, also has aromatic branchlets and can be used in a fashion similar to *Betula alleghaniensis*. It has a more southern distribution than *B. alleghaniensis*.

Bark of *Betula lenta*, a more southern species with similar uses.

The newly expanded leaves are edible raw. The branchlets and inner bark can be used to make an aromatic tea. Given that the phytochemical responsible for the wintergreen flavor (methyl salicylate) is volatile, teas are best made with fresh plant material, in cooler water, within a closed container, and infused for longer periods of time (2–4 hours). This method will create a flavorful beverage, whereas the tea will be quite dilute when made in a similar manner to other herbal teas (i.e., using hot water). The inner bark is also edible raw or cooked, and can be dried for later use and ground into flour. The sap can also be collected in spring and reduced by boiling to create a rich, sweet syrup. The trees can be tapped in a manner similar to *Acer saccharum* (sugar maple), but the similarities between these two trees stop there. The sap begins to flow about three to four weeks later than maples in the same area (i.e., in mid- to late March

through early April) and runs for a considerable period (much longer than maples, but see below). After the sap begins to flow consistently, it will run with only a little correlation to the weather (unlike maples). Large diameter stems, exposure to the sun (i.e., absence of shade), and location near water (e.g., streams, pools) all appear to favor heavy sap flow. A good tree of ***Betula alleghaniensis*** can produce more than 15 liters of sap per day! Tapping should cease when the sap becomes cloudy (due to micro-organisms in the sap), because the flavor of syrup changes for the worse (the syrup will be sweet but will also have an off flavor). The sap is initially very clear and tastes like water (i.e., it is relatively tasteless), perhaps with an aftertaste of something vaguely pleasant in the early part of the season. It will flow like this, with clear sap, for 9 or 10 days (give or take). The syrup tastes somewhat like a cross between maple syrup and molasses (but closer to molasses). Given that the sap contains less than half the sugar of ***Acer saccharum***, it requires much more boiling to create syrup. It is commonly reported to take approximately 100 liters of sap to make one liter of syrup. However, this clearly varies by region, as trees I have tapped required 125 liters of sap to make one liter of syrup. Birches contain fructose and glucose as sugars rather than mainly sucrose like maples. Reducing sap to the same concentration of sugar as one would do with maples (i.e., 7.1 degrees Fahrenheit above the boiling point of water on that day) produces a more runny syrup (but with wonderful flavor). The syrup of ***Betula alleghaniensis*** is nutritious and provides vitamin C, manganese, and calcium. It was consumed alone or mixed with ***Acer saccharum*** by the Algonquin and Ojibwa.

The aromatic oil found in the inner bark contains methyl salicylate (similar to ***Gaultheria procumbens***). It has analgesic, anti-inflammatory, and febrifuge properties (similar to aspirin). Therefore, it can be used to alleviate minor aches and pains, as well as to lower abnormally elevated body temperature. The closely related species ***Betula lenta*** can be used similarly. Because methyl salicylate is volatile, follow the recommendations above for making tea to prepare effective remedies. Because of its pleasant taste, this plant was used by the Potawotomi to flavor other medicines.

The outer bark of ***Betula alleghanienis*** is useful tinder, especially when collected as thin, delicate strips because these are most easily ignited. It will burn even when wet. The bark is best used to produce flame in a tinder bundle, as it does not easily ignite from the coal of a friction-fire set alone (i.e., it should be added around a coal extender). The outer bark of ***Betula papyrifera*** (paper birch) is, in my opinion, superior as a tinder. Because of the different manner in which it exfoliates, ***Betula papyrifera*** also can be used as an envelope to hold especially light and easily blown away materials. The bark of both species can be scored and removed for making containers. In order to do so, the outer, more pliable layers of bark need to be separated from the inner, more rigid bark. Though they can be folded to make water-tight containers, they are not sturdy without reinforcement (such as a rim of sewed roots) and may curl into odd shapes when heated water is placed in them. Therefore, I prefer the bark of ***Pinus strobus*** (eastern white pine) for making water-tight containers that can be used as is for heating water.

Carya ovata (P. Mill.) K. Koch shagbark hickory


Left—pinnately compound leaf. Right—bark of mature tree showing the longitudinally peeling plates.

Carya ovata is a common component of the oak-hickory-pine forests that barely reach into the northern New England states. This tree is easily recognized by its bark, which exfoliates in long, curling, longitudinal plates. It is further characterized by its pinnately compound leaves with larger leaflets toward the apex and seeds surrounded by a four-parted husk. To the south, a form of *Carya glabra* (pignut hickory) sometimes has similar bark (forms of this species also have close, nonexfoliating bark). It, too, has an edible, sweet tasting fruit. *Carya ovata* has thicker husks surrounding the nut and tufts of hairs on the margins of the leaflets positioned just below the apex of the teeth (*Carya glabra* lacks such tufts of hairs; these traits are best viewed with a magnifying lens). Another species with edible, sweet tasting fruits is *Carya tomentosa* (mockernut hickory). It has fissured or ridged bark, a leaf stalk and lower leaflet surfaces with abundant hairs, and thick husks.

Fruit of *Carya ovata*. Upper row—intact fruits as they fall from the trees. Lower left— husk. Lower right—nuts.

Carya ovata is best known for its edible fruit (often incorrectly referred to as a nut but actually a drupe) which can be eaten raw or cooked (e.g., roasted). Its flavor is reminiscent of *Carya illinoinensis* (pecan). It is a good source of vitamin B_1 and magnesium. The fruits begin to fall in the last week of September and first week of October (and often are quickly gathered by rodents). In my experience, these first fruits are often poorly

formed and the edible kernel within the seed doesn't fill the interior spaces within the seed. I usually wait until the second and third weeks of October before I gather the fruits to insure I collect a higher percentage of mature, well-formed fruits with plump kernels. At this time, the green husks will present a wonderful, mild resin smell similar to, but not as strong as, the husk of *Juglans* (walnuts). The fruit of *Carya* consists of a thick husk that encloses the shell of the seed (within which are the fleshy cotyledons or kernel). Soaking the fruits in water and then drying them often causes the husk to split, aiding in the first step of opening the fruit, though this is generally not necessary because simply drying them in the sun will eventually cause the husks to open. The seed within the husk can then be cracked with a hammerstone. Experiment with the amount of force: the correct strike will crack the nut without obliterating it and the nut meat inside. I prefer to find a large stone with small pockets or concavities that I can set each seed in so that it does not move when I strike it with a hammerstone. Further, I find it best to strike the narrow side in order to open the seed and preserve large pieces of the kernel. The kernel (made up of the cotyledons) is very tedious to extract, and it requires several hours to gather 0.5 kg (i.e., just over one pound). Given this fact, it is inefficient from a primitive living perspective to process hickories in this manner (though it does provide a wonderful food and makes a very special gift). Available evidence suggests that Native Americans had an efficient way of procuring the nutrition and calories from hickory nuts. They used hammerstones or wooden pestles to pound the nuts (shell and all after the husks were removed) into a course meal and soaked the entire mass in water for 1–2 days or boiled it for about 45–60 minutes to create a nutritious, oily soup base. The remnant material can be strained from the stock or allowed to settle and the stock poured off into another container (i.e., decanted). Some of the ground pieces of cotyledons will float in the stock, providing a bit of substance to the stock. This wonderfully flavored liquid was referred to as powcohicora by one Algonquin language (now commonly referred to as hickory milk by contemporary foragers). The nuts were an important food for the Dakota, Iroquois, Lakota, Meskwaki, Pawnee, Potawatomi, and Winnebago. *Carya glabra* and *Carya tomentosa* can be processed in a similar manner. *Carya ovata* has other edible uses. The somewhat aromatic leaves can be used to wrap foods for additional flavor when cooking. The leaves can also be used as a salt substitute by burning them in a container (such as in a clay bowl). The resulting ash tastes a bit like table salt overlaid with a resin flavor.

The inner bark of *Carya ovata* (and other hickories) can be gathered and processed in a manner similar to *Tilia americana* for making cordage. It is the strongest inner bark I'm aware of and has excellent abrasion resistance. *Carya ovata* is a very important species to know during the winter as this tree is among the few species that yield high quality inner bark (through split separation, because the inner bark is only partially adhered to the wood) for making improvised bow drill cords. The wood of this tree is among the highest quality woods for self bows and is used in a manner similar to that of *Fraxinus americana* (white ash). It bends easily with wet or dry heat and holds the curves better than many white woods (bends placed in *Fraxinus americana*, for example, often relax somewhat with use). The Chippewa, Ojibwa, and Potawatomi used this tree for manufacture of hunting weapons.

Fagus grandifolia Ehrh. American beech

Left—leaf blade. Right—smooth gray bark typical of trees not infected by scale disease.

Fagus grandifolia is a common tree in north temperate forests and is found over much of the eastern United States and adjacent Canada. It is an upland species of deciduous forests that is easy to identify throughout the year due to its smooth, gray bark (except when infected with the beech bark scale disease, which creates cankers on the trunks and major branches). The leaves are alternate, with remotely serrate leaf blades that have prominent, straight veins. It produces a nut that is triangular in cross-section. The nuts (two each) are enclosed within a husk (properly termed an involucre) that is covered with soft prickles. Like most other members of the beech family (e.g., *Quercus*, the oaks), this tree flowers in the spring (primarily in the latter half of May).

The expanding leaves, which generally appear in the last weeks of April and the first weeks of May, can be eaten raw and used in salads. Their flavor is acceptable, but they soon develop a thick texture and are not desirable as a salad plant. This occurs when the expanding leaves exceed 4–5 cm in length. Consumption of large quantities of the leaves should be preceded by boiling to leach the tannins from the leaves. The inner bark is also reported to be edible (but see medicinal uses). The nuts are the prized food from *Fagus grandifolia*. They generally start to fall in late September, a little later than species of *Quercus* (oaks). They are sweet and can be eaten raw or cooked (e.g., roasted, boiled). In my experience, many of the nuts that fall to the ground are sterile and do not contain nut meat. Those that are fertile are plumper (the sides are not concave to

Fruit of *Fagus grandifolia*, a nut, enclosed inside a set of bracts that are covered with soft prickles.

any degree) and the apical wing angles are pale yellow to yellow-green when fresh (rather than brown or drab). It is reported that the outer layer of the nut (the pericarp) contains a slightly toxic compound called fagin. Consumption of large amounts of nuts could cause kidney, respiratory, and other disorders, but it would take large amounts eaten at high frequency for such disorders to occur. Roasting the nuts helps remove the outer layer and, thus, reduces the amount of fagin present. The oil collected from pressed nuts is harmless (i.e., it does not contain fagin). Further, it can be kept for extended periods of time. The fruits of ***Fagus grandifolia*** were consumed by the Algonquin, Chippewa, Iroquois, Menominee, Ojibwa, and Potawatomi people.

Decoctions made from the inner bark are high in tannic acid and can be used as an antiseptic for various cleansing uses (e.g., external washes, mouth gargle). The Iroquois, Malecite, and Rappahannock used the bark for various minor skin maladies.

Nuts of ***Fagus grandifolia*** removed from the prickly husk (i.e., involucre). The nut on the left is fertile (note the yellow apical angles near the bottom of the image). The nut on the right is sterile and empty.

Fagus grandifolia retains its dead leaves on the tree long into the winter (a condition referred to as marcescent leaves). Because these are held above the ground, they dry quickly and can be used as excellent tinder through the winter. The leaves need to be torn or crushed in some fashion to create small pieces—the smaller the pieces, the easier it is to ignite them with an ember. However, tinder bundles composed entirely or largely of the marcescent leaves of ***Fagus grandifolia*** require practice as they can be difficult to keep together. A thin envelope of flexible bark is one of the easiest ways to hold the leaf fragments together. The wood is suitable for bow construction and is to be made in the style of a white wood bow (see ***Fraxinus americana***). The tannins in the inner bark can be used as a natural mordant for other dyes to make them hold fast to plant fibers and give them longevity against light and washing.

Fraxinus americana L. white ash

Left—leaf, typically with 5–9 leaflets. Right—wind pollinated flowers lacking showy petals that are typical of other members of this plant family (e.g., *Forsythia*—forsythia, *Syringa*—lilac).

This tree is common on rich, moist soils of forests, wooded slopes, and high-terrace floodplains. It has opposite, pinnately compound leaves with 2–4 pairs of lateral leaflets and closely and longitudinally furrowed bark. The flowers are small, inconspicuous, and wind pollinated, and mature into a seed-like fruit with a single, elongate wing. A similar species, *Fraxinus pennsylvanica* (green ash), can be used in similar ways; it has dull, gray-brown branchlets that are covered with very short hairs. *Fraxinus americana*, on the other hand, has somewhat shiny, brown to blue-brown branchlets that lack hairs. Another species, *Fraxinus nigra* (black ash) is used extensively for basketry. It is a species mostly of forested wetlands, with corky outer bark and leaflets that lack petiolules (i.e., leaflet stalks; the individual leaflets of *Fraxinus americana* and *Fraxinus pennsylvanica* have short stalks).

The inner bark of species of *Fraxinus* contains fraxin, a coumarin glucoside (a type of polyphenol combined with a sugar), among other compounds (e.g., an acid, a neutral resin, a volatile oil). It is considered to be tonic, astringent, and somewhat cathartic. Decoctions of the inner bark can be used externally as a wash or the dried bark formed into a poultice for minor skin maladies. Decoctions can also be taken internally to relieve constipation. The Delaware and Iroquois used *Fraxinus americana* as a cathartic. Many Native American tribes used this plant as an external medicine (either as a wash or a poultice). It was also used as a gynecological aid (often after childbirth to assist with cleansing).

Fraxinus americana has its major use as a bow wood. In fact, it is among the best bow woods in the northeastern United States when many of its qualities are considered (e.g., widely available, growth form conducive to bow building, strong, easily worked). Unbacked bows made from ash are typically long and broad in order to distribute the stresses of bending over much wood. Lengths of 160–175 cm nock-to-nock and widths of 4.5–5 cm at midlimb are frequently used to create reliable bows that last for many years (note: these measurements are for a 71 cm draw length, for every increment of decrease in draw length, shorten the bow by twice as much). As

this wood is considered by bowyers to be a "white wood," bow builders typically remove the outer and inner bark and leave the outermost layer of wood untouched as the back of the bow. The finished bows are relatively light in color and are best camouflaged to help them blend in the landscape (see ***Juglans nigra*** and ***Tsuga canadensis*** for dyes). Various species of ***Fraxinus*** were used to make hunting bows by many Native American tribes, including the Cheyenne, Dakota, Lakota, Ojibwa, Omaha, Pawnee, Ponca, Sioux, and Winnebago. The bark of ***Fraxinus americana*** makes a wonderful berry bucket, a type of container made by removing bark during the peeling season, scoring two arching lines that together form an elliptical shape where the base will be, and folding the bark in half, holding the fold in place by stitching the sides of the container with pliable tree roots, reverse-wrapped cordage, or strips of animal hide (e.g., rawhide, brain-tanned buckskin). It is best to reinforce the rim by stitching a strip of bark around the top of the bark container, especially if one plans to have a strap of some type for carrying the container.

Juglans cinerea L. white walnut

Left—leaf, typically with 11–19 leaflets. Right—fruits of *Juglans* prior to falling to the ground.

Juglans cinerea, also called butternut, is a tree of rich, moist soils and is most prevalent on high-terrace floodplains of moderate to large rivers in association with other ecologically similar trees (e.g., *Acer saccharum*—sugar maple, *Tilia americana*—American linden, *Fraxinus americana*—white ash). It has alternate, pinnately compound leaves with 11–19 pairs of lateral leaflets. One of its best identification features is the pith of the branchlets, which is chambered (i.e., with a series of empty spaces separated by regularly spaced chamber walls). *Juglans nigra* (black walnut) is not native to the region but is often planted. It has more spherical fruits, brown pith, and seeds (once removed from the husk) with low, blunt, ridge segments. *Juglans cinerea*, on the other hand, has ellipsoid fruits, dark brown pith, and seeds with 6–8 prominent ridges that travel the length of the nut with additional sharp crests and irregular projections. Unfortunately, *Juglans cinerea* is being attacked by a fungal pathogen called *Sirococcus clavigignenti-juglandacearum* (butternut canker). In many places in the Northeast mature trees can be seen with dead branches and reduced vigor. It appears we may be losing yet another important mast tree from the New England forests (*Juglans nigra* appears largely unaffected thus far).

Chambered pith of *Juglans cinera*; note the dark brown color. The pith of *Juglans nigra* is similar, but the color is medium brown.

The fruit of *Juglans cinerea*, often incorrectly referred to as a nut (but actually a drupe), has a kernel within the seed that is rich in protein and oil and is a high-quality food. It contains high levels of vitamin E, flavonoids, and essential fatty acids (e.g., linoleic acid, linolenic acid) that contribute to descreased risk of cardiovascular disease, higher immune system function, and protection from cancer. The fruits generally mature in late September and begin falling from the tree in October. Because they are highly sought after by rodents, it is best to collect them promptly in lean years. They can be eaten

immediately or stored whole for later use without spoilage. They were used by many tribes, including the Algonquin, Iroquois, Meskwaki, Ojibwa, and Potawatomi. The outer husk must be removed to access the nut inside. It can be removed while green by pounding with a stone or wooden mallet and then pried/pulled apart with the fingers. Liquid from the fresh husks will splatter (if pounding is used to remove the husks) and stain skin and clothes (it is a dye). Alternatively, the freshly collected fruits can be allowed to rot for a time (I usually leave them for several months), dried, and then the husks can be easily removed (note: the kernels will taste different depending on which method is used, the latter method produces a slightly bitter taste). If rotting is used to remove the husks, be sure to protect them from rodents and store them somewhere they will not leak fluid onto a surface, as it will stain. After the outer husk is removed, the kernel can be extracted from the seed by pounding with a round stone and then using a wooden or bone pick to pry out stuck pieces. The intact kernel resembles two short, paddle-like pieces. I often eat these while the fruit is immature and the shell is easy to open (the flavor is excellent and mild). If the kernels are to be enjoyed in quantity, they should be soaked in water for at least eight hours. The soaking deactivates phytic acid, an antinutrient that can bind with minerals and block their absorption (note that phytic acid is present in most seeds, nuts, and grains). After soaking, they can be consumed or dried in the sun and stored in cool location for later consumption. If collected in some quantity, the nuts can be made into nut butter by mashing the kernels together. *Juglans nigra* can be tapped in late winter and early spring to collect sap for making syrup in a manner similar to *Acer saccharum* (sugar maple). The period of sap flow corresponds roughly to that of maples (see *Acer saccharum*). Cold nights (i.e., below freezing) with days warming above freezing are known to stimulate sap flow. Because the sap contains less sugar than *Acer saccharum*, more of it needs to be collected and boiled to produce syrup. Approximately 100 liters of sap will produce 1 liter of syrup.

Many parts of walnuts can be used medicinally. A host of studies have provided powerful documention of the efficacy of these trees, though research has generally focused on the well-known *Juglans nigra*. The leaves and inner bark contain juglone (among many other potent compounds), which belongs to a class of phytochemicals called anthraquinones (a kind of polyphenol). Walnut preparations are anthelmintic, antimicrobial, cholagogical, laxative, and sedative. Decoctions of the inner bark can be used to expel worms. As an antimicrobial, *Juglans* is active against many gram-positive and gram negative bacteria, but interestingly in one study had no activity against *Streptococcus mutans*, one species of bacterium responsible for tooth decay. In another study, preparations from the green fruit husks showed the broadest antimicrobial activity of all the plants tested. *Juglans* is also effective against several common fungal pathogens (see below). Infusions made from the leaves can be used externally as a wash to clean and promote healing of wounds. Bark should be decocted to make similar remedies. The juice from fresh, green husks has been used to treat ringworm, jock itch, and athlete's foot through application of the liquid to infected areas (note: the fresh juice is a dye and will stain the skin, but does eventually vanish). Infusing the fresh hulls in oil is another method of making medicine to treat fungal infections. Studies have shown that the juice from the green husks, which contains ellagic acid, juglone, and plumbagin, is as effective as some commercially available antifungal remedies. However, use the fresh husks cautiously because the juice is caustic and will create burns if left in contact with the skin too long. Native American tribes using this plant as a laxative include the Cherokee, Iroquois, Malecite, Meskwaki, Micmac, and Potawatomi. Decoctions of bark and/or branchlets were the most frequently used kind of medicine. Infusions of the leaves have also been used as a sedative (with evidence to support their efficacy). Do not use *Juglans* species during pregnancy because they are capable of stimulating the uterus as well as the bowels.

The outer husk of *Juglans cinerea* can be boiled to create a brown dye (that of *Juglans nigra* make a dark brown dye). The root bark and inner bark also can be used to make a brown dye. The wood of either walnut species is suitable for white wood bows (see *Fraxinus americana*). However, some have found that outer growth rings break when bent. Reducing the back of the bow a few growth rings will prevent breakage on a properly tillered bow.

Pinus strobus L. eastern white pine

Left—habit of open-grown tree. Right—branch with young growth emerging at ends.

This tree is found over much of the region in a wide range of forest and soil types. Often acting as a supercanopy tree, *Pinus strobus* will sometimes extend above the normal tree-top level of the surrounding forest. Pines (the genus *Pinus*) are easy to identify year-round by examining the fascicles of needle-like leaves occurring in groups of 2, 3, or 5. *Pinus strobus* is the only native species of pine in the area to have five leaves per fascicle. It has seed cones 8–20 cm long, longer than other native pines. This tree was called kuwes (pronounced GOO-wehz) by the Passamaquoddy Indians, which means sap that heals—a very fitting name for this plant.

Pinus strobus is a very important plant and provides many foods, medicines, and products. The inner bark can be collected at any time and eaten raw or cooked. It contains (as do other species of pines) proanthocyanidins, powerful antioxidants and potentiators of vitamin C (a potentiator helps small amounts of a substance, in this case vitamin C, exert the same effect on the body as higher amounts would). In fact, the inner bark possesses among the highest levels of these polyphenols in the plant kingdom. One of the best ways to eat this part of the tree is to cut the bark into short, noodle-like pieces and boil them until softened (note: they will not become delicate when chewed but retain a fibrous texture). The bark can also be dried and stored. It can be broken into pieces or ground into flour. When used as flour, it is best mixed with other, more neutral tasting flours, as it will present a flavor of turpentine (I try not to mix more than 15% of pine bark flour into the mix). Young branchlets, before the leaves and pollen cones appear, can be eaten whole straight from the tree as a snack or

Pollen cones of *Pinus strobus* at the correct stage for collection as food or medicine.

as an addition to wild salads. They are generally ready for collection in early to late May. They are crisp and have a mild, resin flavor. Likewise, the emerging fresh leaves (light green in color) can be eaten raw. As the season progresses, they become too tough to eat easily, but can still be infused to make flavorful teas. The young, unopened pollen cones, which appear in June, can be eaten raw or cooked. They have a crisp texture and only mildly taste of pine. They are highly nutritive and contain pro-vitamin A and vitamins C and E along with several B complex vitamins. Further, they contain several minerals (e.g., potassium, sodium, calcium, magnesium, phosphorus, iron, manganese) and amino acids. They become dry and unpleasant to eat prior to and during the release of pollen (generally late May through early June). The seeds are edible but can be tedious to gather in quantity. It is best to collect the green seed cones just prior to their opening (generally the last week of August and the first three weeks of September are ideal times to gather) and place them around the fire or roast them lightly on coals to coax the cones into opening, at which time the seeds are easy to extract. Freeing the seeds from the cones can be messy work due to the amount of resin on the cones. In the very late summer and early fall, when the seed cones are present on the trees, one can observe red squirrels (*Tamiasciurus hudsonicus*) chewing the seed cones free from the branches of tall pines and dropping them to the ground. During times of need, it would be possible to gather those that the squirrels have dropped (allowing larger quantities to be gathered in shorter periods of time).

The resin (often incorrectly referred to as pitch) collected from the trunk and branches has many uses, among which is as an antiseptic covering for minor wounds. It contains pinene and limonene (kinds of terpenes). The Chippewa, Mohegan, and Potawatomi used the resin of *Pinus strobus* for external purposes. The leaves can be made into teas that have expectorant and diaphoretic properties. Therefore, they are useful during colds. Many Native Americans used the leaves (and bark) for this purpose, including the Abenaki, Iroquois, Micmac, Mohegan, and Shinnecock. The inner bark can be used as a bandage for cuts, bruises, and burns. It is flexible and contains the antiseptic resin. The bark bandage can be held in place with any type of cordage, including a thin strip of *Pinus strobus* bark used as a lace. The pollen is a treasure trove of medicine. It is strongly androgenic and supplies phytoandrogens that increase the levels of free testosterone when consumed over a period of time (two weeks or longer). This assists with age-related and chemical-induced loss of libido, sexual function, and vitality in middle-aged and older men. Further, the pollen increases levels of a potent antioxidant (superoxide dismutase) in several important organs, enhances the functioning of the immune system, stimulates liver regeneration, and promotes healthy endocrine function. It is easiest to collect the pollen cones just prior to their release of the pollen for consumption as medicine (rather than attempting to gather the pollen as it is shed).

The inner bark of *Pinus strobus* can be used fresh to make strong cord. It will stand up to some abrasion, well enough to be used as a temporary cord for bow drills, if cut into strips and reverse wrapped. The inner bark becomes brittle and loses much flexibility when dry. The long roots about the diameter of a pencil (7–10 mm thick) can be collected and used as a cord for bow drills after the outer bark has been removed (easily done by drawing the root around a rough-barked tree or grainy rock). Smaller diameter roots can be used in tandem to make bow drill cords. Collect the roots, which are usually within 10–15 cm of the surface, in areas where *Pinus strobus* is the only tree species around (or is the most frequent tree) in order that you collect the correct roots (which have an orange, flaky, outer root bark and are highly flexible). Many other tree species (especially deciduous types) have roots that are too brittle for this use. Also, collect the roots from moist or wet soils, as those from very dry soils (or exposed banks) are brittle. Further, select those that are uniform in diameter and have no abrupt bends (these features cause the roots to break). As with the inner bark, the roots become hard and brittle when dry. They must be kept moist or rehydrated prior to use. The inner bark and roots are also excellent for weaving baskets, quivers, and other containers. Larger diameter roots can even be split along their entire length to make them more flexible. Some of the best bark containers come from *Pinus strobus*. During

June, July, and August (the best months for peeling bark from trees), the bark can be removed and is highly pliable. It can be shaped into a water-tight container by folding the corners and tying the folded corners in place using any type of cord or root. The containers can be used to cook in by placing heated stones within the container. Sections of the tree with thick outer bark will not work to make water-tight containers because the inner bark will split (though they can still be used to make containers that will hold berries, nuts, etc.). One must use sections of the tree that have relatively smooth outer bark (a brief period of experimentation with different thicknesses of outer bark will be very revealing). The hardened resin makes one of the best lubricants for hand holds for bow drill sets. It can be crumpled into the socket and soon heats up and becomes a viscous liquid once the spindle has begun turning. Futher, it does not dissipate as quickly as some other resins (e.g., ***Abies balsamea***—balsam fir, ***Picea rubens***—red spruce). The resin can also be heated in a container or on a stone and then mixed with a small amount of wood ash or ground charcoal to make a very hard, epoxy-like material for hafting blades to handles or repairing leaks in water containers. It has the advantage of being waterproof (unlike sinew and hide glue) and is reversible with heat. The resin can also be mixed with an approximately equal amount of rendered animal fat (e.g., white-tailed deer, black bear) to create a waterproof coating for cordage and hides (note: though this compound repels water very well, it remains tacky). In July, when the pollen cones are shed from trees, they can be collected and used as an excellent tinder. They do not cohere so they must be contained within an envelope of some type, such as the outer bark of ***Betula papyrifera*** (paper birch). The pollen cones are best collected from open areas where the wind sometimes causes them to accumulate in piles (e.g., rock balds, sand beaches).

A ***Pinus strobus*** bark container filled with berries from ***Elaeagnus umbellata*** (autumn-olive).

Prunus serotina Ehrh. black cherry

Left—inflorescence. Right—underside of leaf blade; note white (later turning red-brown) hairs along the midrib.

Prunus serotina is a medium-sized tree of hardwood forests and high-terrace floodplain forests. It usually flowers in the first few weeks of June. This tree shares with other native cherries the small flowers with five white petals, simple and alternate leaves, and a fleshy fruit with a single seed. *Prunus serotina* has an elongate inflorescence (a raceme), a feature shared with only one other species in the northeastern United States—*Prunus virginiana* (choke cherry; which is also edible). However, *P. serotina* is a tree and has elliptic leaf blades with more than 15 pairs of lateral veins (some of which are faint) and has a dense patch of hairs along each side of the midrib on the underside of the blades. *Prunus virginiana* is a medium to tall shrub that has obovate leaf blades with fewer than 15 pairs of lateral veins and lacks the dense patch of hairs on the undersurface. *Prunus serotina* usually flowers in the last week of May and first two weeks of June.

The fruits of *Prunus serotina* and *Prunus virginiana* are edible raw. Taste varies from plant to plant, those of *Prunus virginiana* usually more astringent (which dries the mouth), but this species is more abundant on the landscape and it fruits more reliably (which means the fruits can be collected in greater quantity). The fruits of both species generally mature in August through the first week of September. The seed contains the glycoside prunasin (the non-sugar portion is a type of carbohydrate), which is transformed by the body into several compounds, one of which is hydrocyanic acid. It is toxic if ingested in large enough quantity (hydrocyanic acid deactivates important respiratory enzymes). However, discarding the seeds prior to consumption makes eating the raw fruits perfectly safe.

Fruits of *Prunus virginiana* (choke cherry).

The fruits can also be dried and pounded (seed and flesh) into cakes. Drying the fruits reduces the amount of prunasin present. It also eliminates much of the astringent quality and concentrates the pleasant flavors. The dried cakes can be stored for a considerable period if kept dry. Before eating, they can be cooked over coals for a short period (cooking further reduces the amount of toxic components). The resultant food can be eaten as is or mixed with animal fat and dried meat to make pemmican. Note that consumption of the seeds in the processed fruits provides abundant vitamin E. These "cakes" were prepared and eaten by many Native American tribes, including the Cheyenne, Crow, Dakota, Iroquois, Montana Indian, Omaha, Pawnee, and Ponca. I prefer *Prunus virginiana* for food (due to the practical reason of ease of collection) and *Prunus serotina* for medicine (again, for practical reasons of collection, thickness of inner bark, etc.).

The inner bark contains the cyanogenic glycoside prunasin (the non-surgar portion is a type of carbohydrate). It also contains the following polyphenols: eudesmic acid, scopoletin, ρ-coumaric acid, and tannins. It can be used to make an infusion that is antitussive (i.e., soothes coughs), stomachic (i.e., tones the stomach and improves appetite), expectorant, and a mild sedative. Used as a cool wash, this species can also assist with eye inflammation due to its astringent properties. For maximum potency, the bark should be collected later in the season, when levels of prunasin are highest. I generally collect the bark near the end of bark-peeling season (in the latter half of August). It has two outer layers, one dark (which I remove) and one thin and green (which I leave on the inner bark). Processing cherry bark is very enjoyable due to the sweet cherry smell that surrounds everything during the removing and separating of the layers. The collected bark can be dried and stored, but, as with many herbs, it loses its potency with time (do not store longer than one year). Because heat destroys prunasin, only warm water should be used to decoct the inner bark. Use the drink sparingly. If it does not provide the desired effect, seek alternative herbs rather than increasing the dosage. Further, several authors warn that long-term use of *Prunus serotina* to allay chronic coughing should be avoided.

A light brown-pink dye can be extracted from the bark (by boiling the bark in water). The leaves yield a green dye. The wood of *Prunus serotina* can be used to make a serviceable self bow. However, it is not nearly as dense as the wood of related species in the same family (e.g., *Amelanchier*—shadbush, *Crataegus*—hawthorn) and is usually backed, even by expert bowyers. Rawhide from white-tailed deer or sinew from deer or moose serve as an effective backing.

Quercus rubra L. northern red oak


Left—shade leaf of *Quercus rubra*; note that the lobes terminate in thin bristle tips (the sun leaves have more pronounced lobes separated by deeper sinuses). Right—mature nuts.

Quercus rubra is a familiar tree of moist to, more commonly, dry, well-drained soils. It has alternate leaves with several pairs of lobes that terminate in bristle tips. The fruit, a nut, is the well-known acorn—a hard-shelled fruit with a "cap" that represents several series of fused woody bracts (called an involucre). Though there are many different species of oak in the region, all have the same edible uses (though there are some important differences when it comes to processing them). Within New England, the genus can be divided into two groups. The black oak group (section *Lobatae*) has leaves with bristle-tipped lobes, nuts maturing in two years, and the inner surface of the shell covered with dense, woolly hairs (e.g., *Quercus coccinea*—scarlet oak, *Quercus ilicifolia*—scrub oak, *Quercus rubra*, *Quercus velutina*—black oak). The white oak group (section *Quercus*) lacks bristle tips at the ends of the lobes, has nuts maturing in one year, and lacks hairs on the inner surface of the shell (e.g., *Quercus alba*—eastern white oak, *Quercus bicolor*—swamp white oak, *Quercus macrocarpa*—bur oak, *Quercus montana*—mountain chestnut oak). The flowers of oaks appear in the spring and the nuts mature in late summer and early fall.

Leaf of *Quercus alba*; note the regular nature of the rounded lobes that do not end in bristle tips.

The nut is the prized food from oaks. It contains starches, oils, some protein, the minerals calcium, phosphorus, and potassium, as well as several B complex vitamins (unfortunately, the B vitamins are water soluable and will largely be lost in the

final product). The protein is a high quality protein due to its completeness. However, the nuts also contain various tannins that must be leached prior to consumption (red oak and close relatives generally being slightly more tannic in our area). Further, the number of nuts produced each year varies considerably, even between nearby trees. When collecting the fruits, gather them from the ground after they have fallen from the tree. They usually mature and begin to drop from the trees in early September. However, the first ones that fall are generally immature or damaged by some pathogen. I generally avoid these and wait for the larger quantities that come later in the month. Also, gather those that are free from the involucre (i.e., the cap), as those that are tightly bound to it are almost always immature or damaged in some fashion. I have found that *Quercus rubra* is sometimes best gathered while the shell is still somewhat green because some populations will have a high proportion of infestation by a weevil larva that eats the kernel and deposits fecal material within the shell (I immediately process the nuts from these areas). However, in most areas I have gathered from, the frequency of infestation is usually low. As the weevil larva feeds, the nut softens and the shell (near the top) can often be cracked with a firm squeeze between the fingers. This squeeze test serves as a quick method of identifying those nuts that are still fresh (the nut and its shell should be quite firm). There may also be a small hole in the shell where the insect bored out of the nut. In most areas, insect problems are minimal and nuts can be gathered later in the fall (at this time it is also easier to identify which nuts have an insect larva within them as the insects have fed longer and the infected fruits are quite light in weight compared with uninfected fruits). As a final note, do not gather nuts that are discolored with dark stains, particularly around the basal, circular scar, as this often indicates that mold or some other pathogen has damaged the nut. *Quercus rubra* and *Quercus velutina*, its close relative, have nuts with moderately high tannin levels (usually about 6–10% tannins by volume). Consuming too much tannic acid can cause digestive and nutritional problems (tannins bind to proteins and minerals, making them unavailable to the body). Fortunately, tannins are soluble in water and can be removed by several methods. First, the nuts need to be quickly washed to remove dirt and other grit that will otherwise find its way into the final food product. Then the nuts need to be cracked and shelled. My preferred primitive method is to place the acorn, point down, on a piece of hard wood and strike the "top" (in reality the bottom) of the acorn with a smooth stone while holding it with my fingers. The point (a remnant of the floral style) presses into the wood and stops the acorn from slipping to the side. Freshly collected acorns can be split this way, but you will need a pick of some type to extract the nut meat. Previously dried acorns are easily shelled this way because the kernel shrinks a little and is not tightly encased by the shell (only rarely will a nut pick be needed). Another method uses water to aid with separating shells from nut meats. It involves simply pounding the dried, intact nuts into small pieces and placing the entire mass (shells and kernels) into a container of water. Most of the shell fragments will float, leaving the nut meats at the bottom of the container. Some shell fragments will sink; therefore, some hand separation is still required (at least ⅔ of the shell material will be removed by this method, sometimes as much as ¾). Note that this method works only with the black oak group and only with dried acorns. The easiest and fastest way to leach the tannins from the nuts is to boil coarsely broken nut meat in several changes of water (which will turn brown as the tannins are removed from the nuts). The water is poured off between boilings and fresh water is again

Opened shells of *Quercus macrocarpa* (top row) and *Quercus rubra* (bottom row). Note that the inner shell surface of the lower row has a layer of light orange-brown, felt-like hairs.

brought to a boil. This process is continued until the nut meat tastes bland (i.e., not bitter) and loses its astringent feel in the mouth. During the final change of water, the boiled liquid should be scarcely discolored (if at all). I normally do six to eight changes of water over a five- to six-hour period. At this point, the leached nut fragments are dark brown and are safe to eat in quantity. I often make a hot cereal by boiling them and adding the syrup of *Acer* (maple) to sweeten them (dried fruit also makes a good addition). They also can be dried and ground into flour (but see below). The nuts can also be leached in cold water in a container. This doesn't alter the consistency of the nuts as much as boiling does and the ground nuts will remain together better during cooking. However, for cold-water leaching, the nuts should be ground into a meal or finer (to increase the surface area for leaching; if left too coarse, they will not leach properly). The ground nuts are placed in a container filled with water, which is poured off at least two times a day after the ground nut meal has settled. This process is continued for seven to 14 days (depending on how fine the meal is ground and local variation in tannin content), ultimately yielding a somewhat bland meal that can be used for making hot cereal or dried and ground into flour (if not already ground fine). Again, leachate color, taste, and mouth feel of the ground acorns are the indicators for fully leached acorns. For cold-water leaching of fresh (i.e., not dried) acorns in primitive fashion, I find it best to lightly pound the shelled nuts into small fragments and dry them in the sun for two or three days on buckskin, bark sheets, or stone slabs (if the acorns have already been dried, this step can be skipped). Once dried, they can be further ground using a pounding stone and a flat to concave rock (mano and metate, respectively) into a meal or coarse flour, which will leach efficiently in cold water. Shelled and ground nuts can also be placed in a tightly woven basket and placed where a trickle of water can flow into it for a couple of days to remove the tannins. This is accomplished by finding streams with sufficient elevational gradient to produce short water falls where flowing water can pour into the opening of a container or be diverted to a container using a sheet of bark as a gutter. The amount of water flowing into the woven container needs to be adjusted so that all of the ground nut material is covered by water (or the exposed material will not leach) and the water doesn't flow over the top of the container (or it will carry away the ground acorn). The nuts of the white oak group (e.g., *Q. alba*, *Q. bicolor*, *Q. macrocarpa*) are much less bitter fresh out of the shell and do not require leaching to make them palatable (depending on your tolerance of bitter tastes). This fact leads people to believe they can be consumed in quantity without processing. However, the fruits still contain tannins and, depending on the species, may contain nearly or fully as much as those of the black oak group. Therefore, consuming large amounts of these oaks will still be detrimental to human health. Hence, they need to be leached as well. For most species of the white oak group, I leach about one-third the time I normally would for members of the black oak group (the notable exception is *Quercus montana*, which needs as much leaching as members of the black oak group do). It is important to note that the nuts of white oaks and relatives are more prone to spoilage during cold leaching. Frequent changes of water and cool temperatures will help avoid these losses. The nuts of oaks are one of the best items for making flour from an efficiency perspective, given their ease of shelling and large kernel. Further, dried acorns (shelled or intact) will keep for a long period of time without spoilage if kept in a dry, cool location. The flour made from acorns can be used to make ash cakes or added to other flours to make various types of bread. The fruits of *Quercus rubra* can be stored whole (i.e., prior to extracting the nut from the shell) if dried in the sun over a period of two to three weeks. As previously mentioned, dried nuts are easier to process later because the nut meat is more easily removed from the cracked shells. Note that *Quercus alba* and relatives take longer to dry (they also dry harder and contain less oil than those of the black oak group). In fact, they can be difficult to passively dry without spoilage. Nuts of the white oak group normally germinate soon after falling from the tree (which means one doesn't have a long period to gather them). The fresh-collected fruits of the white oak group may begin to split and produce a small rootlet. The nut meat itself also tends to shrink within the shell and changes texture relatively quickly. Therefore, the acorns may need to be actively dried soon to prevent spoilage. Utilizing elevated bark sheets as trays on which to place

acorns near a fire is important for members of this group. Unknown to many people is that acorns of the black oak group can sometimes be collected in the spring, shortly after snowmelt, following an autumn season with heavy fruit production (this is because oaks of the black oak group do not germinate in the fall, like white oaks, but instead germinate the following spring). In banner fruit seasons, the animals do not eat and/or store all of the acorns and many may remain on the ground. I often seek out places in the spring where topography helps to concentrate the nuts (e.g., the base of a slope). At this time, the shells are beginning to split and it is easier to shell the fresh nuts. Within a few weeks after snow melt, a long rootlet will grow out of the shell and the nutmeat will shrink and change texture (getting softer), indicating the forager will need to wait until the fall to collect again. *Quercus rubra* was used as an important food by many Native American groups, including the Dakota, Iroquois, Ojibwa, Omaha, Pawnee, Ponca, and Potawatomi.

A decoction of the inner bark and/or leaf galls, or the leachate from the processed nuts contains tannins (e.g., phlobatannin, ellagitannin, gallic acid). It has antiseptic and astringent properties. It can be used as an external wash for cleansing minor skin maladies (e.g., wounds, minor burns, rashes). Decoctions can also be used as an oral gargle for tonsillitis, laryngitis, and similar ailments. The Cherokee and Delaware used *Quercus rubra* in this fashion. It can also be ingested for treatment of acute diarrhea, as was done by the Cherokee, Malecite, Micmac, Ojibwa, and Potawatomi. Care should be taken here as *Quercus* can sometimes be too strong a remedy for some situations (e.g., mild diarrhea).

The wood of *Quercus rubra* can be used to make quality white wood bows in the style of *Fraxinus americana* (see that species). The tannins from the inner bark can be used as a dye, yielding a gray color. The bark can be used as a natural mordant for other dyes to make them hold fast to plant fibers or animal hides/fabrics and give them longevity against light and washing. The bark is also useful in bark-tanning hides (e.g., white-tailed deer). *Quercus rubra* (and other oaks) contain both catechol and pyrogallol tannins, the former of which is more astringent and tans more quickly, the latter of which create hides with good durability and water repellency.

Robinia pseudoacacia L. black locust






Left—elongate inflorescence (called a raceme) that hangs down with white, pea-like flowers. Right—pair of spines present at most leaf bases.

Robinia pseudoacacia is a tree native to the eastern United States. It did not formerly occur in New England but has originated from plantings and is fully capable of seeding itself onto the landscape. It is found here and there in northern New England, often near human habitation, but sometimes also in riparian forests and other wooded places with moist soils. The leaves are alternate, pinnately compound, and have 7–19 oval to elliptic leaflets that lack teeth. Many leaf bases possess a pair of stout, dark spines, a feature that helps to identify this plant. The flowers, which have the characteristic bilateral symmetry of most legume flowers, have a yellow spot on the upper (i.e., banner) petal. They generally appear in the last week of May through the first three weeks of June (depending on latitude).

The flowers, which are shaped like those of peas, are sweet (due to an abundance of nectar) and can be eaten raw, added to salads, or included in soups. They can also be infused to make a pleasant tea that tastes like dilute honey. The tender, green, immature legumes can boiled and eaten. As well, the seeds from the ripe legumes can be boiled and eaten. The legumes mature in September, and hang on the tree for some time (often late into the winter). The seeds within the legumes are small and somewhat tedious to gather in quantity but expand on cooking. They taste much like *Phaseolus vulgaris* (cultivated bean). When preparing them for food, it is best to soak the seeds

Legumes of *Robinia pseudoacacia*. Upper legume intact, the lower legume opened to show the small seeds contained within.

overnight and then boil them for at least 60 minutes. The soaking deactivates phytic acid, an antinutrient that can bind with minerals and block their absorption (note that phytic acid is present in most seeds, nuts, and grains). The legumes can be stored, provided they are spread in a thin layer and dried in the sun for a time to be sure they are not put away moist; otherwise the seeds inside the legume will mold. I have had good success keeping the legumes into the winter with minimal spoilage. Do not eat the young legumes or the seeds raw, as they contain phytohemagglutinins, which destroy red blood cells. These compounds are eliminated on cooking. Other portions of the plant (leaves, roots, bark) are toxic and can cause nausea. They should be avoided by inexperienced persons.

The inner bark of *Robinia pseudoacacia* contains the alkaloids choline and robinalbin, a phytalbumose similar to ricin found in *Ricinus communis* (castor-bean). Robinalbin (sometimes also called robin) is emetic and cathartic; however, its properties are rendered inert by heat. Therefore, decoctions need to be made with warm (but not hot) water.

Robinia pseudoacacia is one of the best bow woods available in the Northeast, having a dense, yellow heartwood at its center. However, it is different from other quality white woods, such as *Fraxinus americana* (white ash), in that only the heartwood is used to build the bow. This means that the bowyer must remove the bark and all of the lighter colored sapwood down to the heartwood. This wood removal must be done carefully as not to cut into the heartwood and ruin the integrity of the wood fibers that will become the back of the bow. The inner bark (as with most trees) can be used to yield material for cord. It is of slightly better quality than some trees but is inferior to species such as *Tilia americana* (American linden).

Thuja occidentalis L. northern white cedar

Left—branches of *Thuja occidentalis* covered with tightly appressed scale-like leaves. Right—seed cones, which have all the scales attached near the base.

Thuja occidentalis is a tree of certain types of peatlands (called fens, those peatlands that are not too acidic), wet cliffs, and occasionally rocky forests. It becomes quite scarce south of our region but increasingly more common to the north. It has pairs of scale-like leaves that are tightly pressed to the branchlet and branches, so the wood of the branch is concealed by the leaves. The leaves are of two types, those that are flat (the upper and lower ranks of leaves) and those that are folded and keeled (like a canoe, the lateral ranks of leaves). Different from some other members of its family (Cupressaceae), the seed cones have woody scales and are longer than wide (unlike the berry-like, leathery cones of *Juniperus*—juniper). This tree has been long known as arbor vitae, meaning tree of life.

The leaves and young shoots are edible and considered to be high in vitamin C. They can be infused (fresh or dry) to make an evergreen-tasting tea, as was done by the Chippewa and Ojibwa. Note that the foliage contains thujone, a toxic ketone (a type of terpene) that in large doses affects the central nervous system (see below). However, recent review of this plant's safety shows that the claims suggesting this plant is harmful to human health have been exaggerated. Given its beneficial pharmacological action, occasional use of this plant should not be discouraged.

The leaves and branchlets contain α-thujone, β-thujone, isothujone, and frenchone (all types of terpenes), as well as flavonoid glycosides, tannins, and mucilage. These phytochemicals work in concert to provide antibacterial, antiviral, antifungal, immune-stimulating, expectorant, and counterirritant actions. One study showed *Thuja occidentalis* to be active against some bacteria, including *Staphylococcus aureus*, but was inactive against some common bacterial pathogens (e.g., *Escherichia coli*, *Streptococcus mutans*). Other studies have shown that *Thuja occidentalis* preparations work as adjuvants (i.e., potentiators) to prescription antibiotics for bacterial infections of the upper respiratory tract (an adjuvant modifies the effect of other drugs or preparations while having little or no effect when used alone). This plant has marked antiviral properties and is especially indicated for acute and chronic infections of the upper respiratory

tract (including influenza and the common cold). It is also showing promise in the treatment of human immunodeficiency virus. Infusions are the route of administration. These can also be used as an external wash for cleansing wounds and for a host of skin maladies such as cold sores, warts, piles, and fungal infections. The Menominee and Penobscot Indians used the dried, powdered leaves as a poultice for similar ailments. Numerous studies have shown that ***Thuja occidentalis*** preparations significantly enhance various aspects of the immune system (e.g., increased total white blood cell count, increased cytokines and antibody production, activation of macrophages). Taken prior to or at the onset of cold and flu symptoms, ***Thuja occidentalis*** has the capacity to shorten the duration of symptoms (especially when used in conjunction with other antiviral and immune-stimulating herbs). It was used as a cold remedy by the Algonquin and Cree. One of the key components of ***Thuja occidentalis*** preparations is thujone, stated to be toxic to the central nervous system. In large doses, it is known to cause intoxication with vomiting, headaches, severe diarrhea, retention of urine, and convulsions. Further, it is stated to be an abortifacient (i.e., inducing the premature expulsion of the fetus). However, recent studies show some of the toxicity claims of this plant to be exaggerated. Commercial preparations of ***Thuja occidentalis*** containing thujone have shown very limited adverse reactions and no abortive effect. That stated, pregnant and lactating women may wish to avoid this plant as it is considered by some authors to have specific action on the uterus and has been used medicinally to assist with delayed menstruation.

Thuja occidentalis arguably is our best wood for friction-fire sets (both spindles and fireboards for bow drills, and fireboards for hand drills). It produces a dense ember that does not easily break apart. Further, ***Thuja occidentalis*** often grows in thick stands, meaning it will have dead and dry lower branches that can be made into bow drill sets on the spot without waiting for the wood to dry (unless taken from wetland habitats, then some drying in the sun over a couple of days may be beneficial but not absolutely necessary, depending on your skill). The fresh inner bark is not particulary strong and has low tensile strength and abrasion resistance (i.e., it is best left in flat strips and used for weaving containers rather than being used for quality cordage). However, the dried inner bark is very fibrous and makes soft cordage. This can be used to make mats and bark blankets (and various types of clothing). The dried inner bark is also an excellent tinder and will both extend the coal as well as produce flame (i.e., it can be used alone as a tinder material). The bark is easily prepared by removing it from the tree and drying it (or removing it from dead trees), then rolling it aggressively between the palms to break up the fibers. Alternatively, the inner side of the removed bark can be scraped with a metal or stone blade to remove the fibers. The branches and bark make good smudging material for ridding shelters and food stores of insects and other arthropods. Many Native American groups consider species of cedar (including ***Thuja occidentalis***) to be sacred plants and use them in ceremonial smudging. For example, the Potawatomi smudged the leaves for protection and to purify objects.

Tilia americana L. American linden

Left—leaves, note asymmetrical blade bases. Right—inflorescence with pendulous flowers and elongate bract that is fused to the peduncle (i.e., inflorescence stalk) for some distance.

Tilia americana is a forest tree of rich, moist soils, including both upland slopes and floodplain habitats. It frequently grows with *Acer saccharum* (sugar maple) and *Fraxinus americana* (white ash). The large, more or less heart-shaped leaf blades with asymmetrical bases and the unusual inflorescence (the stalk of the flower array is fused to a long bract) make this tree easy to identify. Members of this genus are often called basswood by Americans. Linden is a more widely used common name for this group. The flowers appear primarily in the last three weeks of July. This species has many important uses to neo-aboriginals.

Inner bark of *Tilia americana*. Left—raw strips of inner bark, removed after extended retting. Middle—raw inner bark reverse-wrapped into cord. Right—inner bark fibers after prolonged boiling in water and wood ash solution.

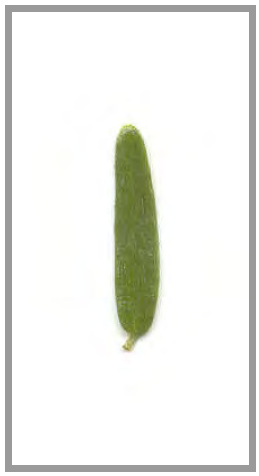
From the latter half of April through early May, the winter buds (which can be eaten at any time of the year) begin to expand and offer a taste similar to *Phaseolus vulgaris* (green beans). They are quite mucilaginous, as are other parts of the plant. The Chippewa ate the expanding buds raw or cooked them as greens. The newly emerged leaves, while still somewhat translucent, can be eaten raw in salads or added to soups as a thickener (again, because of the mucilage). They are preferable to many other trees with edible young leaves because of their pleasant taste. The flowers can be eaten raw or steeped to make a fragrant tea. The fruits, which are spherical and

hairy around the outside surface, have been used in a variety of ways, including roasting and grinding to produce a coffee substitute.

Linden plants have long been used for various types of medicine by Native American tribes, including the Algonquin, Cherokee, Iroquois, Malecite, Meskwaki, and Micmac. They are also used in Europe as a popular cold and flu remedy. Though other parts of the plant are frequently used, it is the flowers (including the bract) that are most often employed in modern herbalism. They contain the polyphenols kaempferol, hesperidin, quercetin, astralagin, tiliroside (all types of flavonoids), as well as mucilage, phenolic acids, and tannins. Infusions made from the flowers (fresh or dry) are used to treat colds and cold-related coughs. Their success in treating these ailments is likely because of the sedative (i.e., relaxing the nervous system) and diaphoretic (i.e., inducing sweating) properties. The mucilage contained in the plant is soothing for sore throats, which are often associated with colds. Infusions are also used for their ability to reduce elevated systemic blood pressure associated with nervous tension and arteriosclerosis. For these conditions, it may also have a preventative role in conjunction with life-style changes. Because of its hypotensive and mild sedative qualities, *Tilia americana* is also considered an effective cardiotonic.

One of this tree's best qualities is the excellent cordage that can be made from the inner bark. It was used for general lashing, basketry, mats, and sewing by many Native American tribes, including the Algonquin, Chippewa, Lakota, Malecite, Meskwaki, Ojibwa, Omaha, Pawnee, Ponca, and Potawatomi. This is one of my favorite plants for coil baskets because of the long fibers that can be extracted (meaning less time spent splicing in new lengths). Furthering its utility as cordage is the fact that the bark can be peeled from branches essentially year-round (though it works best to split the branches lengthwise using split separation in the winter and early spring to remove long sections of intact bark). Long sections (two meters or more) can be easily removed if the bark is scored with a metal or stone blade. The outer bark can be removed and the inner bark immediately used as supple material for binding and weaving. It can also be braided and used as a quick cord for a bow drill for fire making. The highest quality and softest cord can be made by retting the bark. This is accomplished by placing the bark in a body of water and keeping it submersed for 2–6 weeks (depending on the water temperature and amount of biological activity). The inner bark will eventually become slimy and can be removed in thin strips by carefully pulling away sections. The remaining bark can then be placed back in the water so that additional strips of inner bark can be removed. These strips of inner bark can be dried, separated into strands of desired thickness, and then used to make cordage. However, even higher quality (i.e., softer and thinner) fiber is produced by boiling the inner bark in a basic solution (wood ash can be used to alter the pH of the water; add enough to change the water color to gray). This act removes the material holding the strands together and reveals the soft, continuous fibers that can be used for a variety of purposes. Though the cordage is of excellent quality among inner tree barks, it does not equal the strength and abrasion resistance of fibers from herbaceous plants such as *Apocynum* (dogbane) and *Urtica* (stinging nettle). *Tilia americana* has a soft wood that is ideal for use as friction-fire material. Both the fire board and spindle can be made from this plant. The coal it produces is dark and burns readily even if disturbed. However, the coal is more fragile than one produced from *Thuja occidentalis* (northern white cedar) and other quality fire woods. Live trees that are felled and split into fireboards of 2–3 cm thickness can be ready to use in two weeks or less (assuming warm, reasonably dry weather).

Tsuga canadensis (L.) Carr. eastern hemlock



Left—branch with seed cone. Right—leaf (upper surface) with narrow stalk at base. The lower surface has a pale, lengthwise band on either side of the midrib.

Tsuga canadensis is a common and very long-lived tree of forests in northern New England. It often forms nearly pure stands on slopes leading down into drainages. It has dark green leaves with white or gray stomatal bands on the undersurface (these are rows of pores for gas exchange). Individual leaves taper to a petiole-like base prior to attaching to the branchlet. The lead branchlets near the apex of hemlock trees have a characteristic arching or drooping nature. This plant is thought to be poisonous by some because of its common name (hemlock). Note that *Tsuga canadensis*, a member of the Pinaceae (pine family), is not related to poison-hemlock (*Conium maculatum*), an herbaceous species of the Apiaceae (celery family).

The inner bark of *Tsuga canadensis* is edible. It should be cooked in boiling water to leach out the tannins (if it is consumed in quantity during times of need). The young shoots can be eaten raw as can also the young, light green leaves that emerge in the early season. The young and old leaves can be infused to make a flavorful tea that is antiscorbutic (i.e., fighting scurvy due to the presence of vitamin C). One of my favorite plants to use when making kombucha (a fermented tea) is *Tsuga canadensis*.

The inner bark was used medicinally for colds and coughs by the Algonquin, Iroquois, and Micmac. Because of its high tannin content, the bark can also be made into an external wash for cleansing with antiseptic and astringent properities.

Tsuga canadensis has a number of additional uses.

The dye extracted from the inner bark has been painted onto the upper piece of wood with a feather. Below is the original color of the wood.

The inner bark can be boiled in water to extract a red-brown dye. Vary the amount of bark and boiling time to get the desired concentration of dye. Because of the amount of tannins naturally present in the bark, no mordants are needed. These tannins also make the bark useful for bark-tanning hides (e.g., white-tailed deer). *Tsuga canadensis* contains mainly catechol tannins, which are more astringent and tan more quickly than some bark-tan solutions. The inner bark is also very strong and can be used to make quick cords for a bow drill (remove the outer bark using split separation and reverse wrap long sections of inner bark together). It will become brittle when dry; therefore, it needs to be used fresh, kept moist, or rehydrated prior to use. The roots of this species are highly flexible and also can be used for quick bow drill cords as well as weaving (see *Pinus strobus*). They too must be used fresh or hydrated as they are brittle when dry.

Amelanchier laevis Wieg. smooth shadbush



Left—flowers of *Amelanchier laevis*. Right—fruits of *Amelanchier spicata*, a related species.

Members of the genus *Amelanchier* are commonly referred to as shadbushes but are also known as juneberry and serviceberry in the eastern United States. They are an occasional component of many upland plant communities, including open plains, forests, and forest openings. They are, in general, early successional species, being found most abundantly in open places and young forests. The species have alternate, simple, and finely to coarsely toothed leaves. In the spring they produce racemes of flowers bearing five white petals. The fruit resembles a blueberry at maturity, becoming blue to purple, and being crowned by the five persistent sepals. There are several species of *Amelanchier* occurring in our region. Some are very short, grow in colonies, and have small flowers (e.g., *Amelanchier spicata*—dwarf shadbush), whereas other species are rather tree-like and have large flowers (e.g., *Amelanchier laevis*—smooth shadbush). However, because they are all edible, it is not critical to identify them to the species level.

The fruit of all our *Amelanchier* is edible raw. Most species, save perhaps for *Amelanchier arborea* (downy shadbush) and *Amelanchier bartramiana* (mountain shadbush), are of excellent quality, being sweet and juicy. They taste like a cross between *Malus* (apple) and *Vaccinium* (blueberry) and are one of my favorite wild foods. They were enjoyed by many Native Americans, including the Blackfoot, Cree, Omaha, Ponca, Sioux, and Winnebago. Shadbush fruits are a significant source of vitamin B_2 (riboflavin), vitamin B_7 (biotin), iron, and manganese, and contain noteworthy concentrations of polyphenol antioxidants (e.g., cyanidin, delphinidin, pelargonidin, quercetin). *Amelanchier* is generally ripe in the first three weeks of July (later for northern and/or higher elevation populations). The fruits can be mashed into cakes for transport or dried and used for pemmican (adding equal parts of dried fruit, dried pounded meat, and animal fat). They were dried and used as a winter food by the Blackfoot, Menominee, Ojibwa, and many others.

Amelanchier possesses a very dense wood that makes it valuable for self bows (in fact, it is among the densest woods of native New England plants). Unfortunately, most species of *Amelanchier* do not grow to a large diameter (*Amelanchier laevis* is the largest species), so the back of the bow will be crowned to some extent. However, this can be mitigated by decrowning (i.e., removing the high contour of the back of the bow and faithfully following the grain so as to leave intact wood fibers that run the length of the bow).

Comptonia peregrina (L.) Coult. sweet-fern

Left—lobed leaf blades of *Comptonia peregrina*. Right—fruits, which are concealed inside the burs.

Comptonia peregrina is a shrub of dry, sterile, sandy habitats, including woodlands, fields, and sandplains. It has leathery, lobed leaves that are very aromatic when crushed or bruised. The fruit, a nut, is enclosed inside a soft bur. The leaves are marcescent, meaning that after they die they remain on the plant as withered remnants for some time before finally falling. The pollen-bearing flowers are borne in catkins (also called aments), similar to members of the Betulaceae (birch family).

The aromatic leaves, fresh or dry, can be infused to make a pleasant tea. This beverage was enjoyed by the Chippewa. The nuts are also edible and tasty but are tedious to gather in quantity. The pollen catkins, when collected prior to flowering (which occurs generally in the latter half of April), are an enjoyable snack. They are crisp at this time and very aromatic.

Pollen-bearing catkins, which are formed in the fall and overwinter on the shrub, opening in the spring.

The leaves contain various tannins, including gallic acid (a kind of polyphenol), as well as cineol, γ-terpinene, and caryophyllene (kinds of terpenes). As such, they are astringent and antimicrobial. The Delaware, Malecite, Micmac, Mohegan, and Penobscot used the infusions as an external wash for minor skin maladies (e.g., cuts, blisters, rashes, dermatitis from *Toxicodendron* species). The antimicrobial action prevents infection and the astringent action reduces inflammation, discharge, and irritation (i.e., itching). Recent studies show that *Comptonia peregrina* is active against some bacteria and fungi, lending support to the Native American use of this plant. Leaf teas have also been used historically for diarrhea.

The marcescent leaves, collected after the growing season, make excellent tinder as they are kept off the ground and dry quickly after precipitation. They are dry and readily crumble. Because they do not link together well to form a nest or bundle, the dried leaves are best added to other types of tinder or held together with a thin bark envelope.

Crataegus macrosperma Ashe large-seeded hawthorn

Left—flowers of *Crataegus macrosperma*, a species with pink anthers (some species have pale yellow anthers). Right—fruits arranged in a corymb (a flat-topped arrangement in which the branches of the cluster do not all originate from a common point, as in an umbel).

The genus *Crataegus* is a source of tremendous confusion for botanists. Recognition of the group as a whole is relatively straightforward—plants with simple leaf blades, usually evident thorns on the branches and sometimes also the trunks, a corymb of flowers each with 5 white petals, and fleshy fruits, usually maturing red, with 1–5 large "stones" (called pyrenes) on the inside. Species identification is complicated by extreme confusion in the literature—some authors recognize approximately 10 species for our region, others recognize over 50 species. In reality, there are approximately 45 species in New England, distinguished on sometimes subtle differences in leaf blade outline and details of flowers and fruits. However, learning to identify the individual species is not necessary as their uses are similar (though some species have larger flowers and fruits than others). *Crataegus macrosperma* and *Crataegus chrysocarpa* (fireberry hawthorn) are among our most common species in New England. Most hawthorns flower in the latter half of May through the first couple weeks of June.

Most hawthorns have long, conspicuous thorns on the branches.

All the edible parts of *Crataegus macrosperma* (and other hawthorns) are high in antioxidants, which makes this plant extremely healthful to eat. Antioxidants protect against cancer, heart disease, and rapid aging. The very young, tender leaves can be eaten raw and added to salads. The flowers are also edible raw and can be eaten alone or make a good addition to salads. They can also be infused to make a delicately flavored tea. The fruits

ripen from early to late September, most species taking on a scarlet color and the flesh becoming soft. They resemble small apples in form and flavor, though the flesh is much thinner. Inside the fruit is from one to five large pyrenes that must be removed in order to make jams, sauces, or pemmican. Species of *Crataegus* were enjoyed as food by many Native American tribes, including the Blackfoot, Lakota, Ojibwa, Omaha, Ponca, Potawatomi, and Winnebago.

Hawthorns contain many pharmacologically active compounds, including the flavonoid polyphenols vitexin, quercetin, hyperoside, and rutin, the terpenes ursolic acid, oleanolic acid, and crataegolic acid, and several phenolic acids (e.g., caffeic, chlorogenic). Collectively, these phytochemicals can positively affect blood flow to the heart, heart rhythm, and contractility of the heart muscles. Multiple studies have confirmed the ability of teas made from the leaves and flowers to dilate coronary blood vessels, correct mild arrhythmias, increase the mechanical activity of heart, and serve as a tonic for degenerative coronary conditions. *Crataegus* preparations also have documented collagen-stabilizing ability, which enhances the integrity of blood vessels and may have a role in the treatment of periodontal disease. Prolonged use is necessary for desired effects (it may take as long as a month of diligent use to obtain the benefit). The fruits can also be used for herbal preparations, and I prefer using these (alone or mixed with leaves and flowers). Hawthorn should not be used concurrently with other cardiac or blood-pressure medications because the different medicines may work in a synergistic fashion. Though no study has confirmed that this actually occurs, it nonetheless may be best to avoid concomitant use of *Apocynum androsaemifolium* (spreading dogbane), *Asclepias tuberosa* (butterfly milkweed), *Convallaria majalis* (European lily-of-the-valley), *Digitalis lanata* (Grecian floxglove), *Scrophularia nodosa* (woodland figwort), or other plants containing cardiac glycosides.

The thorns of *Crataegus* can be used to make awls for sewing materials that are not too tough and fishhooks of various types. The wood is suitable for self bows. It is extremely hard. In fact, hawthorn is one of our densest woods. Unfortunately, it is often difficult to locate a plant with a relatively straight stem of appropriate diameter. However, *Crataegus submollis* (Lake Champlain hawthorn), another common hawthorn in northern New England, is among our largest species in this group and frequently can be found with relatively straight, large stems.

Empetrum nigrum L. black crowberry

Left—branch and needle-like leaves similar to some species of evergreen. Right—mature fruits.

This low, colonial, prostrate shrub is found usually in relatively open, exposed habitats such as coastal headlands, rock balds, and alpine plateaus. It has small, alternate, crowded leaves with highly revolute margins, giving the appearance of some gymnosperm leaves (e.g., *Abies*—fir, *Tsuga*—hemlock). The inconspicuous flowers mature into black, fleshy fruits. There is another species in New England, *Empetrum atropurpureum* (purple crowberry), which has purple fruits and densely white-hairy young stems. It is more common at higher elevations and has similar uses.

The small fruits of *Empetrum nigrum* are very juicy (almost watery) and slightly sweet. They are unlike most fruits in the Northeast because of their watery interior. The berries mature primarily in the last two weeks of July and first two weeks of August (but often remain on the plant for a month or more). Both latitude and elevation will affect fruit maturation (plants of high elevation sites in the interior of New England will mature at a later time compared with plants of low elevation coastal sites). Eating the fruits reminds me of many trips to exposed ridges and coastal headlands where this plant is usually found. The seeds are small and easily chewed. The berries can be preserved by drying (and freezing in northern latitudes). The fruits of this plant were used as food by many Native Americans, including the Cree, Iñupiat Eskimo, Ojibwa, and Tsimshian People.

The fruits of *Empetrum nigrum* are extremely rich in antioxidants. The most abundant anthocyanic antioxidants are cyanidin-3-galactoside and delphinidin-3-galactoside. A recent study showed that these dark berries are more potent in reducing free radical damage than many well known antioxidant-rich fruits (e.g., *Rubus idaeus*—red raspberry, *Vaccinium myrtillus*—mountain bilberry, *Vaccinium oxycoccus*—small cranberry). Foods containing abundant anthocyanins help prevent cancer, cardiovascular disease, and age-related mental decline while boosting immune system function.

Gaylussacia baccata (Wangenh.) K. Koch black huckleberry


Left—flowers. Right—leaf blade, which is dotted on both surfaces with minute, yellow glands (the glands are best seen with magnification).

Gaylussacia is a genus closely related to *Vaccinium* (blueberries). The two genera can be separated by features of the leaves and seeds (among other characteristics). *Gaylussacia* has tiny glands on one or both surfaces of the leaf blades, these either with or without stalks, depending on the species (note: a hand lens or magnifying glass may be needed to see these characteristics). Further, *Gaylussacia* has 10 relatively large seeds in the fruit. *Vaccinium* lacks glands on the surfaces of the leaf blade and has many tiny seeds in the fruit. Three species of *Gaylussacia* are found in the northeastern United States, all of which have similar edible uses. The common species, *Gaylussacia baccata*, is found usually in dry, sterile, sometimes rocky soils, often associated with pine and/or oak woodlands. Further north, where pine-oak woodlands do not occur, *Gaylussacia baccata* is often found growing on thin, acidic soil over ledge and around rocky balds. It can be identified from other species of *Gaylussacia* by its blue-black to black berries that lack a white, powdery coating (called a bloom) and leaf blades with yellow resin glands on both surfaces. *Gaylussacia baccata* flowers mainly in the month of June.

Fruit of *Gaylussacia baccata*.

The fruit is edible and pleasant to eat. It tastes relatively similar to *Vaccinium angustifolium* (lowbush blueberry) but is more juicy. *Gaylussacia baccata* has antioxidant-rich fruits due to the abundance of anthocyanins. Due to differences in growth form and fruit production, *Gaylussacia baccata* is often more difficult to collect in large quantities (which is usually possible for *Vaccinium angustifolium*). The berries generally mature in July and early August, but the fruits typically remain on the plant for a time, so they can be collected even into late August in some years. Its food uses are similar to those of *Vaccinium* and it can be eaten raw, dried, made into jams, or used in pemmican. The Cherokee and Iroquois mixed the sweet fruits (fresh or dried) with flour to make bread.

Myrica gale L. sweet gale

Left—aromatic leaf blade with teeth confined to the apex. Right—fruits of *Myrica gale*.

Myrica gale is a common, short shrub of open wetlands and shorelines in northern New England, often growing in organic soil, such as peat or muck (i.e., highly decomposed organic soil). It is easily identified by its aromatic leaf blades with teeth near only the apex and its fruit—a nut that is not covered with a layer of wax (as in *Morella caroliniensis*—small bayberry).

The fresh or dried leaves of *Myrica gale* can be used to make an aromatic tea. Both the leaves and the fruits can be used as a bay-like seasoning for meats and stews.

The inner bark of the stems and bark of the roots, when used as a decoction, are an effective astringent that can be used to treat diarrhea and some gastrointestinal disorders (e.g., gastritis, dysentery). Certain phytochemicals in the leaves and inner bark of the stems are known to have an effect on symptoms of the common cold. For example, myricitrin (a polyphenol) has documented anti-inflammatory activity. Leaf teas also have use as a fever-reducer and decongestant. Collectively, these features make the teas a useful tool in reducing the effects of colds. An Ojibwa Indian I spoke with once while we were harvesting *Zizania palustris* (northern wild rice) in Wisconsin extolled the use of this plant as a cold remedy. The tea can also be used externally as a wash to clean and reduce the irritation and itch associated with certain minor skin ailments (e.g., insect bites, poison ivy) and as a cleansing wash for minor wounds. Terpenes in the leaves, including α-pinene, cineol, myrcene, and limonene, have documented antimicrobial actions against some bacteria and fungi.

The dried leaves make a good smudge for ridding shelters and food stores of insects and other arthropods. The Potawatomi were known for their use of *Myrica gale* as an insecticide. They used it as a smudge and lined containers of freshly collected fruits with its leaves. The bark is very high in tannins and can be used for bark-tanning hides (e.g., white-tailed deer).

Rhododendron groenlandicum (Oeder) Kron & Judd Labrador-tea

Left—leaves and budding inflorescence. Right—open flowers.

Synonym: *Ledum groenlandicum*. This well-known member of the Ericaceae (heath family) grows on organic soils. The organic soil layer has accumulated because decomposition has been slowed either by saturation of the soil (such as in a peatland) or by low mean annual temperature (such as on a high-elevation ridge or plateau). The alternate leaves have thick, leathery, and evergreen blades that have abundant white or red-brown hairs on the underside. The flowers have five white petals that lack spotting (common with other members of the genus *Rhododendron*).

The fresh or dried leaves of *Rhododendron groenlandicum* can be infused to make a fragrant tea. It was used extensively for this purpose by Native Americans in the higher latitudes, including the Algonquin, Arctic Eskimo, Chippewa, Hesquiat, Kitasoo, Makah, Malecite, Micmac, Nitinaht, Saanich, Shuswap, and Thompson.

This plant has a long history of folk use for many ailments. An infusion made from this plant is astringent; therefore, it can be used as an external wash for minor skin ailments (e.g., insect bites, poison ivy, cuts). The Chippewa, Cree, and Shuswap used *Rhododendron groenlandicum* in this way. The infusion is diaphoretic and diuretic (i.e., it aids in loss of fluid through sweating and urination, respectively). Further, the tea is an expectorant, helping to clear the upper respiratory tract of fluid and mucus. This latter trait makes *Rhododendron groenlandicum* tea useful for treating certain types of colds. Algonquin, Kitasoo, Micmac, and Oweekeno people all utilized this plant as a cold remedy. Use caution when dealing with this plant and the amount ingested: extensive and prolonged use of this tea is reported to cause irritation to the digestive system and nervous system due to the phytochemical ledol. However, such reports are often based on ingestion of ludicrous amounts that are barely possible to achieve. I have never noticed any harmful effects after years of infrequent use.

Rhus typhina L. staghorn sumac


Left—leaves and cluster of red fruits. Right—thick, hairy branchlets that exude a milky latex when leaves are broken away.

Synonym: *Rhus hirta*. *Rhus typhina* is a colonial shrub or small tree often found at the edges of dry fields and along forest borders and roadsides. Given its need for open, sunny places, this plant is most commonly found in areas where humans have altered the landscape. It has alternate, pinnately compound leaves. The branchlets are stout and covered with short, dense, spreading hairs. If the petiole (i.e., leaf stalk) is broken away from the branchlet, milky latex will exude from the scar. The fruits are red and densely covered with acidic, sour-tasting hairs. A similar species, *Rhus glabra* (smooth sumac), is also found in the Northeast. It differs in its glabrous (i.e., devoid of hairs) branchlets that are glaucous (i.e., covered with a whitish bloom) and fruits with very short, inconspicuous hairs.

In the spring, when new growth is occurring on the plant, *Rhus typhina* offers an interesting food. The young branchlets, while still green and succulent, are relatively good and can be eaten raw. The branchlets must be collected prior to the development of the white pith (the soft, spongy material on the inside of the mature branchlet). Late May through early June, when the branchlets are green through the interior, is the best time to collect this food. Simply break or cut the branchlets free from the plant, peel the bark, and enjoy. The young branchlets of *Rhus glabra* are more slender but do not have the dense covering of hairs. The Iroquois were known to eat sumacs in this way. The ripe fruits (usually ready in early August) are covered with red hairs that contain malic acid, a sour-tasting liquid. If the fruits are allowed to sit in cool water (the length of time dependent on when they are collected and how many are used), the acid is released and makes a refreshing, sour drink that is reminiscent of some citrus juices. When fresh (and not diluted from many rain storms), a single fruiting array will provide enough acid to flavor 0.5 liters (about 2 cups). The water will turn light brown-red when ready. Avoid using hot water for beverage making because it will leach out tannins and the drink will be bitter. Also, be aware that as the season progresses, an insect larva usually comes to live within the fruits (and defecates within the cluster of fruits). Collecting fruits when they first ripen will help avoid insect feces in

your beverage. In my experience, the only fruiting arrays of *Rhus typhina* not affected by the insect larva are some of those colonies found near coastal bays and inlets. The Algonquin, Menominee, and Ojibwa Indians all enjoyed this drink. Some, like the Ojibwa, would sweeten it with maple sugar. The fruits of *Rhus typhina* can also be gathered for consumption, especially later in the season as they remain on the shrub long into winter. They provide a mildly sour food. However, in late season, I eat only the outer fruits as the inner ones have been tainted by the insects that used the fruiting array as their home.

Rhus typhina and the closely related species *Rhus glabra* have a host of medicinal uses. The bark contains tannins and is an astringent, which contracts tissue and reduces fluid discharge. It has been documented to have antimicrobial properties due to the presence of gallic acid, methyl gallate, and 4-methoxygallic acid (types of polyphenols). These phytochemicals show activity against bacteria, viruses, and fungi. Research has shown that species of *Rhus* are effective against many strains of bacteria, including gram-positive and gram-negative species—though generally more so against gram-positive species (e.g., several species of *Bacillus*, *Staphylococcus aureus*) than gram-negative ones (e.g., *Citrobacter freundii*, *Escherichia coli*, *Proteus vulgaris*). Decoctions of the inner bark is the method of administration. These teas also can be used for external washes as to cleanse minor wounds, burns, and open blisters. They can also be taken internally as a decoction for diarrhea (due to the astringent properties). The leaves have similar properties and can be taken as infusions. It is interesting to note that in one study where the antimicrobial activity of leaves was compared against that of immature flower arrays (i.e., budding inflorescences), the latter showed greater activity against all bacteria and fungi that were screened. Additional medicines can also be prepared from *Rhus typhina*. Smoking the dried leaves may help treat asthma. The cold beverage made from the fruits is diaphoretic (i.e., increasing perspiration) and a febrifuge (i.e., helping to reduce fever). The Malecite used *Rhus typhina* for this latter purpose. Native Americans would also use the branchlets as chew sticks to promote oral health and relieve sore mouths and tongues. Chewing on the end of a section of branchlet softens the wood fibers, which can then be used to massage the gums. The antimicrobial substances are active against the oral bacteria responsible for causing gingivitis and tooth decay.

The wood of *Rhus typhina* is an excellent material for friction-fires. I often use a spindle from a branch of this shrub on fireboards of various species with good results (though sumac can be used to make the fireboard as well). The ember that is produced tends to be a bit fibrous (rather than powdery) and, therefore, is a bit fragile. However, even when it breaks apart, each fragment of the original ember usually continues smoldering and can still be used to light the tinder bundle. The fresh white sap (which contains a milky latex) can be used as a hafting material and sealant. Applied fresh to join together two items (such as a stone biface to a handle or the seam of a water container), the sap gradually dries and turns black. The sap takes more than a week to dry and remains tacky for a long period of time. Therefore, it is not a useful adhesive for immediate projects. However, it has the advantages of impermeability to water, not requiring a tempering agent (like evergreen resins do), and durability over time (experiments have shown it to resist becoming brittle and breaking for almost two decades). The tannins from the leaves can be used as a dye by boiling them in water. It produces a tan color. Tannins can also be used as a natural mordant for other dyes to make them hold fast to plant fibers and give them longevity against light and washing. The leaves of *Rhus typhina* are especially useful as a mordant because of their high tannin content. They (along with the bark) can also be used as a tannin source for bark-tanned deer hides. *Rhus typhina* (and other sumacs) contain mainly pyrogallol tannins, which create hides with good durability and water repellency.

Ribes cynosbati L. eastern prickly gooseberry


Left—inflorescence of drooping flowers. Right—mature fruit with soft prickles on the exterior.

In the northeastern United States, ***Ribes*** is a genus of woody plants with alternate, palmately lobed leaves and 5-petaled flowers that mature as a berry. The genus can be divided into two groups—one of which (gooseberries) usually has some form of armature (such as prickles) on the stem and has flowers arranged in a cluster and the other (currants) that is usually without armature and has flowers that are borne in an elongate inflorescence (called a raceme). All are edible, though the flavor varies from species to species. Gooseberries and currants grow in many different places, including rich, moist soils of deciduous forests and at the base of cliffs (e.g., ***Ribes cynosbati***), as well as swamps, stream shores, and high in the mountains. The flowers appear in May and early June.

The ripe fruits are edible raw or cooked. The berries of ***Ribes cynosbati*** have imposing appearing prickles on the exterior but can be chewed without harm as long as they are eaten individually so that the teeth, not the palate, do the initial crushing of the fruit. Other species of ***Ribes*** that grow in New England lack the soft prickles on the exterior of the berry, though they may have hairs or stalked glands. The berries of currants and gooseberries are extremely high in vitamin C, and they contain pro-vitamin A and vitamin B. Further they are rich in polyphenol antioxidants, which protect the body from free-radical damage. The flavor is excellent (this is one of my favorites), somewhere between *Malus* (apple) and *Vaccinium* (blueberry). They generally ripen in late August and early September and will appear dark red or even purple-red when

Flowers of another common species, ***Ribes glandulosum*** (skunk currant), a relatively northern species that sometimes grows high in the mountains.

fully ripe. They were eaten by the Algonquin, Cherokee, Chippewa, Menominee, Ojibwa, and Potawatomi. Because they contain pectin, they can also be made into jam. Though many species of *Ribes* can be used to make tea from the leaves, *Ribes americanum* (eastern black currant) is among the most flavorful because of the yellow resin glands that dot the surfaces of its leaf blades (visible to some with the unaided eye, others will need to use magnification to see the glands).

A decoction of the root bark of various species of *Ribes* was used as an anthelmintic (expelling worms and other gastrointestinal parisites) by the Meskwaki. The fruits and leaves are antiscorbutic and, to some extent, diuretic and diaphoretic.

Rosa virginiana P. Mill. Virginia rose

Left—flowers, which are usually solitary or in few-flowered clusters. Right—ripe hips in the fall.

Roses are an easily identified group of plants with showy, 5-petaled flowers, alternate and pinnately compound leaves with a pair of prominent stipules at the base of the petiole (the stipules are the pair of appendanges at the base of the leaf that form a trough-like structure), and prickles along the stem (at least at the base). The fruits (which are tiny and seed-like) and their associated surrounding fleshy tissue are referred to collectively as a hip. *Rosa virginiana* is one of the common species that is found in a number of open upland and wetland plant communities. It has stout prickles located at the nodes (where the leaves are produced) and apically flaring stipules. *Rosa virginiana* also has a number of close relatives, such as *Rosa palustris* (swamp rose), *Rosa nitida* (shining rose), and *Rosa carolina* (Carolina rose). The former two species are wetland plants, the last one is an upland species. All of these species (including *Rosa virginiana*) are native plants with stalked glands on the hypanthium (the structure below the sepals that turns red upon maturity of the fruit) and more or less entire sepals that are spreading to reflexed in fruit (or deciduous and falling off). The non-native *Rosa rugosa* (beach rose), found naturalized along much of the Atlantic coastline, shares the edible qualities with *Rosa virginiana.* It is a densely prickly species with minutely hairy branchlets and large flowers. *Rosa virginiana* flowers in late June through early August.

Prickles of *Rosa virginiana*.

The very young shoots are edible but are somewhat astringent and have a slight soap-like flavor. The petals can be eaten raw, added to soups, or infused to make a flavorful tea. The hip is edible and matures in September. It often remains on the plant long into winter when it acquires a wonderful, rich, sweet flavor (much sweeter than earlier in the fall). The seed-like fruits (called achenes) inside the hip are

surrounded by hairs, which reportedly cause irritation to some people. They can be removed by various methods. However, I have eaten the hips of our native species (which do not produce as many seed-like fruits inside the hip as some non-native species) in their entirety on many occasions without issue. Futher, the seed-like fruits contain high levels of omega-3 fatty acids (i.e., discarding them isn't good practice, see below). The mature hips can be dried and ground up (fruits and all). This meal can be mixed with other types of meal or flour or used to make a flavorful and healthful tea. Rose hips are extremely high in vitamin C, and they also contain vitamins B_3 (niacin), E, and K and pro-vitamin A. The omega-3 fatty acids contained in the seed-like fruits are beneficial for human health because they are anti-inflammatory, stimulate the immune system, are cardioprotective, and defend the body from cancer. The hips of our native North American roses were eaten by the Alaska Native, Assiniboin, Cheyenne, Cree, Hidatsa, Iñupiat, Lakota, Okanagan-Colville, Pawnee, Ponca, Upper Tanana, and Thompson People. The leaves of some non-native species that possess aromatic glands on the foliage (e.g., ***Rosa rubiginosa***—sweet-briar rose, ***Rosa sherardii***—Sherard's downy-rose) can also be infused to make pleasant teas.

Because of the high vitamin C content, the hips are antiscorbutic (i.e., preventing scurvy). Ascorbic acid is an anti-inflammatory (also called anti-edemic). One or more tablespoons of dried hips can be infused to make teas that can help counteract swelling. The leaves of roses are high in saponins, which can be used externally in a cleansing wash for minor ailments (e.g., insect bites, cuts, burns, poison ivy). Note that they will not produce a foam as would some plants (e.g., ***Saponaria officinalis***—common soapwort, some species of ***Yucca***—yucca). They can also be poulticed for similar problems. Recent research has shown that the aerial portions of the plant (including the hips) are antimicrobial, corroborating this use of this plant by the Ojibwa, Okanagan-Colville, Paiute, and Shoshone. The Cherokee used decoctions of rose roots as an anthelmintic (i.e., expelling worms). The Carrier, Cree, Flathead, Ojibwa, Omaha, Skagit, and Thompson used decoctions of the roots or stem bark as ophthalmic solutions for cleansing the eyes.

The stems of ***Rosa*** are often used to make arrow shafts. The prickles are removed by scraping with a stone or metal blade and then the stem is straightened using heat from a bed of coals or a hot rock.

Rubus allegheniensis Porter — common blackberry

Left—leaf with five leaflets from the first-year stem (i.e., primocane). Right—second-year stem (i.e., floricane) with stout prickles.

Blackberries, in general, are found in open habitats that have a history of disturbance to the canopy (i.e., most species are not located within intact forests). Cleared land of many types harbors members of the genus *Rubus*, including old fields, roadsides, cut-over forests, and wooded edges. Blackberries are woody plants with biennial stems. The first-year stem, called a primocane, is green and produces only leaves. It hardens and changes to red, purple, or brown prior to the first winter. The second-year stem (called a floricane) produces both leaves and flowers. The genus *Rubus* is taxonomically complex, and species' definitions vary by author. Fortunately, the uses of blackberries are relatively similar among the various species (though the quality of the fruit differs considerably).

Blackberries (which belong to the subgenus *Rubus*) are identified by stems that are usually armed with prickles, compound and alternate leaves, and dark aggregate fruits made up of many small individual fleshy sections, each with a single seed. The fruit of blackberries, when picked, includes the white, fleshy receptacle (i.e., the receptacle detaches from the stalk of the fruit; unlike raspberries where the receptacle remains behind). *Rubus allegheniensis* is an upright or arching shrub with stout prickles on the stem, softly pubescent leaflets (on the underside), and an elongate inflorescence (a raceme). Further, the axis of the raceme (as well as usually the first-year stem) has stalked glands that can be seen with low magnification. It usually flowers in the latter half of June.

Fruits of *Rubus allegheniensis*.

The young (i.e., flexible), first-year shoots are green and can be eaten raw. They are prepared by peeling, to remove the astringent outer layer, which allows the succulent inner portion of the stem to be consumed. Peeling is easily accomplished by scraping with a stone or metal blade. In normal years, the first-year shoots are best to eat in the later weeks of May and early weeks of June. The fruits of ***Rubus allegheniensis*** mature in late July through August and are excellent. They can be eaten raw, cooked, or dried for later use (e.g., pemmican). The dark fruits are rich in anthocyanins (which function as antioxidants; e.g., cyanidin-3-glucoside, cyanidin-3-dioxaloylglucoside) and supply some pro-vitamin A, vitamin C, calcium, iron, and potassium. They were eaten by many Native American groups, including the Cherokee, Chippewa, Menominee, Meskwaki, Ojibwa, and Potawatomi.

The leaves can be used to make teas that can treat several maladies. However, it must be stressed that the fresh or dried leaves are to be used. Wilting leaves are reported to contain high concentrations of hydrocyanic acid, which can be toxic if consumed in large enough quantity. The leaves contain tannins, including gallic acid (a kind of polyphenol) and the saponin villosin (a kind of terpene). Leaf tea effectively treats diarrhea. The tannins in the leaves are astringent and help reduce intestinal inflammation, thickening the mucous membrane and, therefore, slowing the resorption of toxic materials. The Cherokee, Chippewa, Iroquois, Meskwaki, and Ojibwa were all familiar with this plant's ability as an antidiarrheal. The leaf teas can also help reduce the painful symptoms of sore throats caused by inflammation (e.g., tonsillitis). It is important to note that the astringent action of the tannins will help reduce inflammation (and thereby help soothe pain) but will not necessarily cure the underlying cause (tonsillitis may be caused by microorganisms that require antibiotics for definitive treatment). Infusions of ***Rubus allegheniensis*** can also be used as an external wash for minor skin maladies (e.g., cuts, burns, itchy rashes). The astringent nature of the tea is very useful for reducing inflammation of burns and even slowing oozing blisters of second-degree burns. Leaf teas, as well as decoctions of the root, have been used by many people, including the Chippewa, to aid with childbirth and in treating painful menstrual cramps. Preliminary studies support some efficacy for these uses. The tea relaxes the uterus, soothes uterine spasms, and strengthens the uterus (i.e., it is a tonic for this organ). Medicinal teas for aiding childbirth should be used only in second and third trimesters of pregnancy, and not before.

The young shoots can be used to make a gray dye by boiling them in water. The fruits can be used to make a purple dye (mash the fruits and apply them to the fibers or surface).

Rubus idaeus L. red raspberry


Left—leaflet showing the dense white-gray hairs on the undersurface. Right—second-year stem with thin, bristle-like prickles.

Rubus idaeus is a familiar plant of old fields, forest openings, and other places with a history of disturbance and/or clearing. Similar to blackberries (and a member of the same genus), red raspberry is a shrub with biennial stems (see *Rubus allegheniensis*). Raspberries (which belong to the subgenus *Idaeobatus*) are identified by stems that are usually armed with prickles and/or bristles, alternate and pinnately compound leaves, and aggregate fruits made up of many small fleshy sections, each with a single seed. The fruit of raspberries, when picked, separates from the receptacle, leaving a hollow cavity in the base of the fruit (unlike blackberries in which the receptacle detaches when the fruit is picked). There are several species of raspberry in New England, all of which are edible. *Rubus idaeus* is an upright or arching shrub with thin prickles on the stem, leaflets that have dense white to gray hairs on the undersurface, and usually a red fruit (at least in wild populations).

The young, first-year shoots, which are green, can be eaten raw early in the season (i.e., late May and early June). They are prepared by peeling, to remove the astringent outer layer, which allows the succulent inner portion of the stem to be consumed. Peeling is easily accomplished by scraping with a stone or metal blade. The fruits of *Rubus idaeus* are excellent and can be eaten raw, cooked, or dried for later use (e.g., pemmican). They ripen in July and the first week of August in much of New England. They are rich in polyphenol antioxidants (e.g., cyanidin-3-sophoroside, cyanidin-3-sophoroside-5-rhamnoside) and supply some pro-vitamin A, calcium, iron, and potassium. In late fall and winter, the branchlets can be gathered and decocted to make a pleasant, mild tea. It has a flavor that is reminiscent of maple (without the sweetness).

Fruit of *Rubus idaeus*.

The leaves have all the medicinal values of ***Rubus allegheniensis*** (see discussion under that species; also note precautions). They were used by the Cherokee and Cree as a parturient and alterative for the female reproductive system. Infusions of the leaves are capable of strengthening contractions and allaying hemorrhage during labor. Studies of women using ***Rubus idaeus*** have shown that red raspberry leaves might shorten labor, reduce the likelihood of preterm and postterm labor, and reduce the need for medical intervention during delivery. Daily use of ***Rubus idaeus*** infusions as a parturient should be limited to the second and third trimesters. Although blackberries and raspberries can be used similarly, ***Rubus*** subgenus ***Rubus*** (blackberries) is preferred for intestinal disorders (e.g., diarrhea, dysentery), whereas ***Rubus*** subgenus ***Idaeobatus*** (raspberries) is preferred as a parturient by some authorities.

Salix discolor Muhl. pussy willow






Left—early-season branchlet with a pollen catkin, which, in *Salix discolor*, emerges before the expansion of the leaves. Right—mature leaves.

Willows are familiar trees and shrubs that grow in a wide variety of plant communities, from lowland swamps to the highest alpine plateaus. Though identification of individual species can be problematic for amateur botanists, the real need is only to identify the genus, as the medicinal properties are similar. The genus *Salix* is characterized by highly reduced flowers borne in crowded, upright clusters called catkins (or aments). The winter buds, present for most of the year, are covered by a single, cap-like scale. Other trees and shrubs have either multiple winter bud scales or none at all. Most willows have slender leaf blades with gland-tipped teeth (which appear as tiny yellow or dark dots at the tips of the marginal teeth). Though there is variation between the different species, willows flower in spring, with some species (e.g., *Salix discolor*) being among the first flowering plants to emerge.

Branchlet of *Salix discolor* (pussy willow), showing single, cap-like winter bud scale.

The young leaves of willows are edible. They should be gathered in the spring as they are expanding from the winter buds. Despite their bitterness, they are likely quite nutritious. A native species eaten by the Iñupiat (northwest Alaska) is known to be rich in vitamin C and extremely rich in pro-vitamin A. *Salix alba* (white willow), a non-native tree that grows in New England, has leaves that are slightly less bitter than other local willow species. The catkins have also been used as food by some groups in North America and Europe.

Willow is an effective analgesic, anti-inflamatory, and febrifuge. The inner bark can be decocted to produce a very bitter, but potent, tea for minor aches and pains. The

compound responsible for this action is salicin, a phenolic glycoside, which is transformed by the body into salicylic acid (similar to aspirin). Willow species vary in their potency. I have tried many native willows with good success. ***Salix alba*** (white willow), a tree of European orgin and the species available in natural food markets, is one of the least potent species. I have noticed only modest effects when using it as a medicine (this is to be expected given its lower salicin content, which could be inferred from its more palatable foliage). This is yet another example where the wild species growing all around us are more healthful to consume and/or make more potent medicine. The Abenaki, Alaska Eskimo, Blackfoot, Cherokee, Chikasaw, Crow, Kashaya Pomo, Koasati, Mendocino Indian, Montana Indian, Pima, and Seminole, among others, used ***Salix*** to reduce pain or fever. Decoctions made from the inner bark of willows can also be used as a dandruff remedy. Salicin helps to regulate the shedding and renewal of skin cells on the scalp. Therefore, rinsing with the teas can help alleviate dandruff conditions. It was used as such by the Makah Indians. The freshly collected bark (placed inner bark side down on the skin) is a remedy for warts (a viral infection). The section of bark can be held in place with cord or bark lashing and replaced daily with a fresh piece. To assist further with the treatment of warts, inner bark teas can be used as a wash between bark dressings. Unlike commercial aspirin, salicin is reported generally not to cause gastric irritation and studies have shown its adverse reactions are barely more frequent than a placebo. Also unlike aspirin, salicin does not inhibit platelet aggregation (i.e., it can't be used as a blood thinner). That stated, it is recommended that preparations of ***Salix*** not be used concurrently with anticoagulants (e.g., warfarin), as salicin may potentiate their effects. Though ***Salix*** is considered safe during pregnancy, it is not recommended during breastfeeding as it is excreted in breast milk. Reye's syndrome is a serious, potentially fatal illness contracted by children under the age of 15 who consume aspirin during viral infection. Though medicine made from species of ***Salix*** has never been shown to cause Reye's syndrome, it is best avoided due to the presense of salicylates.

Many willows have very flexible branches (except at the junction of yearly growth) and can be used to make excellent branch baskets. I have used ***Salix purpurea*** (basket willow), ***Salix sericea*** (silky willow), and ***Salix ×fragilis*** (crack willow, a hybrid of white and Black Sea willow that is frequent in northern New England) for basketry. Species of ***Salix*** that are large enough to have trunks or branches for fire boards and spindles make excellent wood for friction-fire sets. The wood produces a high quality, dense ember. Willow is certainly among our better woods for this purpose. Given that many species of willow do grow in wet soils, it means that the wood may require some drying prior to use, even when taken from dead trees. I frequently find narrow planks of wood that require little or no carving and/or shaping to use as fireboards on tree species (e.g., ***Salix alba***, ***Salix ×fragilis***). Look for these planks where large branches or portions of the trunk have broken away from the tree due to winter storm damage. The planks can usually be torn free by prying them outward with both hands. Species of ***Salix*** are very useful for winter cordage, as the branchlets can be split separated and the bark removed from them (very few woody plants will give up their inner bark during the winter season). This means that species of ***Salix*** can be used for making cord even out of peeling season. The inner bark is not as strong as some species, and thicker diameter cords need to be made for uses where abrasion will be experienced (e.g., bow drills). The inner bark can be used to make a brown dye by boiling it in water. It does not need a mordant due to the abundance of tannins.

Sambucus nigra L. black elderberry

Left—flowers and pinnately compound leaves. Right—mature fruits.

This common shrub is often found adjacent to marshes, swamps, and stream channels. It has opposite, pinnately compound leaves with relatively flat or round-topped clusters of small, white, 5-petaled flowers. The flowers appear in late June and July. The fleshy fruits are small, spherical, and black. Our native North American form of this species is subspecies *canadensis* (the plant of Europe is subspecies *nigra*). A similar species occurs in the northeastern United States (*Sambucus racemosa*—red elderberry). It differs in its red fruits, orange-brown pith (vs. white pith), and inflorescence with an elongate axis. Though some of its uses are similar, many warn that its fruits should be avoided as food and medicine (even though they were consumed by western Native Americans).

The flowers are edible raw or cooked. Their flavor is acceptable; it combines a somewhat sweet floral aroma with a slightly rank taste. The flowers are best served as a pleasant tea that reminds me of fresh-cut grass overlaid with a sweet floral aroma (all very mild). Fresh or dried flowers can be used. The fruits are edible, appearing in late August and September. Despite being somewhat sweet, most will find them to taste a little rank (though individual plants are sweeter than others). They can be cooked and used in jams or mixed with other fruits. They are rich in pro-vitamin A, calcium, iron, potassium, and polyphenol antioxidants. My favorite way to prepare the fruits is to dry them slightly intact (so they begin to shrivel) and then mash them into thin layers and finish the drying. As a dried fruit, the flavor is improved as they lose some of the rank flavor possessed by the fresh fruits. When cooked they have a flavor similar to the cooked berries of *Vaccinium angustifolium* (lowbush blueberry). Unripe fruits contain toxic phytochemicals (e.g., cyanogenic glycosides). These toxins are present in lower amounts in mature fruits and are destroyed by the heat of cooking. The berries were used as food (prepared in various ways) by the Cherokee, Chippewa, Dakota, Iroquois, Meskwaki, Omaha, Pawnee, and Ponca Indians. Other parts of *Sambucus nigra* have been eaten (including young leaves) but are probably best avoided due to the toxic compounds present.

Various parts of *Sambucus nigra* have been used as folk remedies for many types of ailments, and some of the uses have verified merit. The flowers and leaves contain several terpenes (e.g., ursolic acid, oleanolic acid, α-amyrin, β-amyrin, sterols). The flowers also contain chlorogenic acid (a polyphenol), while the leaves also contain sambunigrin (a carbohydrate that belongs to a group of phytochemicals called cyanogenic glycosides) and various polyphenols (e.g., kaempferol, quercetin). An infusion of the flowers has been shown to be effective for some types of colds and can reduce fever (i.e., it is a febrifuge). Further, it is an anticatarrhal (i.e., helping rid the body of excess mucus, especially in the sinus area). The leaves can be infused and used as a wash or poulticed and used as a vulnerary for minor skin problems (e.g., eczema, cuts, bruises). The inner bark can be used for the same purpose, but it should be decocted to be used as a wash. The Cherokee, Delaware, Houma, Iroquois, and Oklahoma all used the bark for this purpose (and for other ailments). Syrup made by boiling down the juice from the berries has also been used as a cold and flu remedy, with research that supports its efficacy. *Sambucus nigra* fruits work through antiviral and immune-stimulating properties. The antiviral mechanisms involve blocking receptor sites on viruses used to infect cells or thwarting the enzymes used by viruses to penetrate healthy cells (depending on the strain of virus). As an immune stimulant, this species induces cytokine production (cytokines are signal molecules that serve as messengers between cells and are capable of regulating immune function). One to three teaspoons of the syrup can be taken three times daily to help prevent colds and flus. At the onset of symptoms, the syrup can be taken as frequently as every hour (use smaller doses and/or longer intervals between doses with younger people). Additionally, the fruits have diuretic and diaphoretic properties.

The leaves can be mashed and rubbed on the skin as an insect repellent (it will discolor the skin until washed off). I have found that black flies will still land on the skin but will not bite while the material is fresh. A strong decoction of the leaves can be used as an insecticide. The stems and branches are of a relatively soft wood with a large pith in the center. They can be used as hand drills for friction-fires when dried. They also make a good spile for tapping trees for sap collecting. I split the branches in half, remove the pith to create a trough, and sharpen one end to be inserted into the drilled hole in the tree. The inner pith is easy to remove from short segments of intact stems by drilling out the center (if one uses a hardwood branch or piece of bone to ram out the pith, the branch might split open from the pressure). Using a sharp piece of bone or a thin, stone bit to drill out the pith best preserves the integrity of the branch. If durability is desired, the branches are strongest when dry. The hollow stems can then be used as a straw, as a way of concentrating air for burning bowls using wood coals, and as a tube pipe for on-the-spot use. *Sambucus racemosa* works best for these uses because its pith occupies a larger proportion of the diameter of the branch (making it easier to remove). Many Native Americans (e.g., Dakota, Menominee, Omaha, Pawnee, Seminole) used the hollowed stems to make children's toys, such as popguns. The Houma used them to fashion blowguns. The fruits can be mashed and used to make a purple dye.

Vaccinium angustifolium Ait. common lowbush blueberry

Left—flowers and expanding leaves. Right—ripe berries and mature leaves.

Vaccinium angustifolium is a common shrub of acid soils. Though found in many types of upland plant communities, it is an abundant understory shrub (even dominant) in certain habitats. These include open balds of low hills and ridges, pine-oak woodlands, and above treeline on the higher mountains. Blueberries are identified by their alternate, simple leaves, pale flowers with fused petals forming a tube or globe, and sweet, blue to black fruits with a crown of 5 persistent sepals at the summit. Most blueberries also have papillose branchlets (i.e., the surface of the branchlet is covered with small, rounded bumps; some people will need to use magnification to observe). Several other species of blueberry grow in the Northeast and have similar uses. Some of the more common species include *Vaccinium corymbosum* (highbush blueberry; a 1- to 3-meter-tall species with large leaves), *Vaccinium myrtilloides* (velvet-leaved blueberry; a low shrub with hairy branchlets and leaf undersurfaces), and *Vaccinium uliginosum* (alpine blueberry; a low shrub of higher elevations with entire leaf blades that are more or less rounded at the apex). The flowers of *Vaccinium angustifolium* usually appear in the latter half of May and early June.

The fruits of blueberries are a valuable food source due to their quality, potential abundance, and ease of collecting. They mature in July and early August and are high in several vitamins, including C and E, and pro-vitamin A. They are edible raw and can be partially dried to make a type of raisin. The fruits can be more thoroughly dried to use for tea and pemmican. As they naturally contain some pectin, the berries can also be made into jam (some unripe fruits, about 15% or so of the total mixture, should be included as they contain more pectin than ripe fruits; adding green apples will assist further with pectin amounts). In addition to the fruits, the flowers (specifically, the petals) are also edible and can be eaten raw. *Vaccinium angustifolium* was eaten by the Abenaki, Algonquin, Chippewa, Iroquois, Menominee, and Ojibwa Indians.

The fruits of *Vaccinium angustifolium* contain various polyphenols, including anthocyanins (e.g., peonidin-3-glucoside, malvidin-3-galactoside, delphinidin-3-galactoside) flavonols, and hydroxycinnamic acids, which are powerful antioxidants that can aid in the prevention of heart disease and stroke (by reducing inflammation in endothelial cells) and age-related mental decline.

The fruits also contain resveratrol, which has been shown to suppress tumor cell growth and promote programmed tumor cell death, thereby helping to combat certain strains of cancer. Consumption of the fruits can aid with night vision as they promote the regeneration of an important pigment (called rhodopsin) utilized by rods in the eye. Given that many eye disorders have a root cause in damage to the capillaries, the antioxidants contained in the fruits protect the eyes from free radical damage that can contribute to glaucoma and cataracts. Eating the berries strengthens capillaries not only in the eyes but also in the lower limbs, so they have use in treating varicose veins and hemorrhoids. The anthocyanin in the fruits lowers blood sugar levels; therefore, those with diabetes should monitor blood sugar levels to prevent hypoglycemia. Consumption of the berries helps prevent the adhesion of certain bacteria (such as *Escherichia coli*) to surfaces in the urinary system, including inner surfaces of the bladder. This means that blueberry fruits can assist with treatment of some types of urinary disorders (including prostatitis) by assisting with the elimination of these bacteria in the urine. The fruits also have been approved in Germany for the treatment of diarrhea. Dosage of fresh fruits ranges from 50 to100 grams three times daily (one US cup of fresh berries is approximately 150 grams). Decoctions of the leaves and stems have also been used for the treatment of diarrhea.

The berries can be used as a purple dye (just as they stain one's teeth!). They can be mashed together into a paste and applied directly to fibers or surfaces. The dyed objects must be protected from excessive moisture as the berries lack a mordant to hold the colors fast.

Vaccinium macrocarpon Ait. large cranberry


Left—leaves and trailing stem. Right—maturing fruit.

Cranberries belong to the same genus as blueberries. They differ mainly in the fruit, which is red and sour. There are three species of cranberry that occur in the northeastern United States. Two species are typical of acidic peatlands—*Vaccinium macrocarpon* (large cranberry) and *Vaccinium oxycoccos* (small cranberry). These species differ in a number of characteristics, including fruit size, bracteole morphology, and leaf shape; however, their uses are similar and it is not vital to know how to separate them. A third species, *Vaccinium vitis-idaea* (mountain cranberry), is typical of open summits (including low ridges and alpine plateaus). Its petals are not divided to the extent of the two previous species, and it has very short pedicels (i.e., flower stalks)—shorter than 5 mm vs. 10–50 mm long. This last species also has similar uses.

Flower of *Vaccinium oxycoccos* with four reflexed petals (very similar to *V. macrocarpon*).

Cranberries are edible raw or cooked and are rich in anthocyanins (which function as antioxidants; e.g., cyanidin-3-galactoside, cyanidin-3-arabinodside). They are sour without the addition of sweeteners. Though they reach maturity in the late growing season, the flavor of the berries improves after the frosts. The berries can be used to make jams, sauces, and flavoring for drinks. They are naturally high in pectin. The fruits of *Vaccinium macrocarpon* were eaten by the Algonquin, Anticosti, Chippewa, Iroquois, and Ojibwa. The Anticosti and Iroquois stored them for later use, such as during the winter season or for hunting trips.

Cranberries are useful for preventing and treating urinary tract infections. They work by preventing the adhesion of bacteria to the uroepithelial cells. Proanthocyanadin is the phytochemical responsible for this trait. Both the fruits and drinks made from the berries serve this purpose. Also, the fruits contain arbutin, which is antimicrobial and diuretic. *Vaccinium macrocarpon* can also help with candidiasis (i.e., yeast infections) and eliminating excess moisture from the body.

Viburnum dentatum L. smooth arrowwood

Left—leaves and inflorescence with budding flowers. Right—leaves and mature fruits.

Viburnum dentatum is a common shrub in many parts of New England. It occurs in three different varieties, some of which differ ecologically (i.e., they grow in different habitats). The most common form of this plant is variety *lucidum* (northern smooth arrowwood) and is found in seasonally or permanently wet soil that commonly occurs at the margins of wetlands and in swamps. Identification of this multistemmed shrub is relatively straightforward. It has opposite, simple leaves with prominent, straight, few-branched veins that travel to the margin of the leaf blade where they meet the large teeth. The small, five-parted white flowers are arranged in a flat- to round-topped inflorescence (a corymb) and mature as fleshy, dark blue fruits. Flowering of this shrub occurs mostly in the month of June.

This species is perhaps one of the best plants for providing shafts for shoot arrows, and thus its common name. On many plants there are one or several stems that are of small diameter, relatively straight, and free of thick branches that would otherwise create blemishes on the shafts. The shoots can be scored with a stone or metal blade, broken cleanly, and bundled together for drying. Do not remove the bark or the shafts might crack or check. After they are dry (in as little as one month, depending on where they are dried), the bark can be scraped away and the shafts planed down to the desired diameter (depending on how rigid one wants the arrow shaft to be).

The Ojibwa used the dried bark of variety *dentatum* (southern smooth arrowwood) as a component of their smoking mixtures.

Viburnum nudum L. — wild raisin


Left—leaves and flowers. Right—mature fruits of *Viburnum lentago*, a related species.

Synonym: *Viburnum cassinoides*. *Viburnum nudum* is a relatively common shrub in northern New England and occurs in and at the margins of wetlands. It has opposite, simple leaves with an entire, wavy, or bluntly toothed margin. Its small, white, five-parted flowers are arranged in a flat- to round-topped inflorescence and mature into dark purple, fleshy fruits 6–12 mm long. A very similar species, *Viburnum lentago* (nannyberry) differs primarily in its leaf margin (which has uniform, small, sharply pointed teeth) and its inflorescence, which essentially lacks a central stalk (the inflorescence of *Viburnum nudum* has a central stalk 5–50 mm long below the branches leading to the flowers). The two species have largely similar uses. The flowers of both appear in late May and June, and the fruits mature in September.

The dried leaves of *Viburnum nudum* can be used for making tea. The fruits of both *Viburnum nudum* and *Viburnum lentago* are quite good and can be eaten raw or cooked, or preserved by drying for use alone or in pemmican. They generally begin to mature in early to mid-September. The flesh is relatively thin and inside is a large, stone-like seed. The fruits of *Viburnum nudum* are smaller, but the seeds are soft and easily chewed (I don't bother removing them). The flavor is similar to that of raisins (*Vitis vinifera*). Fruits of *Viburnum lentago* are larger, but the larger seed is tougher. The flavor of this fruit is reminiscent of dates (*Phoenix dactylifera*). Oddly, these species have some fruits that mature weeks ahead of the others. These early maturing fruits, which are dark blue when most of the fruits are still green and firm, are not pleasant to eat (they are poor imitations of the later maturing fruits). The fruits occasionally remain on the shrubs for some time, allowing them to be collected even in late fall. The fruits of *Viburnum nudum* were eaten by the Abenaki and Algonquin.

Viburnum nudum is closely related to a species that has been sold commercially under the name "crampbark" (*Viburnum prunifolium*—smooth blackhaw). It is a southern species, barely reaching into southern New England. Its inner bark contains several important medicinal compounds, many of which are polyphenols. These include aesculetin and scopoletin (coumarins), chlorogenic acid and salicin (phenolic acids), and amentoflavone (a biflavone).

There are also several terpenes (e.g., α-amyrin, β-amyrin, oleanolic acid, ursolic acid). These phytochemicals are known to be sedative, antispasmodic, and astringent. *Viburnum nudum* has similar uses. The Cherokee, and perhaps other Native American tribes, knew of these properties and used decoctions of the inner bark of *Viburnum nudum* to prevent recurring spasms (including asthma). The decoctions have also been used for menstrual cramps, painful contractions, and pregnancy after-pains because of their ability to relax the uterus. This species also has use in lowering blood pressure that is related to hypertension. It accomplishes this by relaxing peripheral blood vessels.

The branchlets and thin branches are very flexible and have long been used for basketry.

Vitis riparia Michx. river grape

Left—inflorescence and leaves. Right—ripe berries ready for collection.

Grapes are identified by their woody, climbing habit (i.e., they are lianas) and tendrils that are produced opposite the leaves. Our species tend to have variably lobed leaf blades with large teeth (i.e., some blades have short, obscure lobes and others have prominent lobes separated by deep sinuses). Several species are found in our area, two of which are common. *Vitis riparia* is the most frequent species of *Vitis* in northern New England. It produces tendrils from no more than two consecutive nodes and has leaf blades that lack an even covering of gray or rusty hairs on the leaf underside. *Vitis labrusca* (fox grape) has larger and sweeter fruits. It produces tendrils from 3 to 7 consecutive nodes and has leaf blades with a thin, even covering of gray or rusty, woolly hairs. *Vitis labrusca* becomes more frequent as one moves south in New England. True to its name, *Vitis riparia* is frequent in riparian forests along mid-sized to major rivers, where it can be found climbing high into the canopy. However, it is also frequent away from rivers along forest edges and thickets. This species flowers in June and produces fruits in August.

Many people are familiar with grapes as a wonderful edible. The berries of *Vitis riparia* are somewhat sour but tasty nonetheless and very nutritious (again, those of *Vitis labrusca* are larger and sweeter). They contain vitamins B_1, B_2, B_3, and C, pro-vitamin A, and various other minerals and acids. They also contain pectin and can be used to make jams. The fruits have large seeds, but these can be chewed without difficulty. The berries ripen from the last week of August through the first three weeks of September; however, the flavor improves into October as the berries further mature. They often persist on the plant late into fall, offering a somewhat shriveled, sour treat when many other berries are no longer available. Generally, the fruits are easily assessed for condition, the only items that detract from their quality being occasional mold or insects (the berries infected by insects are typically drier, weigh less, and have one or more holes bored through the skin). The berries contain much liquid and can be juiced to make a very tasty and nourishing drink. One way I make juice is to place the berries in a container, add water to fill the space between the berries (i.e., fill the water to level with the berries), crush the berries thoroughly, allow them to stand in the water for some time, then strain out the pulp and seeds. The berries can also be juiced without water as well for a full-strength drink. It is important to

note that some individuals may be sensitive to the tartrate crystals that precipitate out of the liquid when the grapes are juiced. Some species possess more tartrates than others (*Vitis riparia* is reported to be high in tartrate content, while *Vitis labrusca* is reported to be low). Tartrates can cause an irritating, burning sensation to people exposed to too much of the liquid. Washing away any freshly pressed juice that has landed on the skin can prevent irritation. Likewise, allowing the pressed juice to settle overnight in a container placed in a cool location and then decanting the liquid from the residual purple and gray sediment and sludge is an important precaution. The sludge contains the tartrate crystals and should be discarded. These simple precautions will allow one to enjoy *Vitis riparia* without any discomfort. I have not personally experienced any discomfort with the fruits or juice of *Vitis riparia*, *Vitis labrusca*, or their hybrid (*Vitis ×novae-angliae*). However, I encourage people new to *Vitis riparia* to take precaution when they are introduced to this fruit. The Omaha (and likely other Native Americans) were known to eat the fruits of *Vitis riparia*. The young leaves, tendrils, and tender shoot tips are also edible. They can be eaten raw (when very young) or boiled for a short time and eaten as greens. They generally emerge in May. As the leaves get older, the texture becomes tougher and the flavor more bitter. The tendrils have a definite sour flavor similar to species of *Oxalis* (wood sorrel). Many authors write about the potable sap that can be gathered from grape stems. However, clean water is rarely limited in New England, so there is little reason to damage the stems for the sap.

The berries of grapes contain many analgesic and anti-inflammatory phytochemicals. Ferulic acid, genitsic acid, and salicylic acid are some of the better pain relievers, while ascorbic acid, cinnamic acid, myrecetin, and quercetin are some of the better anti-inflammatories. Dried grapes (i.e., raisins) contain higher concentrations of these compounds because the fruits have less water. The seeds of grapes and the leaves have been shown to contain oligomeric procyanadins, which are known for their antioxidant activity. Further, the seeds of grapes have proven benefit in strengthening capillary walls, which aids in prevention of bruising and varicose veins.

The fruits can be mashed to make a purple dye. The fruit paste can be applied directly to fibers or surfaces.

Aegopodium podagraria L. bishop's goutweed

Left—non-maculate-type leaves (the maculate leaves have white stripes or blotches on the blades). Right—an inflorescence (center, with white flowers) showing the ultimate groups of flowers (called umbellets).

Aegopodium podagraria is a non-native, invasive herb that has escaped cultivation in the region. It grows in forests, at forest edges, and along borders. Though this plant is most frequent near human habitation, it can sometimes be found relatively far from homes in minimally disturbed forests. It has twice-pinnately compound leaves with toothed leafules, and flowers with five small, white petals. The inflorescence is an umbel, which is a flat- or round-topped array of flowers in which all the branches originate from a common point. *Aegopodium*, like many members of the Apiaceae (celery family), has a compound umbel (i.e., the inflorescence branches branch again and each supports a small groups of flowers called an umbellet). The umbellets lack bractlets (or have 1 or 2 small ones) at the base (some genera in the celery family have a regular series of bractlets around the base of the umbellet). This species is perhaps easiest to learn in fruit. The two styles are bent backward and extend downward to near the mid-length of the seed-like fruit that ultimately splits into two halves. The foliage is either entirely green or often white-striped or white-blotched in horticultural forms (referred to as maculate). The plant usually flowers in July and early August.

The leaves are slightly aromatic and excellent eaten raw or cooked. Their flavor is reminiscent of *Pimpinella anisum* (anise). The youngest leaves (bright green and somewhat translucent) are best used as salad ingredients. These generally begin to appear in late April, and new leaves will be produced throughout much of May. After the leaves are older, they become darker green and opaque. They are still good as a potherb. Though the leaves of *Aegopodium podagraria* can be eaten through much of the growing season, they are best in the spring while they are still tender. They can also be infused to make a pleasant tea.

Aegopodium podagraria has been used in folk medicine to assist with several ailments. Infusions of the leaves (and other parts of the plant) have long been used internally as a tea to abate the symptoms of painful joints due to arthritis, rheumatism, and gout. Recent research has shown

that *Aegopodium podagraria* contains the lipid falcarindiol, a phytochemical that inhibits cyclooxygenase-1 (COX-1) formation. COX-1 is a compound responsible for inflammation and pain. The highest concentrations of falcarindiol were found in the flowers (though it is present in other parts of the plant). Research also demonstrated that falcarindiol and related polyacetylenes have antimicrobial function, with activity against some bacteria and fungi. This supports the folk use as a vulnerary—poulticed leaves can be placed on minor skin ailments (e.g., cuts, burns, insect stings) to allay infection. Infusions of *Aegopodium podagraria* are also reported to have diuretic and sedative properties.

Allium tricoccum Ait. wild leek

Left—broad, flat leaves (usually in pairs) found during the early season. Right—early inflorescence with budding flowers that are soon to open.

Allium tricoccum is a conspicuous member of rich, moist forest communities, often growing in large, dense colonies. It typically occurs on high-terrace river floodplains or on rocky slopes under trees such as *Acer saccharum* (sugar maple), *Fraxinus americana* (white ash), and *Tilia americana* (American linden). Its flat leaves emerge early in the spring and then wither prior to the appearance of the flowering stem. The white flowers are borne in an umbel on a leafless stem and usually are open in July. The flowering stems often persist late into the growing season, helping mark the location of the bulbs. There are several other wild species of onion and garlic in the genus *Allium*, though none of them have the early-withering, broad, flat leaves of *Allium tricoccum*. All members of this plant family (Alliaceae) have the characteristic odor of onion or garlic when the vegetative parts are bruised or cut. This is a useful trait for identification.

Bulbs of *Allium tricoccum* after the removal of the netted, fibrous coating. The bulb on the left has been improperly collected (from a conservation perspective) because the root crown was removed from the soil.

The most prized food of *Allium tricoccum* is the bulb. It is generally easy to collect as it is not too far below the surface of the soil. It is covered with a fibrous net that is easily removed with the hand. The raw flavor is somewhere between *Allium cepa* (cultivated onion) and *Allium sativum* (garlic). It is edible raw or cooked (boiling softens the flavor very much). Early season collections will find the bulb to be very small because

the plant has used the stored energy to produce the leaves. As the spring progresses, the bulb becomes larger and more efficient to collect. My favorite time for collecting the bulbs is after the plant has fruited (seeds mature in mid- to late August in New England). This allows the seeds to be placed in the freshly dug soil after the bulbs have been gathered, helping insure the seeds find appropriate substrate for germination (this is important given that collection of the bulbs can be lethal to the plant if the root crown is also collected). Harvesting the bulbs in a manner that leaves the root crown behind will not be lethal to the plant as a new shoot can be produced from this structure (see photograph on the preceding page). I find the easiest way to accomplish this type of collection is to partially clear soil around the bulb, but leave the lower fifth of the bulb securely in the soil. When the bulb is removed from the soil, use a prying motion (i.e., lift and bend the bulb to the side with the fingers) so that the root crown breaks away from the base of the bulb (this leaves all the roots intact in the substrate). The root crown can also be cut from the bulb with a stone or metal blade and replanted. Leaving the root crown behind allows the plant to regenerate, easing the impact of collection on the population. The bulbs were eaten by the Cherokee, Iroquois, Ojibwa, Potawatomi, and other Native American tribes. The leaves, which are rich in vitamin C, are edible and are good chopped up in wild salads. They can also be boiled as a potherb. The flavor is excellent and quite sweet upon cooking. The leaves emerge in mid-April to early May and begin to senesce in late May through the first half of June. Foragers must take great care to preserve *Allium tricoccum* and not overcollect it because this plant is uncommon or rare over much of its range in the Northeast. This species has become a popular wild food and is now gathered by commercial collectors, which places more stress on populations. Limiting harvests, timing the harvests to coincide with mature seeds, and harvesting correctly to leave the root crown behind are important conservation strategies.

Allium sativum (garlic) is a related species with a host of medical research showing its effect in lowering blood pressure, inhibiting cancer cells, removing heavy metals from the body, promoting cardiac health, promoting respiratory system health, and reducing the severity of allergic reactions (among many other effects). Recent research has also confirmed its ability as a potent antimicrobial, with action against many bacteria (including both gram-positive and gram-negative types), parasites, fungi, and viruses. Therefore, the crushed bulbs (including those of *Allium tricoccum*) have important use in wound management (mixed with water as a wash) and in treating infection. For example, I have successfully treated ringworm (i.e., tinea) using slices of the bulb from members of this plant family (caution: bulbs left on the skin too long will cause blisters, limit exposure to one-hour intervals twice a day). Consumption of fresh bulbs can also be used to treat many infections, including those responsible for staph and dysentery. Unfortunately, bulbs are difficult to consume raw and can be emetic in large quantities. Therefore, for acute episodes, it is best to consume small amounts on a frequent basis (e.g., drink one bulb crushed in water or juice every 1 or 2 hours). Also, some authorities suggest that the doses should be consumed after meals (as much as possible) as the pH of the stomach has increased and will not destroy the important medicinal compounds. The phytochemical thought to be at least partly responsible for these medicinal actions is the lipid allicin (the oxide of diallyl disulphide; though there are many related phytochemicals that contribute to the overall action of this herb). Allicin is produced by the action of the enzyme alliinase when the amino acid alliin is exposed to air, such as when the bulb is bruised or cut. Allicin is responsible for the characteristic smell of onions and garlics. *Allium tricoccum* has similar medicinal qualities as *Allium sativum*, and consumption of the bulbs (or other uses) is beneficial for human health.

Apocynum androsaemifolium L. spreading dogbane

Left—white flower with pink stripes on inside with recurved petal lobes. Right—early season shoot, showing lack of hairs and branching of shoot (compare with *Asclepias syriaca*).

Apocynum androsaemifolium is a relatively common plant of fields, roadsides, open woodlands, and sandplain grasslands. It has small, bell-shaped flowers with recurved petal tips and interior pink veins. These usually appear in late June and July and eventually mature as long, slender fruits (called follicles) that dehisce by a single suture and shed seeds with a tuft of white hairs. The leaves are opposite, entire, and yield a milky latex when bruised or torn (as do other parts of the plant). A related species, *Apocynum cannabinum* (hemp dogbane), also occurs in the Northeast. It has white to green-white, unstriped flowers that are smaller and lack the recurved petal tips. Both species have similar uses. The genus *Apocynum* belongs to the same family as milkweeds but differs in being poisonous (whereas some milkweeds are edible).

All portions of *Apocynum androsaemifolium* are poisonous and should not be ingested for food. The plant contains the resin apocynin and the cardiac glycosides cymarin and apocynein (kinds of terpenes), among other compounds. These phytochemicals can affect the cardiovascular, respiratory, and urinary systems, and they can act on the female reproductive system (specifically the uterus). That stated, this plant has been used successfully as a medicine by many people. The fresh sap from broken leaf bases contains a proteolytic enzyme and can be used to treat warts. Applying the fresh sap to the wart each day is the method of treatment. It was used as such by the Iroquois. The rhizome and roots of *Apocynum androsaemifolium* can be used as a cardiac stimulant. It is known to constrict blood vessels, slow and strengthen the heart beat, and raise blood pressure. Two methods of administration are frequently used: decoctions and pills, both made from the ground rhizome. Due to the strength of this plant, no more than a single dose should be taken each day. This species was used as a cardiac medicine by the Chippewa Indians. *Apocynum androsaemifolium* is a strong diuretic and has a role in treating people with infrequent daytime urination and edema (the latter formerly referred to as dropsy). It is also an expectorant and can have a role in treating hair loss. For the latter, the decotion is used as a rinse that vasodilates and mildly irritates the hair follicles. Some Native Americans (e.g., Montana Indian) used the root of this plant as a cathartic.

Few plants in the region boast fiber of such excellent quality, especially in regard to strength and abrasion resistance. In can be collected in the manner described for *Asclepias syriaca* (common milkweed) and reverse-wrapped to make cordage for many uses. Even cordage made from living plants in late summer stand up to tremendous abuse; therefore, it is one of the better herbaceous plants to use for bow drill cords. Because of its superior strength, the fiber is highly prized for bow drills and hunting bows. It was used for hunting bow strings by the Menominee and for fishing nets by the Bella Coola.

Arctium lappa L. great burdock




Left—arrangement of flower heads at the summit of stem. Right—rosette of early season leaves.

Arctium lappa is a distinctive composite that originated from Europe (i.e., it is not native to North America). It is a weed of disturbed and cultivated soils, such as roadsides, fields, and pasture edges. It has large lower leaf blades that have a heart-shaped base and a coating of white, woolly hairs on the lower blade surface. The heads have purple flowers that are arranged inside bur-like bracts. The flowers begin to appear in late July and flower for much of the remaining summer. The individual bracts are hooked at the tip and attach to clothing, hair, and fur for animal transport of the fruits. *Arctium lappa* is distinguished from its closely related species by the flat-topped array of heads that are each 2.5–4.5 cm across. A very common species, *Arctium minus* (common burdock), has arrays of heads that are not at all flat-topped (i.e., the lower stalks of the heads are comparatively short, creating an array that is taller than wide), and each head is 1.5–2.5 cm across. Both species have similar uses. Note: *Arctium lappa*, as well many members of the Asteraceae (aster family), may cause allergic reactions due to a group of phytochemicals called sesquiterpene lactones. Contact dermatitis has been reported in rare instances by people sensitive to these compounds.

Roots of *Arctium minus*, a related and common species.

The taproots of *Arctium* can be dug as a quality wild food anytime there isn't an aerial stem (i.e., when only basal leaves are present). Though the highest numbers of plants at the appropriate stage will be found in the spring and fall, some plants in a population will pass the summer as a rosette of basal leaves, so generally some taproots can be found during the middle of the growing season. Though the taproots can be eaten raw or cooked (e.g., boiled or roasted), they are safer

cooked due to the high inulin content that can create flatulence (cooking breaks down the inulin into simple sugars that are absorbed more easily by the intestinal tract). They contain vitamins B_1, B_6, B_{12}, and E and the minerals manganese, copper, iron, zinc, and sulphur. The taproots can be very long, and they taste like a cross between ***Solanum tuberosum*** (potato) and ***Daucus carota*** subsp. ***sativus*** (cultivated carrot), in other words, like a bland carrot. As previously noted, they contain a high proportion of inulin, a carbohydrate with many health benefits (e.g., increases absorbtion of some minerals, acts as a prebiotic to colon flora, has minimal impact on blood sugar level). The taproots soon begin to develop a woody core and become less desirable as an aerial stem is produced. The Iroquois were known to enjoy the roots of ***Arctium lappa***. The young leaves are reported to be edible but are very bitter, and I know of no one who professes to enjoy them (I avoid them except for medicine). Both the young shoots and young petioles (i.e., leaf stalks) can be eaten raw in salads or cooked by boiling. Both are best prepared by peeling away the outer layers to expose the juicy core. The aerial stems should be collected prior to branch and flower bud production while they are very flexible (usually late May through mid-June). There is an outer layer (tinged with red or purple) that is easily peeled and an inner, greener layer that also should be removed (it does not peel well and is best scraped away with a stone or metal blade). The petioles are best in early to mid-spring before they become too tough and gain a bitter flavor. In my opinion, the stems are superior to the petioles and offer a larger quantity of food.

The roots, as well as other parts of the plant, contain several polyphenols referred to as lignans (e.g., arctigenin, arctiin, matairesinol). These phytochemicals make ***Arctium lappa*** (and ***Arctium minus***) useful for treating skin and scalp maladies, particularly those that manifest as dry, flaky or scaly patches. This species is, in my experience, one of the best choices for treating these issues (alone or in combination with other species beneficial for the skin). Treatment is effected by imbibing the decocted root three times a day. A poultice of the fresh root applied to the affected areas can be used in conjunction with decoctions. The decoction itself can be used also as an external wash. Preparations of ***Arctium*** are also an alterative (i.e., restoring vitality and proper functioning to the body, often by eliminating wastes). The teas are believed to act on the kidneys to support their function. Further, preparations are known to be a mild laxative and can heal a damaged liver and protect it from additional decline. The fresh leaves can be poulticed for treatment of minor skin ailments (e.g., eczema, sores, wounds). They have been shown to have antimicrobial activity, probably due to the presence of polyacetylenes (similar to the roots). This makes ***Arctium*** a good choice for a vulnerary. The Micmac, Nanticoke, and Penobscot used poultices of the roots and/or leaves for skin maladies. Recent research suggests that one of the phytochemicals present in the roots (arctiin, which is also present in the tiny, seed-like fruits) may slow or stop the progress of breast cancer when ingested during the early stages (i.e., this plant is antineoplastic). It has also been suggested to have similar effects against colon and pancreatic cancers. This information corroborates the use of ***Arctium lappa*** in the antineoplastic recipe called essiac (see ***Rumex acetosella***—sheep sorrel).

The heads of ***Arctium*** serve well as a temporary fastener for clothing, should a button or tie have been lost or damaged. The bur-like series of bracts works similar to other hook-and-loop attachments (e.g., Velcro).

Asclepias syriaca L. common milkweed


Left—flowers and upper stem. Right—fruit (a follicle) with seeds visible, at a stage too late for consumption.

This plant is a familiar species of open uplands, including fields, roadsides, and forest edges. It is a valuable wild edible given the broad range of time that various parts of it can be eaten. It is one of ten different species of milkweed that occur in New England. *Asclepias syriaca* is characterized by opposite leaves that are soft-hairy beneath and borne on leaf stalks 5–15 mm long. The flowers are purple-green to light purple or red and have a whorl of five tubular hoods, each of which encloses a slender appendage called a horn (note that the horn does not exceed the height of the tubular hood, as is the case in some species). The fruits are covered with thin, raised, wart-like projections (unique among our milkweeds). It is important that one study the morphology of this plant in order to be able to identify it as a shoot (arguably its best stage for food). In late spring *Asclepias syriaca* sends up a thick, gray-green shoot that is covered with very short, soft hairs. The stem, which is unbranched at that time, may have as many as several pairs of oppositely arranged leaves. When broken or bruised, the stems and leaves exude a milky liquid due to a white latex present in the sap. One needs to be cautious not to confuse this plant with species of *Apocynum* (dogbane), which also have white latex in the sap and opposite leaves. Species of *Apocynum* are poisonous but can be separated from *Asclepias syriaca* due to their glabrous (i.e., lacking hairs) stems that may be branched in the early season. These are important distinctions because milkweeds and dogbanes often grow together in the same habitat. *Asclepias syriaca* flowers from early to late July.

Early shoot of *Asclepias syriaca* (compare with *Apocynum androsaemifolium*).

The early shoots, young leaves, flower buds, flowers, and immature fruits (the last while shorter than 3 cm) of *Asclepias syriaca* can all be eaten and are excellent. In fact, this is one of my favorite edible plants in the region. All parts of the plant are best prepared by boiling for 5–10 minutes. This species was eaten by the Chippewa, Dakota, Iroquois, Lakota, Ojibwa, Omaha, Osage, Winnebago, and other Native American tribes. The shoots usually appear in mid- to late May and taste something like *Phaseolus vulgaris* (green beans). New shoots continue to be produced for a time, thus the young stems can be collected into early or mid-June in northern states. Much has been written about the supposed toxicity and bitter taste of *Asclepias syriaca*. I, and others whom I know, routinely eat this plant without prolonged cooking and do not use several changes of water (we even occasionally eat portions of the plant uncooked as a snack). I am in agreement with Sam Thayer that the myth surrounding the need to cook *Asclepias syriaca* in multiple changes of water likely arose due to confusion with an accidental collection of a species of *Apocynum* (dogbane). Keep watch of the populations you collect from because new foods will continue to be produced. The flower buds are one of my favorite foods from this plant. They are generally present from early June (in southern New England) to mid- or late June (in northern New England). Fruits shorter than 3 cm can be eaten whole after cooking. Fruits longer than 3 cm can still be consumed by extracting from the interior the white material (which is the immature seeds and their associated coma—the hairs on the seeds that facilitate wind dispersal). This material can be eaten as long as it is entirely white (no hint of brown coloration), the coma is moist (not dry), and the entire mass can still be easily pinched in two with the fingers (i.e., little or no resistance to tearing). It can be cooked and added to soups. Note that at this later stage I discard the outer portion of the fruit (i.e., the valve).

Winter shoots of *Asclepias syriaca*. Both the fibers of the stem and the hairs on the seeds have important uses.

Asclepias syriaca has been used medicinally to treat warts. The fresh sap from a broken leaf base contains asclepain, a proteolytic enzyme. The sap can be placed on warts twice a day for approximately two weeks. Several Native American tribes were known to use this remedy, including the Cherokee, Iroquois, and Rappahannock. I personally have used this to treat a wart on my finger (with success). The roots of this species contain the glycosides asclepiadin, asclepione, and galitoxin. These are known to both irritate and stimulate the gastrointestinal tract (i.e., they are emetic and purgative), decrease thickness and increase fluidity of mucus in the lungs and bronchial tubes (i.e., expectorant), and increase both perspiration and urine volume (i.e., diaphoretic and diuretic, respectively). *Asclepias syriaca* can cause nausea and vomiting when used in excess as a medicinal. It should not be used by pregnant women and people who suffer from cardiopathy (i.e., any disease or ailment of the heart).

The stems of *Asclepias syriaca* possess good quality fibers for cordage. Though not quite as strong as species of *Apocynum* (dogbane) and *Laportea* (wood-nettle), they are more supple. They are best collected in the fall (mid-October and later), after the stems lose their green color and become dry (the stems are typically gray or partially to completely mottled/suffused with black at this time). The stems stand above the snow through much of the winter and can be collected during this time as well, but the fibers of the stems gradually decrease in quality and become more fragile. Another species of milkweed, *Asclepias incarnata* (swamp milkweed), has much stronger fibers that don't deteriorate as quickly in the winter. This species has red flowers,

lacks wart-like projections on the fruits, and, as its name suggests, grows in wetlands and along shorelines. The first step of creating natural cordage is to flatten the collected stems and then split them open using your thumb. Once opened, the stems will usually break into four long sections (one for each angle of the stem) which allows for easy removal of the inner pith from the fibers. By bending short sections of the flattened stems to crack the inner, brittle material into segments, one can strip the brittle material off the outer fibers (discarding the inner, pithy material). When pulling the inner pith from the fibers, it is important not to pull completely in one direction with each section of pith because this causes a loss of some fibers each time a section of brittle material is removed (some fibers will remain on the sections of pith with this method). The most intact fiber bundles are made by pulling about ¾ of each section of pith one direction, and then pulling the remaining ¼ the other direction (this is very difficult to explain in words but the process and purpose is easily demonstrated in person). Finally, roll the extracted fibers (which may resemble a sheet of material with fibers in it) in your hands or on your leg to remove the outer, chaffy layer (the epidermis). The fibers can be made into good cord for many uses, including bow drills and strings for bows. The older the stems are, the more difficult it becomes to easily remove the fibers from the inner pith. A short period of soaking in water (ca. one minute) can sometimes assist by making the fibers more flexible while still keeping the inner pith brittle for easy removal. Be sure to dry the fibers completely before making cordage. Reverse-wrapped cords of about 5 mm thick are suitable for hunting bows drawing less than 20 kg. Though slender cords can be used for bow drill strings, those of 8–10 mm thickness work well and hold up longer to the abrasive stress of this fire-making tool. The cord from *Asclepias syriaca* can be used for many aspects of primitive trapping; however, they do not work well for winter snares that target snowshoe hare, as this animal readily consumes the cord (rather than walking through them)! It is also possible to prepare serviceable cord from the green stems in late summer, but one must use split separation to remove the outer epidermis (with the embedded fibers) from the inner pith. It is important to note that cord prepared at this time will dry out and become somewhat brittle; therefore, it must be kept moist (or soaked in water) to make it supple enough for bow drill use, etc. The hairs attached to the seeds are useful as a tinder source for fire making. The hairs are a coal extender (i.e., they will increase the size of the coal but will not burst into flame).

Atriplex acadiensis Tascher. maritime orache

Left—*Atriplex acadiensis*, vegetative habit in early summer at an optimal time for collection as a potherb. Right—*Atriplex patula* (spearscale orache), a closely related non-maritime species, showing the paired bracteoles on seed-bearing plants that conceal the seeds.

Atriplex acadiensis is a common, sometimes abundant, component of salt marshes in northern New England. *Atriplex* as a genus is identified by its inconspicuous flowers that lack showy sepals and petals, and seeds that are hidden by a pair of triangular- to diamond-shaped bracteoles. Its leaves are oppositely arranged, and at least the lower ones of *Atriplex acadiensis* have a pair of forward pointing lobes near the base of the blade (note that species of *Chenopodium*, goosefoots, have alternate lower leaves; to casual observers they can look very similar). There are several species of orache that are found in saline marshes of the northeast (e.g., *Atriplex acadiensis*—maritime orache, *Atriplex glabriuscula*—bracted orache, *Atriplex prostrata*—hastate-leaved orache), and these are separated on subtle and technical characteristics. However, there is a long history of these species being eaten, and identifying the particular species does not seem necessary.

The young, leafy shoots and young leaves make good potherbs. They are succulent and somewhat salty tasting. They are best collected in late spring and early summer (i.e., June). Because they contain saponins, they should be cooked by boiling in water. Saponins are a group of phytochemicals (terpenes) that are found in many plants and can aggravate various problems (e.g., leaky gut, the functioning of certain enzymes). Though saponins appear to survive the heat of cooking, some leach into the cooking water. If the water is discarded after cooking, a net reduction in the level of saponins can be accomplished (note that it takes massive doses of saponins to cause health issues, saponins are more a problem for those with compromised health or age-related problems). The leaves decrease in bulk upon cooking, so collect more than you think you need. As the season progresses into summer, it is best to lengthen the amount of time the leaves are boiled to make their texture more pleasant.

Brassica nigra (L.) W.D.J. Koch — black mustard

Left—flowers and immature fruits. Right—mature fruits, which are oriented upward and closely pressed to the axis of the fruiting array.

Brassica nigra is cultivated throughout portions of the world as a source of mustard seed. In the Northeast, it is a weed of roadsides, fields, farmland, and, occasionally, riverside meadows. Like most members of the Brassicaceae (mustard family), it has four petals and six stamens (four long and two short). *Brassica nigra* has leaves that taper to the base (unlike some other members of its genus, which have clasping leaves) and strictly upright fruits 10–20 mm long that are 4-sided in cross-section and have an evident beak at the apex. Flowers generally first appear in June and are continually produced until September or even October. Fruits are present from mid-July through September.

This mustard offers many excellent foods at different times in the growing season. The young shoots and leaves are excellent raw or cooked, as are the young inflorescences (i.e., prior to the expansion of the flowers). The flowers and the immature fruits (while still green and tender) are a great snack or addition to wild salads. Given the asynchronous development of flowers, the immature fruits are available for much of the later growing season. Most parts of the plant are pungent and have a characteristic taste due to the presence of mustard oils (these are carbohydrates referred to as glucosinolates). The seeds can also be extracted from the fruits and used intact or crushed as a spice.

Sinigrin, one of glucosinolates in *Brassica nigra*, is a phytochemical with therapeutic effect. The fresh seeds can be ground and added to warm water to make a paste that is a rubefacient (i.e., causing mild and local irritation to the skin that serves to dilate blood vessels and stimulate blood flow). An infusion of the ground seeds can be taken internally as a decongestant. Mustard seed infusions are also diuretic and diaphoretic. The glucosinolates contained in *Brassica nigra* are sulphur compounds, thus they have use as an antimicrobial. Research has shown that extracts of *Brassica nigra* and close relatives are broadly active against many types of fungi and bacteria (including gram-positive and gram-negative types). Infusions of the fresh leaves can be used as a wash for cleansing cuts, scrapes, and other types of wounds.

Caltha palustris L. yellow marsh-marigold

Left—flowering habit of *Caltha palustris*. Right—cluster of fruits, each one opening by a single suture (this type of fruit is called a follicle).

Caltha palustris is a relatively common plant of open and semi-open wetlands, often found in low fields, ditches, stream banks, and forested swamps. It is a conspicuous plant in early spring with an abundant display of yellow flowers. The yellow, petal-like flower parts are actually sepals (*Caltha palustris* does not have green sepals below the petaloid parts of the flower as *Ranunculus*—crowfoot—does). It has hollow, succulent flowering stems and toothed leaves with a basal notch where the leaf stalk attaches (i.e., the leaf blade is heart-shaped). *Caltha palustris* usually flowers during the first few weeks of May. Caution is needed with this plant becuase it contains several irritating compounds; however, proper timing and preparation can make this species safe to consume. It has been reported that in rare instances persons can get blisters on the skin from handling this plant (I know of no one personally that this has happened to).

The young leaves (i.e., those that are emerging and unfolding) of *Caltha palustris* can be eaten raw or added to salads in moderate quantities. They are best collected in mid-April through early May (or later in far northern portions of New England). *Caltha*, like many members of the Ranunculaceae (crowfoot family), contains terpenes that are broken down into protoanemonin and other derivatives, substances that are acrid and irritating to the gastrointestinal tract. However, the amount of these substances *Caltha palustris* contains in early season is minimal. These compounds are rendered inert with heat; therefore, one the best ways to prepare this plant is by boiling (i.e., using the greens as a potherb). Like many other greens, the leaves and shoots reduce considerably on cooking, so gather more than you think you will need. After the leaves have fully expanded and the plant begins to produce flower buds and open flowers, the leaves need to be boiled in a change of water. This preparation renders the leaves safe to eat (as drying would also) at a time when the ranunculosides (the sesquiterpene lactones that ultimately break down into protoanemonin) are accumulating in the plant. As the season progresses, this plant should be ignored as a food source due to increasing concentrations of the irritating compounds. The roots have also been eaten in parts of North America and Asia after boiling in several changes of water or cooked after complete drying.

Cardamine diphylla (Michx.) Wood two-leaved toothwort


Left—leaf blade, which is divided into three toothed leaflets. Right—flower, with four white petals.

Cardamine diphylla is a species of rich, deciduous forests, such as those dominated by *Acer saccharum* (sugar maple), white ash (*Fraxinus americana*), and *Tilia americana* (American linden). It is found on rich slopes and high-terrace floodplain forests. Its 4-merous flowers (i.e., with four sepals and four petals) have six stamens (four long and two short), features it shares with most members of the Brassicaceae (mustard family). *Cardamine diphylla* usually has a pair of leaves, each with three toothed leaflets. The underground stem (i.e., rhizome) of this species is relatively uniform in diameter. Other related species (with similar uses) have alternating constrictions and expansions along the length of the underground stem. *Cardamine diphylla* flowers predominantly in May. As this species is a spring ephemeral, the plants die back to the underground stem in July (i.e., the plants are visible for only part of the growing season).

Pale, underground stem (i.e., rhizome) of *Cardamine diphylla*.

The underground stems, leaves, and flowers contain mustard oils, spicy, pungent, and somewhat bitter substances belonging to a class of carbohydrates called glucosinolates. These aromatic compounds are released by mechanical breakdown of the tissue (e.g., chopping, chewing) and action of the enzyme thioglucosidase. In moderate amounts, the underground stems, leaves, and flowers make great additions to salads and can be used as condiments (their flavor is reminiscent of *Amoracia rusticana*—horse-radish). In large

quantities the mustard oils are reported to be irritating to the gastrointestinal tract.

Because of the pungent mustard oils contained in the plant (especially within the underground stem), *Cardamine diphylla* is an expectorant when ingested. Applied externally as a poultice, the rhizome can be used as a rubefacient. Because the glucosinolates contained within the plant tissue are sulphur-containing compounds, *Cardamine diphylla* shows some antimicrobial action. The leaves are high in vitamin C and, therefore, are antiscorbutic (i.e., preventing scurvy).

***Chamaepericlymenum canadense* (L.) Aschers. & Graebn. Canada dwarf-dogwood**

Left—false flower (actually an entire inflorescence of approximately 20 flowers) with the associated four petal-like bracts. Right—red, fleshy fruits produced in the later part of the summer.

Synonym: *Cornus canadensis*. *Chamaepericlymenum canadense* is a familiar and easily identified herbaceous dogwood of north-temperate and boreal forests. It is found in a variety of upland settings, sometimes present as a dominant member of the herb stratum of mixed evergreen-deciduous forests of northern New England. *Chamaepericlymenum canadense* produces an inflorescence of tiny flowers subtended by four petal-like bracts (all collectively appearing to be a single flower). The flowers mature as a cluster of red-orange drupes (a drupe is a fleshy fruit with a single seed), giving rise to another common name—bunchberry. This species occurs over a wide variety of elevations; therefore, its flowering time varies by site. Flowers appear as early as late May for lowland populations and persist into July for high-elevation sites.

The fruits of *Chamaepericlymenum canadense* are edible raw and easily collected in quantity. They have the slightest hint of a sweet flavor. Fruits mature from August through September (again, depending on the elevation). The seed is relatively large but is easily chewed. The fruits can be dried and pounded for use in pemmican or cooked whole into breads. They were eaten by the Abenaki, Alaska Eskimo, Algonquin, Cree, Hesquiat, Southern Kwakiutl, Maka, Potawatomi, Salish, and other Native American groups. The Hesquiat, Hoh, and Quileute used this species as a special food for certain ceremonies, occasionally eaten with other special foods.

Chamaenerion angustifolium (L.) Holub narrow-leaved fireweed


Left—flowers with four petals and four-parted stigma. Right—fruit, a four-valved capsule that separates from a central column, with tiny seeds that have a tuft of hairs at one end.

Synonyms: *Chamerion angustifolium*, *Epilobium angustifolium*. This familiar herb of fields, roadsides, and forest clearings is recognized by its four-parted flowers with pink-purple petals and a style that divides into four branches near the top. The flowers mature as a long, slender capsule with small seeds, each of which is provided with a tuft of light colored hairs (which aid in wind dispersal). The first flowers generally open in June and July, and flowering continues through much of August.

Chamaenerion angustifolium offers several foods at various times in the season. The young shoots are edible raw and can also be used as a potherb. They were enjoyed by many Native Americans, including the Bella Coola, Gitksan, Iñupiat and Inuktitut Eskimos, and Okanagon people. The shoots can be eaten raw, but I feel they are best steamed or boiled for a short period (similar to the preparation of asparagus). As the shoots get taller and the stems become tougher, the leaves can still be used as a potherb. They are acceptable greens, but by July they are a little tough and somewhat bitter, lacking a pleasant taste that many other potherbs possess. The mature leaves can be dried and used to make a tea. It has an acceptable flavor but is perhaps best mixed with other tea plants (such as various mints) to create a better beverage. The flowers, also, can be made into pleasant tasting tea. It has a mild flavor that reminds me somewhat of the water in which greens have been cooked.

The leaves of *Chamaenerion angustifolium* have been shown to contain several different polyphenols, including oenothein B, which have antimicrobial, antiviral, anti-inflammatory, and astringent actions. One study showed this species to be highly active against *Escherichia coli*, *Pseudomonas aeruginosa*, and *Staphylococcus aureus* (in fact, *Chamaenerion angustifolium* was one of the most potent antimicrobial plants in a study that examined more than 300 species in the Great Lakes region). This corroborates the use of this plant by the Bella Coola, Chippewa, Menominee, Ojibwa, Thompson, and Woodlands Cree Native Americans as a dermatological aid. Infusions and poultices can both be used externally in wound management to cleanse and prevent

infection. Further, the anti-inflammatory and astringent actions can help reduce swelling, discharge, itching, and pain associated with cuts, scrapes, burns, rashes, and infections of the skin (these actions partly due to the phytochemical myricetin 3-0-glucuronide). Persons suffering from severe acne, rosacea, and other skin disorders (e.g., psoriasis, seborrhea) may find relief using this plant. The infusions of leaves and/or flowers can be used internally in the treatment of bacterial infections. *Chamaenerion angustifolium* also has documented activity against *Candida albicans* and can be used in the treatment of yeast infections. Though both the leaves and flowers can be used as an antimicrobial, the flowers are generally more active against both bacteria and fungi (one exception is the bacterium *Escherichia coli*, against which the leaves are slightly more effective). As the polyphenols contained in this plant are potent antioxidants, they play a role in the prevention of certain cancers. This is because the ellagitannins contained in the leaves are able to impede the growth of cancer via several mechanisms.

The Cree, Haisla, Kitasoo, and Oweekeno, among other Native Americans, extracted fibers from the stems for cordage. The stems can be collected in late season and split lengthwise to remove the fibers from the inner pith (similar to the process for *Asclepias syriaca*).

Daucus carota L. wild carrot

Left—open inflorescence. Right—budding inflorescence, showing distinctive, pinnately dissected bracts below the flowers.

Daucus carota is a common, non-native herb of human-disturbed habitats. It is found along roadsides, in fields, at lawn edges, and in other open places. It has highly dissected leaf blades with pubescent (i.e., hairy) leaf stalks. The stem is likewise pubescent. The inflorescence, an umbel, has many small white flowers and often a central, dark purple flower. Most distinctive are the pinnately lobed bracts that subtend the inflorescence. Many people avoid eating this wonderful edible because they have been told it can be confused with *Conium maculatum* (poison-hemlock). However, *Conium maculatum* does not have a pubescent stem and it does have simple (i.e., unlobed) bracts subtending the array of flowers (among many other differences). The flowers of *Daucus carota* appear in July and August.

Basal leaves of *Daucus carota*.

This species' best food, in my opinion, is the pale taproot that is quite flavorful and very similar to the taste of *Daucus carota* subsp. *sativus* (cultivated carrot). As with many other taprooted biennials, their roots are best eaten in the early spring and late fall when they are crisp, succulent, and without a woody core. It is generally easy to tell when *Daucus carota* is ready to eat—whenever an aerial stem is absent (i.e., when only basal leaves are present). The taproot is edible raw or cooked. Many plants have very small taproots that are hardly worth the effort of unearthing. Generally speaking, the larger

Taproots of *Daucus carota*.

the rosette of leaves, the larger the taproot will be. Within a short period of time, it will become apparent which plants are worth the investment of digging up. Cleaning the taproots is simple, and I have not found any need to peel away the outer skin. After a flowering stem is produced, the taproot develops a tough, woody core. However, the outer layer of the taproot is still edible and can be peeled from the core and eaten in times of need. Though the leaves, flowers, and fruits are also edible, the next best food on the plant, in my opinion, is the young aerial shoots. The peeled, young stems have an excellent flavor and texture. The leaves are best in the early spring, when their taste is milder and their texture is softer. The fruits can be used as a spice, which combines an aromatic flavor with some bitterness. They are mature in the late summer (i.e., late August and September). Women who are or wish to become pregnant should not consume the seeds (or the flowers), because they have contraceptive action (see below).

The leaves of *Daucus carota* (similar to those of *Daucus carota* subsp. *sativus*) contain flavonoids (types of polyphenols), daucine (an alkaloid), petroselinic acid, volatile oils, and tannins. They are diuretic, antilithic, carminative, and antispasmodic. Infusions of the leaves can be used in the treatment of kidney stones. The volatile oils are a urinary tract antiseptic, so teas are useful for cystitis and prostatitis. Further, this plant's antispasmodic properties are appropriate for cramps of the urinary system. Infusions can also be made into a mouth wash or gargle by infusing the leaves in hot water and allowing the tea to cool. The tea is antiseptic and helps control oral bacteria. Raw carrots (in quantity) are also known to promote the movement of stool through the intestinal tract (i.e., they are a weak laxative). The seeds can be used in the relief of flatulence and colic. Perhaps more notably, the seeds have a long history in many different societies as a safe and effective oral contraceptive. The seeds are most effective when consumed within 8–12 hours after intercourse and followed by an additional dose every 8–12 hours for a total of three doses. The amount of seeds used depends on whether they are consumed or used in a medicinal tea. When the seeds are consumed, each dose consists of 5 ml (1 teaspoon) of dried seeds. They can be eaten as is or ground and added to water to facilitate ease of swallowing. The seeds can also be infused by placing 15 ml (1 tablespoon) of partially ground seeds in a container, pouring 235 ml (1 cup) of boiling water over the seeds, covering the container, and allowing the seeds to infuse for 20–30 minutes. The flowers, also, can be used for this purpose and prepared as an infusion (similar directions as for the seeds), using 3–6 inflorescences for fresh flowers and two or three inflorescences for dried flowers. It is important to note that for *Daucus carota* to be used as a reliable oral contraceptive, it should not be ingested daily over long periods of time because it can lose its effectiveness. Also, women who have very recently stopped taking prescribed oral contraceptives (i.e., the pill), have had hormone replacement therapy, or have recently had an abortion, pregnancy, or miscarriage (i.e., had events in their life when substantial hormonal shifts have occurred) should not rely on *Daucus carota* as a contraceptive until normal patterns have been re-established. The only side effect noted was temporary vaginal dryness (and this only with ingesting the seeds, not with imbibing teas). Women have reported healthy pregnancies after ceasing *Daucus carota* as a contraceptive.

Equisetum arvense L. field horsetail

Left—reproductive stem, which appears in early spring and soon withers. Right—photosynthetic stem, which emerges after the reproductive stem and persists through the growing season.

Equisetum arvense is a common species of fields, roadsides, sandy shorelines, and forested swamps. It has an interesting life cycle in which early in the spring (i.e., April and May) the plant produces a soft, light brown to pink-brown stem that bears a spore cone. This stem withers soon and the plant then sends up a green, branched stem that serves the function of food production (through photosynthesis). This latter stem is present through much of the growing season. There are several species in the genus *Equisetum*, some of which usually have branched stems with a blunt spore cone apex (the horsetails), others of which have unbranched stems with a pointed spore cone apex (the scouring-rushes, the most common of which is *Equisetum hyemale*—tall scouring-rush). *Equisetum arvense* is identified by its unusual life cycle with two forms of aerial shoots (most species of *Equisetum* in the region have only one form of aerial shoot), photosynthetic stems with multiple whorls of simple branches, and sharply pointed, black scales (the true leaves) at the nodes of the stem. This species was called ahas ’soqon (pronounced ah-HAHS s’-gw’n) by the Passamaquoddy Indians, which means tail of horse.

Stem and spore cone of *Equisetum hyemale* (tall scouring-rush), an unbranched species of river banks and railroad embankments.

The soft, light brown to pink-brown reproductive stems, which appear in the early spring, are edible raw and were used by the Chinook, Hesquiat, and Saanich, among other Native American tribes. They are relatively tasteless. It is best to gather them prior to the release of spores (easily viewed by tapping the stems and watching for a cloud of spores released into the air), after which

they begin to wither. As they may contain thiaminase, an enzyme that destroys vitamin B_1, it is important to cook them (e.g., boiling) before they are consumed in quantity. The mature green stems are impregnated with silicon and are not pleasant to eat. Further, they contain various alkaloids and flavonoids (among other phytochemicals) that make them unsafe to eat in quantity.

The alkaloids (including nicotine, palustrine, and palustrinine) and flavonoid polyphenols (including isoquercitrin and equicetrin) found in the mature green plants that make them unsafe to eat in quantity serve as useful phytochemicals with medicinal benefits. Taken internally as a decoction, the plant is an astringent and diuretic. It acts on the genitourinary system to aid in reducing hemorrhage and helping to limit incontinence and bed wetting. Its astringent action also reduces inflammation (such as benign swelling of the prostate gland). Further, it is rich in silicon, an important mineral for healthy connective tissue and bones, and may have a role in treating osteoporosis. Because this species may contain thiaminase, I recommend decocting the dried plants prior to consuming the medicine. Prolonged heat helps to deactivate this vitamin-destroying enzyme. Applied externally, the plant is a vulnerary (i.e., aiding in the healing of wounds) and a weak styptic. A recent study found that a related species (*Equisetum sylvaticum*—wood horsetail) was active against some bacteria (i.e., it was antibacterial), corroborating the use of horsetails as a vulnerary. Externally, this plant can be applied as a poultice or decocted and used as a wash. Preparation of the decoction normally begins with ground, dried plants, though fresh plants can be used as well.

The mature stems of several species of *Equisetum* are usable as an abrasive (i.e., as sandpaper) for cleaning pots and smoothing wood and bone. Perhaps the best species is *Equisetum hyemale* (tall scouring-rush), but any species will work. Larger stems of this species, bundled together in the hand, are roughly equivalent to 180-grit sandpaper. The mature green stems of *Equisetum arvense* and closely related species can be used to make a gray-yellow to green-yellow dye by boiling them in water.

Erythronium americanum Ker-Gawl. American trout-lily

Left—flower with six yellow tepals that sits atop a leafless stem. Right—bulb, which is often deeply buried.

Erythronium americanum is one of the spring ephemerals that are found in rich, moist forests of the Northeast. It normally grows under deciduous trees such as *Acer saccharum* (sugar maple), *Fraxinus americana* (white ash), and *Tilia americana* (American linden), occurring on rich, often rocky, slopes and along forested terraces of rivers. As a spring ephemeral, it occurs, often in great abundance, on the forest floor in the spring and early summer and withers away sometime in July, passing late summer, fall, and winter as a small, subterranean bulb. Identification is relatively straightforward. The plants have basal leaves that are often spotted or blotched and produce a leafless stem with a single flower, each of which has six yellow, recurved tepals (tepals is the name for perianth parts when sepals and petals resemble each other in color and form). The flowers normally appear during the last week of April and the first weeks of May.

The leaves appear in mid- to late April (early half of May for northern populations), preceding the flowers. They are edible raw or can be boiled as a potherb. Eaten raw, they have a definite flavor of *Cucumis sativus* (cucumber) and often leave a peppery sensation on the tongue. They are best in the early part of the season prior to the appearance of the flowers. When cooking the leaves, one should boil them for only a moment or two as they quickly become soft. Note that the leaves are said to have been used as a contraceptive by the Iroquois. I am unaware of studies that support or reject this use. Pregnant women or women wishing to become pregnant perhaps should avoid consuming the leaves. The bulbs are also edible and are excellent when collected in the early spring (the bulbs do not come with the warning applied to the leaves). They are normally prepared by boiling or roasting over coals but can be eaten raw. They are frequently buried at some depth and can be laborious to gather in quantity but are available whenever the plant can be found. I find the most efficient manner to collect *Erythronium americanum* is to find areas where the plants grow very close together. I use a digging stick or other tool to loosen and lift a patch of soil containing the bulbs. I then use my hands to work through the sod, picking out the bulbs with the leaf and leaf stalks still attached (i.e., I do not dig numerous holes to collect them individually from the soil). After carefully rinsing them to remove the dirt and sorting

through the collected material to remove unwanted matter (e.g., fine roots of other plants, dried leaf litter), I cook the entire plants in boiling water for about 6–8 minutes. The resulting food is a delicious, tangled mass of soft greens and sweet bulbs (note that the leaves of *Erythronium americanum* are overcooked a little with this method, but the bulbs and leaf stalks are perfect, and much time is saved during preparation). The bulbs differ somewhat in flavor depending on the season, being sweeter very early. Many Native American tribes ate the fresh and dried bulbs of various species of trout-lily (such as *Erythronium grandiflorum*—yellow trout-lily), including the Blackfoot, Okanagon, Shuswap, and Thompson. It has been reported that eating the raw plants in quantity can make one sick as they are mildly emetic. I have not experienced any ill effects after eating this plant raw.

Native Americans used *Erythronium americanum* for many different ailments, but there appears to be no research verifying the efficacy of the various treatments (which is not to say that the preparations are ineffective). However, the fresh leaves are an emollient and, as such, may have valid use in wound healing. Emollients soften the skin, allowing wound edges to remain pliable and heal together more effectively (in contrast with hard and scabbed wound edges). The poulticed fresh leaves can be applied under the bandaging of minor wounds to speed healing. *Erythronium americanum* was used as a dermatological remedy by the Cherokee and Iroquois.

Eurybia macrophylla (L.) Cass. large-leaved wood-aster


Left—array of capitula at the summit of plant. Right—heart-shaped basal leaves, which often occur in large patches on the forest floor.

Synonym: *Aster macrophyllus*. This herb is found on moist soils of deciduous and evergreen-deciduous forests in New England. In addition to the aerial stem that produces the flowers, *Eurybia macrophylla* also carpets the forest floor with heart-shaped leaves, which often occur in great profusion over a large area. The flowering stem likewise has heart-shaped leaves near the base that are borne on a prominent stalk. Moving up the stem, the leaves become smaller, lose the heart shape, and have shorter petioles. As a member of the aster family, this species has capitula (i.e., flower heads) composed of many individual small flowers that collectively resemble a single flower. *Eurybia macrophylla* has two types of flowers—tubular disk flowers near the center of the capitulum and strap-shaped ray flowers around the margin of the capitulum. The ray flowers range from light purple to almost white (but always have at least a faint tinge of pink, blue, or purple). The capitula are collectively arranged in a flat-topped array at the summit of the plant. The flowers appear in August and the first half of September, long after the best time for gathering the leaves as food. *Eurybia macrophylla* has a close look-alike called *Eurybia schreberi* (Shreber's wood-aster). It is very similar to *Eurybia macrophylla*, including the production of heart-shaped leaves that are not associated with a flowering stem. However, *Eurybia schreberi* has pure white ray flowers (among other technical differences) and is much less common in the Northeast. Note: *Eurybia macrophylla*, as well many members of the Asteraceae (aster family), may cause allergic reactions due to a group of phytochemicals called sesquiterpene lactones. Contact dermatitis has been reported in rare instances by people sensitive to these compounds.

The leaves are edible and were used as food by the Algonquin Indians. Early in the season (i.e., late May and early June), when they are beginning to expand, the leaves are light green, tender, and have soft hairs. At this stage, they are without bitter principles and can be eaten raw as a salad plant. Because *Eurybia macrophylla* often occurs in large colonies, the leaves are easy to collect in abundance. After the leaves are fully expanded, it becomes practical to cook them (by boiling), at which time the leaves reduce slightly in volume (but not nearly as much as some

potherbs). The leaves become darker green and of firmer texture, and hairs on the blades stiffen as the season progresses (though the hairs are softened with cooking). The leaves also become a little bitter but can be made palatable by changes of water during cooking. However, in July and August, the leaves become more of a survival food than a sought-after edible.

Fallopia japonica (Houtt.) Dcne. Japanese knotweed


Left—habit of plant, note colonial growth form. Right—leaf blades.

Synonym: *Polygonum cuspidatum*. *Fallopia japonica* is native to Asia and was introduced into the United States to hide latrines. It is well suited to this task given its aggressive, colonial growth. This species is most common in areas of human habitation, and is frequent along roadsides, field edges, and river shores. There are two closely related species of non-vining *Fallopia* in the northeastern United States—*Fallopia japonica* and *Fallopia sachalinensis* (giant knotweed). Both species have similar uses. They are easily identified by their tall (commonly 1.5–4 meters at maturity), hollow stems with solid cross-walls at the nodes, where the leaves are produced. The flowers are white and, at maturity of the fruit, have three prominent wings. They appear mainly in August and September. Note: given this species' invasive habit, it should not be propagated because planting this species would facilitate its spread and damage to the ecosystem. It is best to simply utilize existing stands.

Early season shoots of *Fallopia japonica*.

The shoots (i.e., stems and unfolding leaf blades) collected in the early season, prior to reaching 20 cm (8 inches) tall, are excellent cooked like *Asparagus officinalis* (asparagus). They contain resveratrol, a polyphenol with powerful antioxidant properties. The time for collection is late April through mid-May. A given population will be good for collecting for about six to ten days. When collected at the proper stage, the shoots will be crisp and almost snap from the base when bent. As they begin to mature past the best collecting stage, the stems become more pliable and need to be torn free. Beware that a late frost will

damage many plants in a population. The early shoots will turn brown, wilt over, and ultimately rot away. These shoots at first lose the reddish color of the stipules at the nodes (the stipules appear as a membranous sheath surrounding the stem where the leaf stalk attaches). The shoots often then become somewhat compressed and more grooved, ultimately changing color and becoming almost entirely brown. These shoots are not good for collection and eating. The healthy shoots are best prepared by steaming for a short period or boiling for about two minutes. The taste is mildly reminiscent of *Asparagus officinalis* (asparagus) overlaid with a slightly sour taste (similar to *Rheum rhabarbarum*—garden rhubarb) and with a somewhat mucilaginous texture. Be warned, it is easy to overcook this plant and end up with a food lacking in substance. As the shoots become taller and leaf blades expand, the sour taste becomes more pronounced and the stems gain a tough texture.

The rhizomes of *Fallopia japonica* contain a number of pharmacologically active chemicals, including the polyphenols emodin, physcion, chrysophanol, resveratrol, questin, and questinol (and many more). Collectively, these compounds are useful for treating thrombotic diseases (i.e., clots within a blood vessel). These are often the result of injury, slowing or stagnation of blood distal to an injury, or increased coagulation of blood (the last sometimes the result of autoimmune disorders). *Fallopia japonica* preparations have been shown to prevent thrombosis that could result from arterial damage, improve microcirculation, and help alleviate organ tissue damage from ischemia (i.e., localized impairment of blood flow). It also helps lower blood fat content (i.e., it is a hypolipidemic). But perhaps most important, *Fallopia japonica* has verified use in the prevention and treatment of some types of cancer and was able to reduce tumor mass, tumor volume, and metastases in research trials. This valuable plant is also useful as an antiseptic wash and as an antimicrobial against some fungi, bacteria, and viruses, including *Staphylococcus aureus* (staph infection), *Treponema* (a spirochete that causes periodontitis), and *Candida albicans* (yeast infection). It has been shown to be particularly useful for serious burns, facilitating rapid healing of the skin, stimulating growth of new blood vessels, healing damaged blood vessels, and preventing infections that often accompany severe burns. *Fallopia japonica* also has verified use as a cardiotonic, cardioprotector, anti-inflammatory, and immune modulator (immune modulators normalize the action of the immune system, depressing it when overstimulated and stimulating it when depressed). Because of many of these medical actions, *Fallopia japonica* is one of several important plants useful in the treatment of Lyme disease (an infection of specific kinds of spirochetes). It is active against the *Borrelia* spirochete, enhances the immune system, reduces inflammation associated with Lyme disease, and protects the heart and corrects heart function (important for managing symptoms of Lyme carditis). As important, preparations of this plant improve microcirculation, which helps carry active constituents of this and other herbs to the site of spirochete infection (i.e., *Fallopia japonica* works synergistically with other Lyme disease herbs). Decoctions of this plant's dried rhizomes are the method of administration. External washes of the tea can also be used (in conjunction with oral doses) for wounds and superficial infections. Long-term use of this herb internally is reported by some authors to cause kidney damage. Though *Fallopia japonica* is recommended by some experts for long periods during the treatment of certain diseases (e.g., 8–12 months for Lyme disease), it is recommended to be used at the lowest dose that will relieve symptons. Given these facts, medical use is likely best reserved for times of need. It is contraindicated for pregnant women.

The stems are hollow except at the nodes, where leaves are produced (there is a cross-wall of tissue at these points). This makes *Fallopia japonica* an excellent source for making vials. Simply cut below a node so that the cross-wall forms the bottom of the vial. A whittled branch cut short serves as the stopper. When dry, the stems will easily crack if the stopper is inserted into the vial with too much force. It is best to reinforce the top of the vial-to-be with cord or rawhide to prevent splitting the stem. These vials can be used for dry storage tasks.

Gaultheria procumbens L. eastern wintergreen

Left—low-growing habit of plants. Right—ripe fruits, which are red, berry-like capsules that only partly split open.

This low-growing, evergreen subshrub is a common species of north-temperate forests under a variety of different canopy types. It typically grows in moist to dry soils, away from wetlands and seepy areas. The leaves with dark green and leathery blades are closely clustered near the top of the stem. The white flower hangs below the leaves on a nodding stalk and is reminiscent of a blueberry flower in that the petals are fused together and the flower constricts near the apex to a small opening. The flower matures as a red capsule that looks much like a berry because it is fleshy and only partially splits open. The flowers usually appear in the latter half of July through August. The fruits mature later and often overwinter on the plant.

The entire plant is edible and tastes of wintergreen, but various parts of *Gaultheria procumbens* differ in quality as a food. The leaves can be chewed and eaten as a pleasant nibble, but they are leathery. They were used as a type of chewing tobacco by the Cherokee. The flowers and fruits are edible. The fruit is somewhat mealy but is quite pleasant given its flavor and lack of annoying seeds. The Iroquois used to mash the fruit into cakes and dry them for later use. All aerial parts of the plant can be infused to make a tasteful, fragrant tea, and were used by the Abenaki, Algonquin, Chippewa, and Ojibwa. However, the phytochemical that produces the wintergreen odor is volatile, so the teas tend to have a mild flavor. The most concentrated teas are made with water of lower temperature. Using cool water and allowing the chopped or mashed leaves to sit for a longer period of time (2–4 hours) will give the fullest flavor.

Methyl salicylate, a type of polyphenol and the source of the wintergreen flavor, is closely related to the compound found in aspirin (acetylsalicylic acid). It can be used as an analgesic for minor aches and pains (e.g., headaches, sore throats), as a fever reducer, and as an anti-inflammatory. The Algonquin, Delaware, Iroquois, Menominee, Ojibwa, and Potawatomi used this plant to relieve various types of pain. Natural salicylates do not thin the blood as does synthetic aspirin, so people using aspirin for various heart conditions will not be able to use this plant in the same manner. However, methyl salicylate does not cause irritation or ulceration to the gastric system, making it a good choice for persons who are sensitive to aspirin for this reason. A heaping

palmful of fresh leaves (25–40 leaves) that are chopped and infused in one cup of hot water will serve well as a gargle (for sore throat) or as a tea (for headaches and other minor pains). However, because methyl salicylate is volatile, much of the medicine will escape from a hot tea. Higher concentrations of this phytochemical can be achieved by infusing in cool water over a longer period of time (see discussion in previous paragraph). Also given that methyl salicylate is highly volatile, it is unlikely that the dried leaves would have much use as a medicinal treatment (but I have not experimented with the dried plant). However, as the plant is evergreen, it is possible to collect it year-round. Simply keep a record of where colonies of *Gaultheria procumbens* are located so that they can be reached under the snow (if desired).

Hemerocallis fulva (L.) L. orange day-lily


Left—large, conspicuous flowers with six, petal-like parts. Right—young shoots emerging in the spring.

Hemerocallis fulva is a common sight in many gardens, but it is also a naturalized plant growing along roadsides, field edges, and in other open areas (less commonly this herb can be found in shaded colonies in forests). Though it is often found far from homes, it is most frequent in regions of human habitation (i.e., it would not likely be found on the interior of large forest tracts). It is recognized by its long, linear leaves that are confined to the base of the stem and its branched inflorescence with several large flowers that have six red-orange, petal-like members. A similar species called *Hemerocallis lilioasphodelus* (yellow day-lily) has yellow flowers and tends to be shorter. It has similar uses. Both flower in late June and July. Some authors warn that this species resembles various species of *Iris* when not in flower. However, member of the genus *Iris* have equitant leaves (i.e., the leaves are arranged so that the edge of the leaf faces the stem), whereas day-lilies do not. Further, *Iris* species do not have tuberous roots.

Tuberous roots of *Hemerocallis fulva*.

Hemerocallis fulva offers many quality foods over a long period in the growing season, making it a valuable wild edible. When the shoots begin to emerge in the spring, they can be chopped and eaten in salads or cooked for a short period (e.g., steamed, lightly boiled) and eaten. They have a starchy core and are slightly sweet. Shoots emerge generally in late March and early to mid-April and can be gathered over a two- or three-week period (depending on the weather or how quickly the spring progresses). The roots of this plant are tuberous, but they

range in quality. One must select the firm, crisp, pale tubers for food (older tubers will appear brown and soft). They are edible raw or can be cooked in a manner similar to *Solanum tuberosum* (potato). Their flavor is mild. The flower buds (which appear in the latter half of June) are excellent raw as a nibble, added to salads, or cooked. The open flowers can be eaten raw. They have a definite lettuce taste and are a good addition to wild salads. When they begin to wither, they make a fine addition to stews as a thickener. There are some warnings that the roots and young leaves are potentially toxic and that compounds in the roots may accumulate in the body (these warnings do not apply to the flowers). However, *Hemerocallis fulva* has been used as a food plant for a very long time. Some authors also recommend sampling small amounts of the roots and young leaves initially to determine how your body will react to this plant, as a minority of people react poorly to ingestion of the raw plant (i.e., they experience nausea and/or diarrhea). I personally have never had any issues with ingestion of the plant but know of a couple people who have.

Decoctions of the dried roots have been used in Asia as a diuretic for several ailments (e.g., edema, difficulty urinating). Tests confirm its efficacy.

The leaves of *Hemerocallis* are useful for making coil baskets (as the bulk material for the coil). They are best gathered in the summer, dried for storage, and soaked in water prior to use (to make them flexible again). This prevents them from shrinking after the basket is made and loosening the coils (as will occur with fresh leaves).

Heracleum maximum Bartr. American cow-parsnip

Left—large umbels of white flowers. Right—leaf blade, which is divided into three lobed and toothed parts.

Heracleum maximum is a coarse herbaceous plant, generally taller than one meter, belonging to the Apiaceae (celery family). It grows in a wide variety of habitats and at various elevations, usually occurring in moist to wet soil of wetland borders, meadows, stream banks, roadside ditches, and also high into the mountains in open, damp places. It has large, alternate leaves that are divided into three coarsely lobed and toothed leaflets. The thick petiole (i.e., leaf stalk) expands where it meets the stem into a conspicuous, sheathing base. The white flowers appear in July and early August. They are arranged in umbels, and those near the margin of the inflorescence are often irregular and expanded on the peripheral side. The fruits are compressed and have obvious oil tubules containing an aromatic oil. This species was called paqolus (pronounced BAH-gw'-looz) by the Passamaquoddy Indians, based on the word paq, which means growing close together. Three species of *Heracleum* occur in our area, but only *Heracleum maximum* is native. The others, *Heracleum mantegazzianum* (giant cow-parsnip) and *Heracleum sphondylium* (European cow-parsnip), are rare in the Northeast. All three species can cause severe burns in susceptible individuals through phytophotodermatitis. Chemicals in the sap, called furanocoumarins, cause increased sensitivity to the sun's ultraviolet radiation. Prudent foragers will, immediately after collection, wash their hands and other parts that contacted the plants.

All parts of *Heracleum maximum* are strongly aromatic. This imparts a flavorful, but sometimes overpowering, taste to the parts eaten as food. Longer cooking (including changes of water) can help to soften the taste for those who don't enjoy the strength of this herb. The roots (on vegetative plants that lack aerial stems), young stems (i.e., shoots), young leaves, and unexpanded umbels are all edible. Though the very young shoots and leaves are edible raw, most people will prefer to cook these parts (for 5–10 minutes in boiling water). The early season vegetation is my favorite part of *Heracleum maximum*, and I enjoy it as nibble, in wild salads, and as a boiled potherb. The expanding leaves emerge from the ground in the latter half of April through mid-May (boreal and alpine populations may not appear until June). The roots, to be collected from

plants that lack an aerial stem, are strong enough that I consider them best chopped finely and added (in limited quantity) to soups and stews as a flavoring agent (rather than as a bulk ingredient). They should be boiled for 10–20 minutes (depending on their diameter). The stems from young plants that haven't produced flowers can be peeled to remove the tough, outer layer in order to enjoy this food longer into the growing season. The leaves can be burned in a container, such as an earthenware vessel, and the ashes used as a salt substitute. The ashes contain mostly potassium chloride (rather than sodium chloride), so the flavor, though salty, is different from table salt. However, the seasoning is appropriate for people on a low sodium diet.

Leaf of *Heracleum sphondylium*; note the pinnately divided character with 5 or 7 leaflets (on the larger leaves).

Heracleum maximum was used as an important medicinal plant by the Aleut, Bella Coola, California Indian, Chippewa, Cree, Iroquois, Meskwaki, Ojibwa, Omaha, Paiute, and many other tribes. It contains many volatile oils (various kinds of terpenes) and polyphenols (e.g., umbelliferone, psoralen). Collectively, these phytochemicals make the plant useful as an expectorant, carminative, sedative, anti-inflammatory, and vulnerary. Infusions of the leaves or decoctions of the dried root can be taken internally to clear phlegm and help create productive coughs during colds (i.e., they are an expectorant). Teas can help alleviate intestinal cramps and joint pain. The fresh leaves have long been used as a poultice on minor wounds to aid in healing. Recent study confirms the antimicrobial action of the leaves (note: the same study showed that the stems and fruits are slightly more potent as an antimicrobial). However, given the photosensitizing properties of the furanocoumarins, it is important to keep the poulticed area covered. Further, it is suggested that persons actively using *Heracleum maximum* as a medicinal treatment should use extra caution concerning exposure to the sun. *Heracleum maximum* also has use in treatment of psoriasis and dandruff (i.e., it is an alterative for the scalp).

Hesperis matronalis L. dame's-rocket

Left—upper stem and array of flowers. Right—flower, showing four petals.

Hesperis matronalis is a weed of field edges, roadsides, and other human-disturbed sites. It can be frequently found also in floodplain forests of rivers where it is sometimes invasive. It has alternate, toothed leaves and 4-petaled flowers arranged in a panicle (i.e., a branching flower array that matures from base to apex). The flowers range in color from white to pink to purple (sometime varying within a single colony). The stem arises from a basal rosette of narrow leaves. The leaves of the stem and rosette (as well as the stem itself) have rather stiff hairs that, when viewed with magnification, can be seen to fork into two prongs. The flower matures as a slender, capsule-like fruit 50–100 mm long that splits open by two valves. The flowers appear from June through August.

The leaves are edible raw or cooked and can be easily gathered in quantity due to their size and the usual habit of the plant growing in large colonies. The leaves are best collected during one of two periods in the snow-free season. Early in the season (i.e., April and May), they can be gathered prior to the flowering of the plant. Once the plant produces an aerial stem the the leaves become bitter (though this can be tempered by changes of water). They present a spicy flavor of *Amoracia rusticana* (horse-radish) with a slightly, but not disagreeable, bitter taste. These tastes are made very mild with cooking. The overwintering stage of the plant has a basal rosette of green leaves (which remain green late into the fall). These are also mild regarding the accumulation of bitter principles and make a fine late-season green. I have collected the rosettes of leaves as late as November, even after many frosts and the ground was beginning to freeze. The hairs on the mature leaves are rather stiff, so I prefer to boil the late-season leaves for a short time to soften their texture. If they are not boiled too long (i.e., 1 minute or less), they maintain a slight taste of horse-radish. The flower buds and flowers are also edible raw and make a colorful addition to salads.

The leaves are very high in Vitamin C and are antiscorbutic (i.e., preventing scurvy). Teas made from the leaves are also diaphoretic and diuretic (i.e., inducing sweating and increasing the amount of urine, respectively). The leaves (more potent) and flowers (slightly less potent) have documented antimicrobial activity. They can be used as an effective poultice on minor wounds and burns.

Hylotelephium telephium (L.) H. Ohba purple orpine


Left—upper stem and inflorescence. Right—succulent leaf blades with sparsely and coarsely toothed margins.

Synonym: *Sedum telephium*. *Hylotelephium telephium* is a species native to Europe that has become widely naturalized in northern and eastern North America. Normally occurring in fields and adjacent to roads, it is sporadically found in forests and other such places away from human disturbance. The fleshy plant has many alternate leaves that are coarsely toothed above the middle. The 5-parted flowers are pink to purple and mature into a capsule (i.e., a dry fruit that splits open to release the seeds). The roots of this plant are white and fleshy-thickened, resembling the shape of a carrot (but generally much smaller). The flowers are generally present from late July through August. A similar species, *Hylotelephium erythrostictum* (garden orpine), is also found in our region. It has white to green-white petals, and the leaves do not gradually reduce in size toward the apex, as in *Hylotelephium telephium*. However, its uses are similar.

The leaves are excellent raw and maintain a neutral taste through the season that is largely free of distasteful principles (unlike many other plants, making this a valuable species to know). They are crisp, succulent, and easy to gather in quantity. For these reasons, *Hylotelephium telephium* is one of my favorite salad plants. The fleshy roots are also edible and are present throughout the year. I find that their flavor varies, and some plants present a slightly disagreeable taste, while others are acceptable. They are edible raw or cooked. I generally boil the roots for about five minutes prior to eating them.

Fleshy roots of *Hylotelephium telephium*.

Impatiens capensis Meerb. spotted touch-me-not


Left—very distinctive flower with curved nectar spur. Right—leaf blade with coarse teeth.

This distinctive species is a common plant of moist to wet soils of wetland edges, stream banks, and rich, deciduous slopes. This species was called apuckoltokkuwewossok (pronounced ah-booch-k'l-d'-k'-weh-W'S-s'g) by the Passamaquoddy Indians, which means a little plant that jumps backwards, an obvious reference to its fruits (see below). It has leaves that are oppositely arranged below and alternate above that take on a silver sheen when placed under water. The stems are somewhat translucent and have reddish prop roots near the base. The flowers, which appear in July and August, are bilaterally symmetrical and have an obvious, curved nectar spur protruding from the back. The fruit is a capsule with explosively dehiscent valves that rapidly coil when touched, projecting the seeds a short distance. There are two native species in the Northeast. *Impatiens capensis* typically has orange flowers with red spots and blotches. The other species, *Impatiens pallida* (pale touch-me-not), has yellow flowers. This latter species is much less common and, in fact, is rare in some parts of northern New England (e.g., Maine) and should not be collected for food or medicine outside of emergencies. Its food and medicinal properties are similar to those of *Impatiens capensis*.

Capsule of *Impatiens capensis*. The valves of the fruit explosively coil up when touched, throwing the seeds a short distance.

The young stems and tender leaves can be boiled and eaten as a potherb. They should be gathered before reaching 20 cm (8 inches) in height. Raw plants are reported to be emetic (i.e., causing vomiting) when eaten in quantity. For this reason, the cooking water should be discarded. Many authors recommend changing the water at least once during cooking. Though I have not seen direct

reference for the seeds being edible, the seeds of several species are eaten for food in Asia. Further, I, and others whom I know, have eaten small quantities of *Impatiens capensis* seeds as a pleasant nibble and have suffered no ill effects.

Yellow flower of *Impatiens pallida* (pale touch-me-not). Note that the spur points downward instead of projecting forward as in *Impatiens*

Impatiens capensis is a familiar plant to many as a remedy for the dermatitis caused by *Toxicodendron* (poison-ivy and poison-sumac). It has long been used by native people of this continent, including the Cherokee, Chippewa, Iroquois, Meskwaki, Omaha, and Potawatomi. The remedy is affected by crushing the stems and applying the liquid to the skin. The plant contains a phytochemical called lawsone (specifically, lawsone belongs to a class of polyphenols called naphthaquinones, typically characterized by their dark pigmentation). This phytochemical can prevent the dermatitis caused by species of *Toxicodendron*. A compound called urushiol from the sap of *Toxicodendron* binds to the skin and ultimately causes an itchy rash, the severity of which depends on the individual's sensitivity. Lawsone, the chemical present in *Impatiens*, binds to the skin more aggressively than urushiol and prevents it from causing dermatitis. Therefore, the best use of *Impatiens* is as a preventative measure after contact has been made with *Toxicodendron*, not as a remedy after the rash has developed. Though the leaves contain lawsone, the highest concentrations of the phytochemical are found in areas with red coloration (e.g., the red knobs and prop roots near the base of the plant).

Lactuca canadensis L. tall lettuce


Left—array of flower heads in bud. Right—one form of the highly variable leaves.

Lactuca canadensis is a tall, biennial herb of forest edges and open places (infrequently it is found within riparian forests) that can grow to three meters or more in height. It is frequently associated with human disturbance, such as roadsides, field edges, and waste lots. Positive identification of this plant is difficult without resorting to relatively technical characteristics. However, many of the species that may be confused with this plant have similar uses (though they differ in taste). As a composite, *Lactuca canadensis* has flower heads (also called capitula) made up of many, tiny flowers that collectively resemble a single flower. Each of the tiny flowers has a strap-shaped ray that is yellow (blue in the related *Lactuca biennis*, tall blue lettuce, a non-native plant originating from Europe). The plant contains a white or light yellow-brown latex in the sap that exudes as a milky liquid when the leaves and stem are cut or bruised. The small, seed-like fruits are tipped by a slender beak, to which are attached many white bristles that aid in wind dispersal. The leaves are highly variable and range from entire to prominently lobed, and clasping or not clasping the stem. The leaf blades are generally narrow or have narrow, spreading lobes with few or no teeth along the margins of the lobes (*Lactuca biennis* has broader, more or less square to rectangular lobes with numerous teeth along the margins of the lobes). The flowers of *Lactuca canadensis* appear in July and August. Note: *Lactuca canadensis*, as well many members of the Asteraceae (aster family), may cause allergic reactions due to a group of phytochemicals called sesquiterpene lactones. Contact dermatitis has been reported in rare instances by people sensitive to these compounds.

Flower head of *Lactuca biennis*.

The leaves of *Lactuca canadensis* are edible raw or cooked. They are superior in flavor to *Lactuca biennis* (which is much more bitter). They were eaten in North America by the Cherokee. They contain vitamins B_1, B_2, C, D, and E and pro-vitamin A. The leaves from the very young shoots, near the tips of the developing stem, are the best and have the most favorable texture and mildest flavor. Late May through early June is the best time to collect the leaves of this plant. It can be boiled in water to help soften the bitter taste (though I have not been able to completely remove the bitterness). The fall, when new rosettes of leaves are produced, is another time to collect mild tasting foliage. The young stems are also edible raw. The budding capitula (i.e., flower heads), including the supple branches that support them, are also edible. They are easiest to collect when the entire array of capitula is in bud, breaking off the whole unit just below the lowest heads. These are generally best for collection from mid-June through late-July. The open flower heads can also be eaten and are an acceptable raw or cooked food.

The leaves of *Lactuca* contain lactucin (a terpene), quercetin (a polyphenol), and two coumarins (cichoriin and aesculin; also types of polyphenols), among other phytochemicals. In concert, these chemicals are sedative, analgesic, and antispasmodic. The Cherokee and Iroquois are known to have used this plant for these purposes. Infusions of dried leaves can be used to promote restful sleep. Infusions are also useful for aiding in treatment of intestinal and uterine pains and some types of muscular pains (especially those associated with rheumatism). Because of the antispasmodic properties, infusions have been used successfully to treat whooping cough. The fresh latex from the plant was used as a dermatological aid by several Native American tribes (e.g., Chippewa, Menominee). It was used to assist with rashes caused by species of *Toxicodendron* (poison-ivy) and for warts. However, I am unable to confirm its effectiveness for these ailments. Herbal sedatives are contraindicated for people dealing with depression.

Lathyrus japonicus Willd. beach vetchling


Left—habit of flowering plant. Right—inflorescence with relatively large, pea-shaped flowers.

Lathyrus japonicus is a common member of the Atlantic coast beach flora, being particularly frequent at the upper edge of gravel and cobble beaches. It has alternate, pinnately compound leaves that are tipped by branching tendrils and have prominent stipules at the base of the petiole. The stipules, which appear to be a pair of small leaflets, are sagittate-shaped (i.e., they have two basal lobes that make them look like an arrowhead). The flowers are zygomorphic (i.e., bilaterally symmetrical) with a large petal (the banner petal) that stands up behind the other petals, a characteristic of most members of the Fabaceae (legume family). *Lathyrus japonicus* is a fleshy plant with relatively small legumes (when compared with *Pisum sativum*—garden pea). The flowers are typically present from the latter half of June through August.

The best known food of *Lathyrus japonicus* is the legume. Collected while the pod is still green, the seeds (i.e., peas) are easily removed and cooked by boiling for 10–20 minutes. Prior to boiling, it is beneficial to soak the seeds for at least several hours. Soaking deactivates phytic acid, an antinutrient that can bind with minerals and block their absorption (note that phytic acid is present in most seeds, nuts, and grains). Early July is typically a good time for collection along much of the Maine coastline. The seeds taste relatively similar to *Pisum sativum* (garden pea), though not of the same quality. The seeds are rich in pro-vitamin A, vitamin B, and protein. The Makah were known to eat the immature seeds as food. Once they mature, they turn brown and become difficult to chew and lose the pleasant taste. However, the mature seeds can

Legume of *Lathyrus japonicus*; note that the legume is tinged with red, indicating it is nearly past the time for seed collection.

be roasted and ground to make a coffee-like beverage, as was done by the Alaska Eskimos. Several groups from eastern North America, including the Iroquois, also ate the young shoots as they emerged from the ground. They should to be cooked by boiling prior to consumption and have a pleasant flavor. The young, tender tendrils can also be eaten. Some species of *Lathyrus* can be detrimental to human health when eaten in large quantities over a long period of time (such as during famines). They cause a sickness called lathyrism, which affects the skeletal and nervous systems. However, when eaten in moderation as part of a balanced diet, various vetchlings are beneficial due to the vitamins they contain.

Leucanthemum vulgare Lam. ox-eye daisy


Left—Flower heads (i.e., capitula) with prominent white rays and a yellow disk. Right—leaf blade near lower portion of stem (the upper leaves are generally longer relative to their width).

Synonym: *Chrysanthemum leucanthemum*. This familiar plant of fields, roadsides, lawn edges, and disturbed clearings is native to Europe. It flowers mainly from the latter half of June through July. The flower heads (i.e., capitula), which resemble a single flower, are made up of many small flowers. Individual flowers are one of two types—yellow, tubular flowers in the central disk and white, strap-shaped flowers around the margin of the head. Each flower stalk bears a single head. The leaves are alternate and usually have coarsely toothed or lobed blades. Note: *Leucanthemum vulgare*, as well many members of the Asteraceae (aster family), may cause allergic reactions due to a group of phytochemicals called sesquiterpene lactones. Contact dermatitis has been reported in rare instances by people sensitive to these compounds.

The entire young shoot (collected while the flowers heads are in bud or before) can be eaten raw, boiled for a short period, or steamed. The leaves are edible raw and make a nice addition to wild salads. They are aromatic, reminiscent to me of *Daucus carota* subsp. *sativus* (cultivated carrot) leaves. They retain a relatively pleasant flavor during most of the growing season, not accumulating as much bitterness as some wild greens. Further, they are high in pro-vitamin A and vitamin C. The flower heads (fresh or dry) can be infused to make a flavorful tea.

Leucanthemum vulgare contains an aromatic volatile oil, a bitter principle, saponins (types of terpenes), and flavones (types of polyphenols). It has a long history of folk use. It also has verified use as an anti-inflammatory and antispasmodic. As such, it works well in the treatment of certain types of coughs (i.e., it is antitussive), to relieve symptoms of asthma, and it has been used as a calming drug (i.e., it is a nervine). Due to the saponin content, infusions of *Leucanthemum vulgare* also have expectorant qualities. Although the entire above-ground portion of the plant can be used, it is the flower heads that are usually collected and used fresh or dry as an infusion. The leaves are also used as a vulnerary, and can be poulticed fresh on minor wounds or, when dried, made into a paste and applied similarly. Recent study confirmed they are mildly antimicrobial, corroborating this use.

Maianthemum racemosum (L.) Link feathery false Solomons's-seal


Left—Habit of plant with expanded leaves and flower buds. Right—inflorescence with tiny white flowers bearing six white tepals.

Synonym: *Smilacina racemosa*. *Maianthemum racemosum* is a plant of rich, often rocky, deciduous forests and high-terrace floodplains. It is often found growing in plant communities that harbor many spring ephemerals (such as *Dicentra cucullaria*—Dutchman's-breeches, *Erythronium americanum*—American trout-lily, and *Sanguinaria canadensis*—bloodroot). The unbranched stem characteristically arches to one side and bears alternate leaves and an array of flowers at the apex. Once fully expanded, it has pointed leaves with several prominent pleats (or folds) running the length of the blade. The flowers are very small, have six white tepals (note: tepal is the name given to sepals and petals when they are similar in shape and color), and are arranged in a panicle. *Maianthemum racemosum* flowers during June and early July.

The very young shoots are edible raw and can be chopped up and added to salads. These are usually at the best stage of collection during late April and early May. When the shoots begin to grow taller, they are best steamed or boiled for a short period of time similar to *Asparagus officinalis* (asparagus), though the flavor is much different. The rhizomes were eaten by the Ojibwa, Okanagan-Colville, and the Thompson. They are reported to be extremely bitter (which I do not find to be true; see below). Several sources state that in order to make the rhizomes palatable, they are best prepared by soaking them overnight in a wood ash solution because the lye in the wood ash helps dispel the bitter principles. After the prolonged

Underground stem of *Maianthemum racemosum*.

soaking, the rhizomes then need to be rinsed thoroughly and boiled to dispel the lye. Interestingly, the rhizomes I have eaten from several locations in New England are not at all bitter and are palatable, even raw (though there is a slight off flavor). The rhizomes are long, thin, pale, and knotty (the bumps are where each year's aerial stem was produced). They are, in my opinion, best prepared by boiling for 20–30 minutes. Their texture is not too dissimilar from that of many starchy roots and rhizomes, but there is some fibrous material as well (though not so much as to get in the way of enjoying the rhizomes). I have prepared them by soaking them in a wood ash solution and found them to be fairly similar when prepared by boiling alone (i.e., the mild off flavor was reduced, but the extra effort and time weren't completely worthwhile). The berries, which are red at maturity in late summer, are also edible and were eaten by several western North American groups (e.g., Costanoan, Okanagon, Thompson). Their taste here in the East is somewhat sweet initially with a slightly distasteful finish. I find them better mixed with other berries or cooked into other foods. They are reported to be cathartic in large quantities. They are likely safe after cooking given that members of this genus are used in making wild preserves (i.e., the heat of cooking likely reduces any cathartic effect).

Maianthemum racemosum was used medicinally by many Native American tribes for various purposes. One of the most common uses of the plant among many different tribes was as an analgesic. It was used by the Algonquin, Chippewa, Iroquois, Ojibwa, and Thompson, among others, for back pain, headaches, and rheumatism. Both the leaves and the rhizomes were used in this manner. Decoctions of the rhizomes were also used as a laxative or a cathartic (depending on the strength of the decoction and the frequency of ingestion). Contemporary herbalists consider the decocted rhizome of *Maianthemum racemosum* useful as a demulcent and expectorant for lung infections and sore throats, especially during the inflammatory stages. Recent studies have shown that the rhizome and berries are antimicrobial, with action against some bacteria, fungi, and viruses (the berries demonstrated antifungal activity only).

Matricaria discoidea DC. rayless chamomile

Left—habit of plant. Right—close-up of flower head, which contains only tubular, yellow flowers (i.e., no strap-shaped ray flowers as in other members of this genus).

Synonym: *Matricaria matricarioides*. *Matricaria discoidea* is a common, non-native weed of roadsides, field edges, driveways, and other places of human disturbance where bare, sandy soil is exposed. It has alternate, finely divided leaves that are very fragrant and smell of *Ananas comosus* (pineapple) when bruised or crushed. The flower heads, called capitula, are made up of many individual, yellow, tubular flowers that collectively appear as a single flower. The plants flower over a long period of growing season and can be found in flower during much of June through August. Note: *Matricaria discoidea*, as well many members of the Asteraceae (aster family), may cause allergic reactions due to a group of phytochemicals called sesquiterpene lactones. Contact dermatitis has been reported in rare instances by people sensitive to these compounds.

Infusing the fresh or dried leaves and flower heads in hot water makes a pleasant, fragrant tea that has an odor reminiscent of *Ananas comosus* (pineapple; which gives rise to another common name for this species—pineapple weed). Unfortunately, most of the time when I see this plant, it is growing along the gravel edges of paved and unpaved roads (a location I would prefer not to collect from). Therefore, I look for this plant in recently graded sites away from highways, where bare sand and gravel have been exposed.

Matricaria discoidea belongs to the same genus from which we get the famous chamomile tea, made from *Matricaria chamomilla* (German chamomile). These plants contain the terpenes chamazulene, matricin, and matricarin, among other phytochemicals (including several pharmacologically active polyphenols). Collectively these compounds act as a mild sedative that can assist with insomnia, anxiety, menopausal depression, and loss of appetite. It also has the ability to calm digestive disorders that are associated with stress, such as gas, indigestion, colic pains, vomiting during pregnancy, and sometimes even ulcers. Its sedative qualities also act as an antispasmodic for such things as muscular cramps (especially in the legs and abdomen). This plant has use as an internal anti-inflammatory for the digestive and respiratory systems. It can effectively relieve inflamed tissues and assist with the elimination of excess mucus. The anti-

inflammatory activity has also been used successfully for some eye problems (the cooled infusion used as an eye bath). Steam inhalations can be used to concentrate the active constituents in the sinuses and lungs. This species can further be used as an alterative for the skin, helping to treat dry skin and scalp maladies (e.g., psoriasis, dandruff, eczema). Both drinking the tea and using the infusion as an external wash are beneficial for these ailments. The fresh plant can be used as a poultice on wounds and other skin ailments (i.e., it is an effective vulnerary due to antimicrobial and anti-inflammatory actions). And if these weren't enough, species of *Matricaria* are known to be oral antiseptics, helping kill bacteria that cause gingivitis. Drinking the tea or making a stronger infusion and using it as a gargle is beneficial for oral hygiene. As with many medicinal plants with a pleasant taste, the difference between food and medicine is the amount of herb used and/or the number of doses.

Matteuccia struthiopteris (L.) Todaro ostrich fern


Left—mature vegetative blade. Right—reproductive blade, which releases spores over the winter and following spring.

This well-known edible plant, often referred to as the fiddlehead fern by rural foragers, is found along the terraces of river floodplains and on rich, rocky slopes forested by deciduous trees such as *Acer saccharum* (sugar maple), *Tilia americana* (American linden), and *Fraxinus americana* (white ash). Identification of the mature plant is relatively straightforward. The leaves are dimorphic, meaning they have two forms. The vegetative leaves are green and pinnately compound, tapering very gradually to the base with increasingly smaller leaflets. The apical portion of the vegetative leaf tapers relatively quickly to the tip. The reproductive leaves are green at first, then turn dark brown. They have contracted leaflets that enclose spore-bearing structures. The crozier (i.e., fiddlehead), which is the portion of this plant that is eaten, emerges in the spring and frequently occurs with other ferns that have a similarly coiled early-season leaf. Those of *Matteuccia struthiopteris* are covered with easily removed, papery, brown scales. Most often confused with this species are those ferns belonging to the genera *Osmunda* (the royal ferns) and *Osmundastrum* (cinnamon ferns). Those species (three of which occur in our area) have light brown or yellow-brown, woolly-textured hairs on the croziers. *Matteuccia struthiopteris* is further characterized by a deep groove that runs on the inside of the petiole (i.e., leaf stalk) and rachis (i.e., leaf axis). Although many ferns are known to contain toxic and/or carcinogenic compounds, *Matteuccia struthiopteris* appears free of

Croziers of *Matteuccia struthiopteris* at a good stage for collecting; note the remnant brown scales on the left-most unfolding leaf.

these compounds and is the safest fern to consume in quantity. However, it is noted by some authors to contain an enzyme that destroys vitamin B in the body (referred to as thiaminase), so it is best prepared by cooking prior to consuming large amounts.

The croziers are collected in the early spring prior to the leaf unfurling (i.e., they are best collected when a tight, circular spiral is still present at the top of the leaf). They occur in a circular rosette of several leaves. Collect only two or three leaves from each rosette to limit the impact of gathering on a plant. Further, do not return a second time to harvest from the same population. I normally collect the croziers when they are between 5 and 20 cm tall, which is generally their size during the last two weeks of April and the first two weeks of May (and even into late May on far northern rivers). The young, curled-up leaflets as well as the petiole (i.e., leaf stalk) are all edible. Some prefer to collect only the curled up portion of the crozier, but there is much good food in the petiole as well. They can be eaten steamed, boiled for a short time, cooked over coals, or even fried in oil (note that when they are to be consumed in quantity, I prefer to boil them due to the presence of tannins). They are reminiscent of *Asparagus officinalis* (asparagus) or *Phaseolus vulgaris* (green bean) if not cooked too long. It is interesting to note that there isn't much written about Native American use of this edible plant (though they almost certainly consumed it). *Matteuccia struthiopteris* is facing severe collection pressure in the Northeast due to its popularity among rural people and the fact it is harvested by commercial collectors. Be observant when you forage for this species. If you notice that many croziers have already been gathered, find a new location rather than collecting more of the population.

The reproductive leaf blades of *Matteuccia struthiopteris* persist after the growing season and release spores during the winter and the following spring. Therefore, these unusual leaves can be found protruding from the snow during the early part of the winter (and sometimes later depending on snow depth). They make a suitable tinder material that is quick to collect and arrange as the leaves do not need to be broken or crushed into tiny pieces. However, they are difficult to ignite by ember alone. Used in conjuction with a coal extender (e.g., fruits of *Typha*—cattail, fruiting arrays of *Solidago*—goldenrod), the brown leaves of *Matteuccia struthiopteris* will produce a long-lasting flame for starting fires.

Mentha canadensis L. American wild mint





Left—habit of upper stem. Right—flowers arranged in dense cycles in the axils of leaves.

Synonym: *Mentha arvensis* subsp. *canadensis*. *Mentha canadensis* is a native mint that grows at the edges of wetlands, in low meadows, and along shorelines (including the shoreline marshes of tidal rivers). It has aromatic foliage with an odor of *Mentha* ×*piperita* (peppermint) or *Mentha pulegium* (pennyroyal). The small flowers grow in separate, dense cycles in the axils of leaves (called verticillasters) along the middle and upper portion of the plant. Species of *Mentha* have very different flowers from most other mints. Mints, in general, have flowers that are clearly bilaterally symmetrical, but those of the genus *Mentha* are very nearly radially symmetrical (the upper petal is slightly broader and generally notched compared with the three other petals). Some species of *Mentha* (including *Mentha canadensis*) superficially resemble another group of plants in the Lamiaceae (mint family)—the water-horehounds (genus *Lycopus*, which have flowers of similar shape as *Mentha*). Members of the genus *Lycopus* in New England do not have strongly aromatic foliage and have only two stamens per flower (use magnification to see). Members of the genus *Mentha*, on the other hand, do have strongly aromatic foliage and have four stamens per flower. *Mentha canadensis*, native to North America, has a close look-alike called *Mentha arvensis* (field mint), which has been introduced from Europe. The two species can be difficult to tell apart but fortunately have relatively similar uses. The introduced species has broader leaves and shorter sepals, and the foliage usually has a sweet fruit odor (among other characters). *Mentha canadensis* flowers primarily during the latter half of July through August.

The leaves and flowers of *Mentha canadensis* are edible and make a wonderful nibble or addition to wild salads. They can also be used as a spice in cooking or infused to make a fragrant, delicious tea. *Mentha canadensis* was consumed by the Apache, Blackfoot, Chippewa, Cree, Hopi, Omaha, Paiute, Pawnee, Ponca, Nespelem, Winnebago, and many other Native American tribes.

Mints are important and powerful medicinal plants with a long history of use on various continents. The aerial portions (particularly the leaves) of species of *Mentha* contain an aromatic,

essential oil. This oil consists of volatile terpenes, especially menthol (an alcohol), along with menthone (a ketone), methyl acetate (an ester), pulegone (a ketone), limonene (a hydrocarbon), and/or neomenthol (an alcohol). Additionally, flavonoids and tannins are found in the herbage. In concert, these compounds are carminative, antispasmodic, anti-emetic, sedative, diaphoretic, and antimicrobial. Infusions of ***Mentha canadensis*** have a relaxing effect on the digestive system. They work, in part, by being a calcium antagonist. Muscles require calcium to contract and by blocking the flow of calcium to the smooth muscles of the digestive tract, ***Mentha canadensis*** is able to function as an antispasmodic to alleviate painful cramps. Combined with its ability to remove excessive gas (i.e., it is a carminative) and act as a mild anesthetic to the stomach wall, infusions can settle upset stomachs, help quiet the feelings of nausea, and reduce the urge to vomit. This plant can also work as a mild sedative to calm nervous tension, though its use in this arena is probably best combined with other herbs that have a stronger effect on the central nervous system. The Bella Coola, Cheyenne, Chippewa, Cree, Dakota, Malecite, Micmac, Mohegan, Okanagon, Pawnee, Southern Carrier, Winnebago, and many other Native Americans knew the value of ***Mentha canadensis*** in dealing with cramps and nausea associated with the digestive system. As an infusion, ***Mentha canadensis*** is safe for many ailments that affect the gastrointestinal tract, including nausea associated with pregnancy, motion sickness, flatulent dyspepsia, and intestinal colic. However, although some people have found that relief from heartburn with mint, others have found the problem to be exacerbated (however, the worsening of the problem was the result of using highly concentrated, commercial extracts). The essential oils of ***Mentha canadensis*** are known to be antimicrobial. They can play a part in the treatment of various types of bacterial infections, including infections of the upper respiratory tract (e.g., bronchitis, laryngitis), intestinal tract (e.g., diarrhea, dysentery), and urinary tract (e.g., cystitis, urethritis). External washes may also have success against skin disorders and infections (e.g., acne, scabies). Caution: commercial extracts of mint oil contain highly concentrated portions of menthol, which is toxic in low dosages. Whereas infusions using fresh or dried material are very safe, extracts need to be used cautiously and should be avoided by women who are or wish to become pregnant.

Some Native American groups (e.g., Blackfoot, Winnebago) used ***Mentha canadensis*** to deodorize traps (especially those that had been used and may have had animal blood on them). Trap parts were boiled in water that contained aerial portions of the plant.

Mitchella repens L. partridge-berry

Left—habit of plant and what appears to be paired flowers. Right—mature fruit.

Mitchella repens is an occasional plant that most often grows in upland evergreen and mixed evergreen-deciduous forests. It has tough, leathery stems that trail over the ground bearing pairs of evergreen leaves at the nodes that typically show a light-colored mid-stripe on the blade. The flowers, which appear to be in pairs, have a common ovary and two sets of partially fused petals. Each corolla (i.e., all the petals of given flower taken collectively) has a basal tube and four white-hairy lobes that spread horizontally at the summit. The ovary matures as a red berry with two depressed spots on the top, which are the locations where the petals were attached. Flowering time is usually late June and July, with fruits maturing in September.

This small plant provides an enjoyable nibble in the fall and through the winter and spring of the following season (so long as the plants are not covered by snow) because the red berries remain on the plant for an extended period. They are relatively neutral tasting (perhaps the slightest hint of sweetness) with a slightly mealy texture. Though they would be difficult to gather in quantity at most stations for this plant, they can add a touch of color to wild-collected salads and the like.

Mitchella repens has a long history of being used as a parturient (i.e., a substance that aids with childbirth) and as an emmenagogue (i.e., a substance that stimulates and regulates menstrual flow). It was used as such by the Cherokee, Delaware, and Iroquois. The dried above-ground portion of the herb, taken as an infusion, assists in preparing the uterus (by toning and strengthening it) for childbirth. It should be taken for several weeks prior to the anticipated delivery date. It also serves the purpose of alleviating the pain of dysmenorrhoea (i.e., painful menstruation). The infusions may also have benefit for those suffering from colitis, an inflammation of the colon that can cause diarrhea and abdominal pain. Because of its astringent qualities, the plant also has been used by nursing mothers to allay the pain of sore nipples. Poultices would be used for this, in addition to the normal route of delivery (infusion). The active phytochemicals are largely unknown but include alkaloids, saponins, glycosides, and tannins.

Nabalus trifoliolatus Cass. three-leaved rattlesnake-root

Left—Array of flower heads. Right—one form of the highly variable leaves, showing the prominent lobes separated by deep sinuses.

Synonym: *Prenanthes trifoliolatus*. The genus *Nabalus* is a group of plants related to *Lactuca*, the lettuces. In fact, members of this genus are sometimes referred to as wild lettuces. Given the close relationship, they share many features, such as flowers heads (i.e., capitula) composed of strap-shaped ray flowers and sap containing white latex that exudes from the plant when parts are broken or bruised. The two genera differ in rather technical details of the fruits (e.g., mature ovaries round in cross-section and lacking an expanded, circular attachment for the white bristles at the summit in *Nabalus*; mature ovaries compressed and expanded to a conspicuous, circular attachment for the white bristles at the summit in *Lactuca*). Fortunately, there are some easier ways to tell the two genera apart. *Nabalus* typically has fewer flowers per flower head (usually 5–16 vs. 13–55) and, in the commonly encountered species, has leaf blades that are either triangular or lobed with 3–5 broad divisions. Commonly encountered species of *Lactuca* have entire to pinnately lobed leaf blades that are much longer than wide. *Nabalus trifoliolatus* is found in forests and fields, on coastal shorelines and islands, and in open areas high into the mountains (even above treeline). It flowers from the latter half of June through September. There are several species of *Nabalus* that occur in northern New England; however, identification of the various species is not essential as their uses are similar. Note: *Nabalus trifoliolatus*, as well many members of the Asteraceae (aster family), may cause allergic reactions due to a group of phytochemicals called sesquiterpene lactones. Contact dermatitis has been reported in rare instances by people sensitive to these compounds.

The young leaves are edible raw or cooked, and were eaten by the Cherokee. I find them to be bitter, but palatable. The older leaves are more bitter and are best boiled, in changes of water if necessary, to make them more palatable. Whereas the quality of leaves is generally superior in *Lactuca*, *Nabalus trifoliolatus* and its relatives are found in forests, in the mountains, and on the river shores of northern counties, places where *Lactuca* would be rarely found (species of *Lactuca* are common to open, disturbed habitats, especially sites with a history of human disturbance). Knowledge of *Nabalus* allows neo-aboriginals to collect edible greens from a wider range of habitats through the growing season.

Nuphar variegata Dur. bullhead pond-lily


Left—Flower of *Nuphar variegata* with six yellow, petal-like sepals. Right—leaves with a conspicuous heart-shaped base.

Nuphar variegata is a common and well-known aquatic plant of shallow lakes and slow-moving rivers. It has floating leaves (unless stranded after water level decline) with blades that are longer than wide and have a conspicuous notch near the base. The thick rhizome (i.e., horizontal stem) is usually just under the mucky or muddy substrate and is covered with dark, semicircular marks throughout its length. The marks are leaf scars, indicating where the leaf stalks were attached in prior seasons. The flowers of *Nuphar variegata* are roughly spherical and have 5 or 6 yellow, petal-like sepals that are open from June through August. There are several other species of *Nuphar* that are found in northern New England; however, their uses are similar and separating the different species is not critical.

Rhizomes with conspicuous semicircular leaf scars along their length.

The rhizome has been reported to be edible by several authors; however, it is extremely distasteful. Their large size and ease of gathering led me to believe they would be a good source of food during survival situations. I have tried them on multiple occasions and have failed to find a way to make them palatable, and I have heard several anecdotal reports of people becoming ill after consuming them. It is even noted in several reputable sources that repeated boiling will leach out the bitter flavors, but a group of alkaloids are responsible, at least in part, for the flavor. Given that alkaloids are poorly soluble in water, it doesn't matter how long you boil it, the rhizome will remain extremely bitter. The seeds are edible and have an acceptable flavor (though they do have a slight hint of the rhizome's flavor). The seeds can be boiled or roasted and eaten, or dried and ground into flour. Freeing the seeds from the fresh, intact fruits is not

difficult—using any tool to crush the fruit allows the seeds to be removed. It is tedious, though, to gather them in quantity. Therefore, I generally use the seeds as a quick nibble after picking them free from the fruit. If time permits, the fruits can be placed in a container or a pit and allowed to deteriorate, which softens them and allows the seeds to be removed more easily.

Species of *Nuphar* have a long history of folk use for various ailments, not only here in North America but also in Europe and Asia. What is known is that the rhizome contains nupharine and a host of related alkaloids with antispasmodic and sedative qualities. This makes the infused, dried rhizome useful for alleviating nausea. However, along with sedative qualities, the rhizome is known to contain antagonistic hypertensive alkaloids, perhaps diminishing its effects on the body. The Gitksan, a western North American aboriginal group, used the rhizomes for tuberculosis (TB). Tests confirm that *Nuphar* has moderate activity against *Mycobacterium tuberculosis*, the primary organism responsible for TB. Note that the Gitksan combined *Nuphar* with *Oplopanax horridus* (devil's-club), another plant with known activity against TB-causing bacteria. There is also some information that suggests this plant may assist with rheumatoid arthritis, which is an autoimmune disease. This is based on the presence of deoxynupharidine, a phytochemical with immune suppressant properities. Some cultures (e.g., Algonquin, Cree, Flathead, Gitksan, Kutenai) used the poulticed rhizome as an external anti-inflammatory and analgesic on wounds, bruises, and other minor injuries. Though the rhizome is known to contain steroids, which would corroborate these uses, high levels of such compounds have not yet been found.

Nymphaea odorata Ait. white water-lily


Left—Flower of *Nymphaea odorata*. Right—Leaf blade of *Nymphaea tuberosa*.

This common aquatic plant occurs in shallow, still or slow-moving water systems. It is well known and often cultivated for its attractive flowers with white to pink-red tepals (tepals is a name given to sepals and petals when they cannot be identified separately because they resemble one another in shape and pigmentation or gradually change from one to the other). *Nymphaea odorata* has circular floating leaves with a prominent basal sinus. Three species of *Nymphaea* occur in our area, but one of them, *Nymphaea leibergii* (dwarf water-lily), is very rare and known from only northern Maine and Vermont. It is identified by its fewer stamens and stigmatic lines at the top of the ovary (20–40 and 5–12, respectively; vs. 40–100 and 10–25 in *Nymphaea odorata*). *Nymphaea leibergii* should not be collected as a food or medicine except in dire situations. *Nymphaea odorata* is the commonly encountered species of water-lily, with non-tuberous rhizomes, unstriped or faintly striped leaf stalkes, and often purple leaf blade undersurfaces. *Nymphaea tuberosa* (tuberous water-lily) is an infrequently encountered species, with rhizomes that bear tuber-like branches, brown-striped petioles, and green leaf blade undersurfaces. *Nymphaea odorata* flowers from the latter half of June through early September.

Various species of *Nymphaea* have been used as food in North America by the Kiowa, Klamath, Lakota, and Ojibwa. The unfolding leaves in the spring, as well as the flower buds, are edible after boiling for a short time (ca. 5–10 minutes). The rhizomes of *Nymphaea tuberosa* have short branches with narrow constrictions where they attach to the main rhizome. They are easily dislodged and do float. Native Americans are reported to have used their toes to dislodge the tubers and then collected

Tuber from the rhizome of *Nymphaea tuberosa*.

them as they floated to the surface. In practice, I find it easier to use my hands (some tuberous branches will dislodge during the collection and they do float, so it is easy to the gather the ones that will break free). The tubers are prepared by thorough boiling and are bitter. The seeds are also edible and contain protein, starch, and some oil. They can be roasted, boiled, or dried. They can also be ground into flour (but these would be tedious to collect in enough quantity). The fruits can be gathered and allowed to deteriorate as a manner of freeing the seeds (similar to *Nuphar variegata*—bullhead pond-lily).

Nymphaea odorata, as with many plants, has been long used for many different ailments, most of which are without verified efficacy (which is not to say that they don't work). What is known is that the rhizomes (as well as other parts) contain the alkaloid nupharine, which is antispasmodic and sedative. It is capable of treating insomnia, hypertension, and various anxiety disorders, as well as certain types of coughs. In North America, the Micmac, Ojibwa, and Seminole all used *Nymphaea* rhizomes for treating coughs and other respiratory issues. Decocting the dried, ground rhizome is the route of administration. The rhizomes were thought also to be an anaphrodisiac by the Abenaki, capable of reducing sex drive. The rhizome and seeds contain tannins, which are astringent principles—nymphaea-tannic acid in the rhizomes and nuphar-tannic acid in the seeds. This makes infusions of the dried, ground rhizome or seeds useful for diarrhea, as the astringency reduces inflammation within the intestinal tract and slows the absorption of toxic materials. Given that alkaloids are present, it is best to use caution and small and/or infrequent doses until familiarity with this plant as a medicine is gained. Native Americans also poulticed the rhizome for minor skin ailments (wounds, bruises, boils).

Oenothera biennis L. common evening-primrose

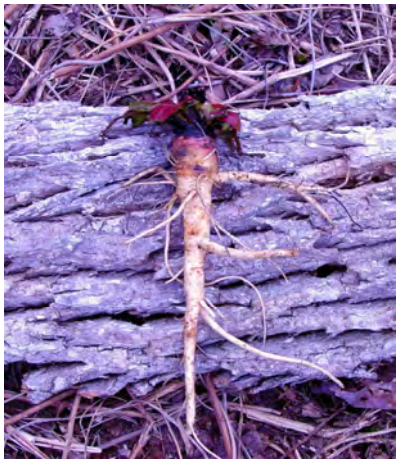

Left—inflorescence (a raceme) with large, yellow flowers. Right—Remnant array of fruits in the late fall.

Oenothera biennis is an early successional species of fields, roadsides, sand and gravel shorelines, dunes, and open banks. It is usually a biennial species, producing a basal rosette of leaves the first year and an aerial stem the second that supports the flowers and fruits. *Oenothera biennis* and its close relatives have large flowers with 4 reflexed sepals and 4 yellow petals. The style divides at the apex into four fleshy stigma lobes collectively creating a cross-shaped structure. Each flower matures as a 4-valved capsule. Several similar species occur in our area, such as *Oenothera parviflora* (small-flowered evening-primrose), *Oenothera villosa* (hairy evening-primrose), and *Oenothera oakesiana* (Oakes' evening-primrose). These species differ in subtle, technical details. However, their uses are the same and separating the species is not essential. The flowers appear in July and persist through early October in some places.

Rosette of leaves that marks the location of the taproot.

The pale taproots are a good food source and are located by finding the basal rosettes (i.e., the first-year plants). They are best collected in the spring (i.e., April and May) or in the late summer and fall (i.e., September and onward, until the ground becomes frozen). The taproots of the flowering or fruiting plants have a woody core and are unpleasant to eat (though the fleshy exterior can still be removed and eaten). Therefore, if an aerial stem is present (even if only a couple of cm tall), it is too late to collect the taproots (except for survival situations). The flavor of the taproot is reminiscent of *Pastinaca sativa* (wild parsnip), and it also possesses a black pepper quality (see below). They can be boiled or roasted in a manner similar to cooking *Daucus carota* subsp. *sativus* (cultivated carrot) or *Pastinca sativa*

and are excellent either way. The very young shoots, young leaves, flower buds, and green, immature fruits are also edible. All can be eaten raw, though some authors suggest that the immature fruits should be boiled or steamed for a short period (I cook these parts only when they are to be eaten in quantity). The young shoots and leaves eventually acquire a firmer texture and harsher pepper taste and require boiling to soften these qualities. The new shoots are best as a raw food while still supple and crisp (prior to late May through mid-June, depending on latitude and elevation) when the flavor is mild. The shoot can be peeled by simply stripping off the leaves (except the tender ones at the top, which can be enjoyed at the same time). All parts of *Oenothera biennis* have a slight, harmless, irritating quality to the back of the throat (the intensity seems to be, in part, dependent on different people's sensitivity to this plant). The feeling is not too different from what I experience when some black pepper becomes stuck in the back of my throat. Cooking softens this quality considerably. The seeds are also edible and can be collected from maturing capsules by shaking the infructescences (i.e., arrays of fruits) into a container. They are difficult to gather in quantity but are highly nutritious and have medicinal benefits.



Taproot collected in the spring.

The seeds of *Oenothera biennis* contain γ-linolenic acid, γ-linoleic acid, the amino acid tryptophan, and phenylalanine. These (in particular, the γ-linolenic acid) have been shown to have positive effects treating premenstrual syndrome, eczema, chronic pain (e.g., headaches, rheumatoid arthritis), high blood pressure, and diabetic neuropathy. Preparations of *Oenothera biennis* assist with arthritis by preventing the production of inflammation-causing free radicals that can be created by cytokines. They achieve this through the high content of γ-linolenic acid, which is a precursor for prostaglandin E1—a molucule that suppresses cytokine formation. The γ-linolenic acid in the seeds of *Oenothera biennis* work to improve nerve blood flow and increase nerve conduction velocity, thereby improving nerve function and preventing wounds, ulcers, fractures, and/or damage to foot architecture that can result from blunted peripheral sensation caused by diabetic neuropathy. Gamma-linolenic acid is has been shown also to improve the functioning of the immune system. The seeds can be ingested to receive the medicinal benefits of this plant (such as adding them to hot cereal and soups, sprinkled on wild salads, etc.). The Potawatomi were one Native American group who used the seeds as valuable medicine.

The late-season stalks of *Oenothera biennis* can be harvested and the fibers extracted by splitting open the stems and removing the pithy material (in a manner similar to preparing *Asclepias syriaca*—common milkweed). The fiber is not as strong as that from some cordage plants and is more difficult to extract from the stem, but it is relatively good nonetheless. The dried stalks can also be used as hand drills for friction-fires. Again, they are not of high quality compared with some species but do work with practice.

Oxalis montana Raf. northern wood-sorrel


Left—Leaves and flower of *Oxalis montana*. Right—habit of *Oxalis stricta*.

Oxalis montana is a native, north-temperate and boreal species that is often found at higher latitudes and/or elevations in New England. In many places it forms extensive carpets on the floors of cool, evergreen and mixed evergreen-deciduous forests. Both the leaves and the flowers are produced from the rhizome (i.e., underground, horizontal stem). The leaves have three heart-shaped leaflets, and the flowers have five white petals that are striped with pink (sometimes the petals are also tinged with pink). Occurring in disturbed soils of fields and abandoned lots, along roadsides and sidewalks, and sometimes along sandy shorelines, are four species of yellow-flowered wood-sorrels. These include *Oxalis corniculata* (creeping yellow wood-sorrel), *Oxalis dillenii* (slender yellow wood-sorrel), *Oxlis florida* (flowering yellow wood-sorrel), and *Oxalis stricta* (common yellow wood-sorrel), the latter species being the most common. These three species, all with similar uses, differ from our native *Oxalis montana* in the color of petals (yellow), and their leaves and flowers are borne on an aerial stem. *Oxalis montana* flowers primarily from the latter half of June through early August.

The leaves of the various species of *Oxalis* are edible raw or cooked. They are a good addition to wild salads, offering a sour taste to the mix of greens. The sour taste is from oxalic acid. The leaves have a long period of collection during the growing season because they do not acquire a harsh texture or flavor as do many salad plants. The Apache, Cherokee, Cowlitz, Iroquois, Makah, Quileute, and Tolowa all enjoyed this plant as a food. An acidic drink can be made by macerating the leaves and allowing them to stand in water (similar to a sun tea). They are then removed by straining and the drink enjoyed. There exist many warnings about consumption of wood-sorrel leading to renal, digestive, and nutritional disorders. However, it would require eating massive quantities of this plant continuously over a long period of time. Foragers using this plant occasionally through the growing season should not be concerned with any ill effects. For those concerned with oxalates, refer to *Rumex acetosella* (sheep sorrel) for more discussion of this topic.

The entire plant of *Oxalis montana* can be boiled in water to produce a yellow to yellow-orange dye.

Persicaria maculosa S.F. Gray lady's-thumb smartweed



Left—pink flowers. Right—leaves, which commonly have a dark blotch on the upper surface of the blade.

Synonym: *Polygonum persicaria*. *Persicaria maculosa* belongs to the genus of smartweeds, a large group of herbaceous plants that includes native and non-native species in New England. Most species are annual, with fibrous roots, and have white to pink to red flowers composed of four or five tepals (tepals is the name used when sepals and petals are similar in shape and color). The alternate leaves have a tubular sheath that surrounds the stem and, in most species, is fringed at the top with thin bristles (these best viewed with magnification). The flowers are similarly subtended by tubular and fringed bracteoles that resemble smaller versions of the sheaths (these also require magnification to see). The flowers mature as an achene, which is a small, dry, seed-like fruit. *Persicaria maculosa* is a weedy species primarily of human-disturbed habitats, though it can also be found on shorelines and other places where erosion and soil disturbance occur. It flowers primarily from late July through September. Other species of *Persicaria*, which in my experience have similar uses, occur as native plants in wetlands, along shorelines, in open places, and within rich forests.

Members of the genus *Persicaria* have a tubular sheath that surrounds the stem at each leaf-bearing node.

The leaves and flowers are edible raw or cooked. The leaves have a long period of collection because they do not accumulate the volume of bitter principles as do some plants. However, as the season progresses, the leaves do acquire a firmer texture. Boiling in water for 5 minutes will soften the leaves and render them a good edible. Some species of smartweed, especially

Persicaria hydropiper (water-pepper smartweed), have an acrid principle (polygonic acid) that creates a burning sensation similar to eating black pepper. In moderation, leaves of this type can be used to flavor wild salads. The fruits are also edible. They are similar to *Fagopyrum* (buckwheat) in many ways but are smaller and more difficult to collect in quantity. They can be boiled as a hot cereal or dried and ground into flour. If eaten in quantity, the seeds or flour should be soaked for several hours or more prior to cooking. Soaking deactivates phytic acid, an antinutrient that can bind with minerals and block their absorption (note that phytic acid is present in most seeds, nuts, and grains). I collect the fruits by gathering the fruiting inflorescences and rolling them vigorously between the palms, which rids the fruits of the persistent floral parts. Winnowing then separates the various parts because the fruits are substantially heavier than the tepals.

Species of smartweeds have verified antimicrobial activity. *Persicaria maculosa* has mild activity against *Staphylococcus aureus*. The leaves can be used as a poultice for minor wounds (e.g., cuts, burns). *Persicaria coccinea* (scarlet smartweed; synonym: *Persicaria amphibia* var. *emersa*), a native species of wetlands, has slightly higher antimicrobial action (including activity against some fungi). The leaves showed slightly higher activity against bacteria than did preparations using the entire flowering stem.

Plantago major L. common plantain

Left—basal rosette of leaves with veins that arch along the margin. Right—habit of plant with slender, fruiting spikes.

Plantago major is a common, weedy herb of human-disturbed and human-manicured places. It is frequent on lawns, in fields, along roadsides, and occasionally works its way into relatively pristine places where there is a history of disturbance (e.g., river beaches). Plantains are an easily identified group of plants given the basal leaves with lateral veins that arch along (rather than running to) the margin and the dense, cylindrical spike on a leafless stalk with highly reduced flowers. The fruit is a pyxis, which is a type of dehiscent fruit that opens by a latitudinal suture (i.e., the top of the fruit comes off like a lid) to reveal a number of small seeds. There are 11 species of *Plantago* in New England with leaves in a basal rosette, and their identification is highly technical. *Plantago major* belongs to a complex of three species identified by perennial habit, narrow-elliptic to broad-ovate or obovate and entire leaf blades, and both the bracts and sepals without hairs or with sparse cilia near the apex (as opposed to hairy over the entire surface of the bracts and/or sepals). *Plantago major* is an introduction from Europe (i.e., it is non-native). *Plantago rugelii* (Rugel's plantain) is native and is usually confused with *Plantago major* because it is superficially similar to it and occurs in the same habitats. *Plantago intermedia* (many-seeded plantain) is native and usually occurs in habitats influenced by saline or brackish tides or spray. These three species differ in minute details but fortunately have similar uses. The flowers of *Plantago major* appear mainly in early summer, and the lower ones of each inflorescence begin to fruit by early July. This species was called sekotepokahtek (pronounced zeh-g'-deh-b'-GAH-tehg) by the Passamaquoddy Indians, which means lies flat on ground.

The leaves are edible and contain vitamins C, K, and T, pro-vitamin A, and the minerals calcium and potassium. Though best eaten in the early half of the growing season, the leaves remain palatable late into the season (though boiling for a short time helps soften the texture of late-season leaves). They have been shown to also contain a biologically active polysaccharide with documented immune-stimulating action that provides protection against bacterial infection. The flowering spikes are edible and can be picked and eaten raw or boiled for a short time to soften them. The seeds are also edible and can be roasted, ground into flour, or cooked as a hot cereal.

They are high in protein (for plant material). The seeds are very tiny and would be tedious to gather and separate. However, I find it most efficient to collect the fruiting spikes in the late summer and fall and allow them to dry for a short time. After drying, the entire fruit (the pyxis), which contains the seeds, can be removed from the spike by loosely drawing one's hands over the axis of the inflorescence. The pyxis and the seeds can be eaten together (i.e., it is not necessary to separate out the individual seeds). A little winnowing helps remove the chaffy bracts and other less tasty items. The dried leaves also make a good tea.

Plantago major and its close relatives provide very potent medicines for many types of ailments. The efficacy of this common plant never ceases to amaze me. The leaves and other aerial portions of the plant contain the iridoids aucubin and catalpol (types of terpenes), the flavanoids apigenin, luteolin, scutellarin, baicalein, nepetin, hispidulin, and plantagoside (types of polyphenols), as well as tannins and other phytochemicals. These constituents provide vulnerary, expectorant, anti-inflammatory, astringent, diuretic, and antiseptic actions. As a vulnerary, the fresh leaves can be poulticed to aid in the healing of minor wounds. The leaves are rich in mucilage, which acts as an emollient, keeping the skin around the wound soft and pliable (which aids the healing of lacerations, etc.). The astringent and verified anti-inflammatory actions combine with this to create a powerful vulnerary that can greatly assist with wound healing. Poultices can also be used topically for hemorrhoids with remarkable results. Taken internally as an infusion, *Plantago major* is a gentle expectorant, and the demulcent properties soothe inflamed membranes. Infusions can also assist with diarrhea, hemorrhoids, and cystitis due to the astringent action and have documented activity against anaerobic oral bacteria.

Polygonatum pubescens (Willd.) Pursh hairy Solomon's-seal

Left—habit of flowering plant; note the small flowers hanging from the underside. Right—rhizome of plant with the characteristic scars where each aerial stem from a previous year was produced.

Polygonatum pubescens is a species of rich, deciduous forests, typically occurring on moist, rocky slopes or on high terraces of forested floodplains. It frequently grows in the shade of *Acer saccharum* (sugar maple), *Tilia americana* (American linden), and *Fraxinus americana* (white ash). It produces a single, unbranched stem from which the entire, alternate leaves are produced. The whole stem arches to one side, so that the green-yellow, tubular flowers hang down along the underside of the stem. The flowers mature into a berry. The stem is produced from a knotty rhizome with successive swellings and constrictions. Near the apex of each swollen segment is a brown, circular scar that indicates the location of a previous year's aerial stem (each stem scar is the "Solomon's-seal"). There are two other species of *Polygonatum* that occur in New England. *Polygonatum bifolium* (King Solomon's-seal) is both native and non-native, the non-native form being much larger than our native form. *Polygonatum latifolium* (broad-leaved Solomon's-seal) is a rare introduction into northern New England. Identification of these species is not crucial because their uses are similar. *Polygonatum pubescens* flowers in late May and early June.

The rhizome is an excellent food source that can be harvested throughout the year when the ground is not frozen. However, it must be cooked by prolonged roasting or boiling for 30 (or more) minutes because it contains saponins and crystals of calcium oxylate. These substances, which are found in the raw rhizomes, can be irritating if ingested in quantity. Fortunately, heat from cooking or thorough drying dispels these qualities. The cooked rhizomes of *Polygonatum pubescens* are similar in texture to *Solanum tuberosum* (potato) but have a sweeter flavor. Because of their starchy quality, the dried rhizomes can also be ground into flour for use in making breads. The young shoots, collected early in the spring before the leaves expand, can be boiled as a potherb. The Cherokee was a Native American group who used species of *Polygonatum* for various types of food.

The rhizome of *Polygonatum* species contains steroidal saponins. It is reported to be anti-inflammatory and astringent. The poulticed rhizome has been used as an anti-ecchymotic, which helps reduce discoloration from bruising. There is evidence that the rhizome can be used as a cardiotonic, carminative, hypoglycemic, and sedative. Decoctions of the dried rhizome have long been used in North America and Asia for certain types of pain and swelling in the abdomen, to counteract accumulation of fluids in the joints, and for skin eruptions. There are also demonstrated antibacterial and antifungal effects (though one recent test showed it had little or no activity against some common bacterial pathogens). The antifungal research was directed toward opportunistic fungal infections for those with compromised immune function (e.g., AIDS, organ transplant, cancer).

Pontederia cordata L. pickerel-weed

Left—inflorescence of blue-purple flowers. Right—leaf blade with rounded basal lobes.

Pontederia cordata is a common aquatic plant that grows in shallow water of lakes and slow-moving streams. It has leaf blades with entire margins and a conspicuous basal notch. The blue-purple (rarely white) flowers have two yellow spots on the upper petals and have glandular hairs covering the outside surface. During flowering it is very conspicuous and often grows in large colonies. It is just one of many important aquatic plants that offer several different types of food through the growing season.

Fruit of *Pontederia cordata*, an achene that is ornamented with toothed ridges.

The leaves of *Pontederia cordata* are edible but have a tough texture that makes them not very enjoyable. They are best eaten in the early portion of the growing season when they are just expanding at the apex of the leaf stalks (they will be light green as opposed to the darker green, expanded leaves). The flowers mature into an odd fruit (called an achene) that is ornamented with toothed ridges and has dark, withered remnants of the sepals and petals at the tip. Despite its formidable appearance, it is edible raw and can be prepared in a number of ways (e.g., roasted, boiled). The taste of the achenes changes to more of a nut-like flavor when roasted. Late in the growing season (i.e., early to late September), when the leaves of aquatic plants are beginning to senesce, the spikes of *Pontederia cordata* are densely packed with these fruits. However, the stems begin to lean over, often hiding the fruiting spikes below the other vegetation (or sometimes below the surface of the water). Therefore, a careful, observant eye is sometimes needed to find these caches of food. The best time for collection is when the lower portion of the spike is just beginning to shatter and a few fruits have fallen into the water.

Pteridium aquilinum (L.) Kuhn — bracken fern

Left—Leaf blade. Right—crozier (i.e., fiddlehead) in the early spring; note the nectary above the ant.

Pteridium aquilinum is a common fern of fields, woodlands, forest openings, roadsides, and trail edges. It has a large, more or less triangular blade that is divided into three prominent leaflets, each of which is made up of many individual segments. The leaf blade usually reaches widths of 40–70 cm (sometimes even wider), being one of the broader leaf blades of ferns in the Northeast. In the early spring, the crozier (i.e., fiddlehead) is divided into three parts and is often covered with short, red-brown hairs. Nectaries, which appear as slightly raised, dark, circular areas, can be seen at this time at the base of the divisions.

The crozier is edible and has an asparagus-like flavor with a hint of almond (at least to my palate). It is first available from late April to late May in northern New England (depending on the latitude and elevation), prior to the expansion of the leaf segments. Both the curled-up leaf segments as well as the flexible, succulent stalk can be enjoyed. *Pteridium aquilinum* regularly produces new shoots as the season continues (usually at least until late spring), so it provides new shoots for food much longer than other ferns. Note that leaves in light shade (i.e., under a canopy of trees) emerge prior to those in full sun. This plant should not be eaten raw as it contains several toxic compounds. One of these is thiaminase, an enzyme that breaks down vitamin B_1. Another is prunasin, which is broken down by the body to hydrogen cyanide. Various tannins also exist, in this case, binding to cellular enzymes that govern energy-yielding reactions. However, boiling for 8–10 minutes destroys and/or leaches these toxins. One final note: *Pteridium aquilinium* is believed to be carcinogenic, and regular and prolonged consumption is suggested to lead to various types of cancers, especially stomach cancer. This is especially prevalent in Asia where this plant is a regular item in the diet. Some authors consider the plant entirely safe when cooked. In any case, infrequent consumption of this plant does not appear to pose a threat to human health.

The leaves of *Pteridium aquilinum* senesce in October. They dry and turn brown but are held off the ground for some time by the more persistent leaf stalk. As such, they are an excellent tinder and can be gathered into a large ball in seconds. The tinder will both extend the coal and produce flame, making it one of the most convenient choices when it is available. I have used this plant as tinder until the snow finally covers the leaves. The young shoots in the late spring can be boiled in water to make a yellow-green to gray-green dye.

Raphanus raphanistrum L. wild radish


Left—flowers with four yellow petals. Right—leaf blade from lower portion of stem.

This member of the Brassicaceae (mustard family) is frequently found as a weed of human-disturbed habitats (e.g., roadsides, fields, waste places). Because it is tolerant of saline conditions, it is also found in close proximity to the Atlantic coast, occurring on beaches and other open areas. It has flowers with four pale yellow petals 15–20 mm long (including the narrowed basal portion) that mature into a cylindrical fruit 40–80 mm long containing 4–12 seeds. Though most fruits in the mustard family dehisce (i.e., split open) by two valves, in *Raphanus raphanistrum* the fruits do not or only tardily dehisce. The fruits have a slender, apical beak and prominent, corky constrictions between the seeds. This plant is further characterized by alternate leaves that are pinnately lobed (at least the lower ones) and a taproot with an odor of radish. The flowers are open from June through much of September.

Fruit of *Raphanus raphanistrum*; note the apical beak and the constrictions between the seeds.

The leaves, flower buds, flowers, and immature fruits are all edible raw or cooked. The older leaves are still edible raw but are best boiled for a short period of time to soften the texture. All of the parts have a pleasant flavor of radish and make a great addition to wild salads. The plant is rich in vitamin C and the vitamin B complex. My favorite use is the budding inflorescences and open flowers as a nibble or in salads. The fruits need to be eaten young because they soon become tough and unpleasant to eat. Also, the seeds can be harvested and used as a condiment similar to mustard.

Members of the genus *Raphanus* contain raphanin, a type of carbohydrate known as a glucosinolate. This phytochemical is useful in treating hypothyroidism (regular consumption of the plant would be beneficial for this condition). It is an antiseptic and antifungal as well. Poultices of the root and leaves are beneficial for burns and can be used to control body odor.

Rumex acetosella L. sheep sorrel

Left—upper stem and inflorescence. Right—lower leaf blade, with two outward-pointing basal lobes.

Rumex acetosella is a native of Eurasia that is naturalized in many types of open habitats in New England. Though most common in areas of human disturbance, *Rumex acetosella* can sometimes be found along relatively pristine river shores, in grasslands, and in forest openings. It is a relatively small herb with two sexes of plants—those that bear pollen (i.e., staminate) and those that bear fruits (i.e., carpellate). The flowers are quite small and bear six small tepals (tepal is the name given to sepals and petals when they are similar in size and pigmentation). The leaves possess the characteristic tubular stipules of the Polygonaceae (knotweed family) that sheathe the stem just above the attachment of the petiole. The lower leaf blades are halberd shaped, with two outward-pointing basal lobes. *Rumex acetosella* flowers from late May through most of August.

The leaves are edible raw or cooked (and so are the soft, flexible shoot tips in the early season). They have a sour flavor due to the presence of oxalic acid and make a great addition to wild salads. The leaves do not accumulate the amount of bitter principles as do many plants; therefore, they remain enjoyable to eat late into the season (though their texture does become firmer). Later in the season, seek out the green leaves on non-flowering plants if possible (their flavor is better than the red-tinged leaves on reproductive plants). Because the leaves reduce significantly on boiling as a potherb, collect more than you think you need. An acidic drink can be made by macerating the leaves and allowing them to stand in water (similar to a sun tea). They can then be removed by straining and the drink enjoyed. Many warnings exist about consumption of sheep sorrel leading to renal, digestive, and nutritional disorders due to the high content of oxalic acid. Note that it would require eating large quantities of this plant continuously over a long period of time to suffer acute effects. Further, many other plants that contain oxalic acid are eaten without the associated warning, including *Allium sativum* (garlic), *Allium schoenoprasum* (wild chives), *Lactuca sativa* (cultivated lettuce), *Petroselinum crispum* (parsley), *Raphanus sativus* (cultivated radish), *Rheum rhabarbarum* (garden rhubarb), and *Spinacea oleracea* (spinach). What is true is that oxalic acid can form oxalates (the salt form of oxalic acid) in the body that can bind to minerals and, in poor diets, lead to kidney stones. However, foragers using this plant

occasionally through the growing season should not be concerned with any ill effects, especially those people with nutrient-rich diets that include lots of vitamin B_6, omega-3 fatty acids, and probiotics (i.e., fermented and cultured foods)—all of which prevent deposition of oxalates or break them down into harmless compounds. Anyone fearing this plant as a food can boil it—some oxalates will precipitate out in the water and then the water can be discarded.

The fresh leaves or an infusion of the fresh leaves have been used medicinally as a febrifuge, antiscorbutic, and diuretic. They contain oxalic acid, tannins, and polyphenols emodin and rhein. Some research has indicated that this plant contains compounds that prevent and combat cancer. It gives credence to the Ojibwa use of this plant, along with ***Arctium lappa*** (great burdock), ***Ulmus rubra*** (slippery elm), and ***Rheum palmatum*** (Chinese rhubarb), in an anticancer tea called essiac (interestingly, only ***Ulmus rubra*** is native to North America; other species are sometimes used as well). These plants are thought to act in concert to protect DNA, act as potent antioxidants, inhibit tumor growth, and excrete wastes through the urinary system. One version of the formula calls for 53% dried root of ***Arctium lappa***, 36% dried leaf of ***Rumex acetosella***, 9% dried inner bark of ***Ulmus rubra***, and 2% dried root of ***Rheum palmatum***. To make two gallons of this formula, one would create one cup of the dried mix, which contains ½ cup of finely chopped ***Arctium lappa*** root, ⅜ cup of powdered ***Rumex acetosella*** leaf, 2⅔ tablespoons of powdered ***Ulmus rubra*** inner bark, and 1 teaspoon of powdered root of ***Rheum palmatum***. Decoct these ingredients for 10 minutes in two gallons of water (halve the ingredients to make a one-gallon portion) and let the decoction stand for 10–12 hours after removing it from the heat. It is recommended to reheat the formula to kill any bacteria and then strain the ingredients from the liquid. Dosage of essiac formula varies depending on the goals of the person using it. For general health maintenance and as a cancer preventative, approximately 115 ml (½ US cup) is imbibed once per day. For more aggressive use, especially for those actively combating cancer, a total of 235–350 ml (1–1.5 US cups) is taken per day, spread out over three doses (morning, noon, and evening). Essiac should be consumed for 3–5 months for maximum benefit. Two tablespoons of the dried essiac mixture is sufficient to make a quart of the formula (prepared in the same way as the two-gallon version), which will be used in a more timely fashion and is not as likely to mold. Two tablespoons of the prepared decoction should be added to four tablespoons of hot water and drunk in the evening. Food should not be eaten within one hour before or after drinking the tea. Side effects that have been reported using this decoction include nausea and indigestion, diarrhea, intestinal discomfort, and enlargement of a tumor prior to its reduction in size.

Dark green to brown and dark grey dyes can be obtained from the roots of ***Rumex acetosella*** after boiling them in water. These dyes do not need a mordant to remain fast.

Rumex crispus L. curly dock

Left—late inflorescence of *Rumex crispus* at a time when the tepals have turned brown, indicating the proper time for fruit collection. Right—side view of leaf blade; note the wavy margins of the blade.

Rumex crispus is a non-native plant that is normally found in human-disturbed soils (e.g., roadsides, fields, waste lots). It is sometimes referred to as yellow dock in herbal literature. *Rumex crispus* is a member of the Polygonaceae (knotweed family) and, as such, possesses the distinctive sheathing stipules that surround the stem just above the attachment of the leaf stalk. The flowers are small and bear six tepals (tepal is the name given to sepals and petals when they are similar to each other in size and pigmentation). The inner three tepals enlarge in fruit, become reticulate-veiny, and have a prominent tubercle, which resembles an egg-shaped swelling on the outer face of the tepal. In *Rumex crispus*, usually all three of the inner tepals have a well-developed tubercle (though one is usually smaller than the other two), and the margins of the inner tepals are without teeth or spines. This dock is further characterized by green to dark green leaf blades with bluntly toothed and wavy margins, simple (i.e., unbranched) lower stems that lack tufts of leaves in the axils of the well-developed leaves, and stems usually emerging from a basal rosette of leaves. It normally flowers from July through August, and mature fruits are usually available from August on.

Flowers of *Rumex crispus*. The pale, egg-shaped swellings near the center of each tepal are the tubercles.

The young leaves of *Rumex crispus* are edible raw or cooked. They contain vitamins B_1, and B_2, pro-vitamin A, and iron. As the spring continues, an aerial stem is formed and the leaves become more bitter and are best boiled, sometimes in

changes of water, to remove the unpleasant taste. Some authors warn that the very young leaves of *Rumex crispus* contain enough chrysophanic acid to irritate your mouth. To combat this they recommend that you wash or cook the leaves prior to consuming them. However, I have eaten the young leaves fresh in the field without issue. It may be that plants from different regions have different amounts of acid or that people differ in their sensitivity to this phytochemical. The young stems, prior to the production of flower buds, can also be peeled and eaten. They are best collected in late May and early June. The fruits (called achenes) are small, dry, and seed-like. They are brown and triangular in cross-section and are edible but must be separated from the persistent tepals (which appear as a dry, papery husk on the fruit). I strip the fruits from the branches of the plant, parch them with dry heat, and rub the masses of them vigorously between my palms. This action tears away the papery tepals and frees the seed-like fruits. These can then be winnowed in light wind to collect the fruits; however, the tubercles on the tepals are very difficult to separate from the small achenes because they are about the same size. The fruits (and tubercles) can be ground into flour, but it is bitter and astringent. It can be made palatable by mixing it with other, neutral tasting flours. The seeds or flour should be soaked overnight in water prior to use. Soaking deactivates phytic acid, an antinutrient that can bind with minerals and block their absorption (note that phytic acid is present in most seeds, nuts, and grains).

The taproot of *Rumex crispus* contains a group of polyphenols that are referred to as anthraquinone glycosides (e.g., nepodin, physcion, frangulin, emodin) as well as tannins and oxalates. Decoctions of the dried root are alterative, laxative, cholagogue, and hepatic. As an alterative, the decoctions assist with skin complaints, especially those that manifest with dry, scaly, and/or itchy symptoms, such as eczema, psoriasis, prurigo, and itchy hemorrhoids. They are also known to support and strengthen the digestive system. Anthraquinone glycosides are well known for their laxative effect. However, the co-occurrence of tannins in the roots helps temper the effect and creates a mild action to assist with constipation. As a cholagogue, it stimulates the flow of bile by promoting contraction of the gall bladder. Bile is useful for fat digestion and acts as a natural laxative, facilitating cleansing of the system. Cholagogues also act on the liver, ensuring a strong and healthy organ. This plant should not be used as a laxative when non-mechanical intestinal obstruction is present (i.e., the peristaltic movement of the intestinal tract has stopped).

The roots can be boiled in water to make a yellow dye. The strength of the dye can be controlled by the amount of roots used and the length of time the water is heated.

Sagittaria latifolia Willd. common arrowhead

Left—Leaf blade, which is variable as to the width of the blade and lobes. Right—inflorescence, with flowers that have 3 white petals.

Sagittaria latifolia is a common aquatic plant, usually growing in shallow, still or slow-moving water of lakes and rivers (including fresh-tidal river shores). It is commonly found anchored in mucky soils along with many other marsh plants. It gets its common name "arrowhead" from the leaf blades, which have two backward pointing, basal lobes. The inflorescence is a raceme of flowers that have three sepals and three petals. The ovaries mature as a small, beaked achene. There are several species of *Sagittaria* that grow in the Northeast, some of which do not have sagittate (i.e., arrow-shaped) leaves. However, all the species share, among other features, white roots with cross-partitions (the cross-partitions makes the roots look segmented). Further, the roots have laticifers, which are cells that produce white latex and make the sap appear milky, similar to the foliage of *Taraxacum* (dandelion) and *Asclepias* (milkweed). Tubers, which are located at the ends of the underground stems, are not produced by all species of *Sagittaria*. Both *Sagittaria latifolia* and *Sagittaria cuneata* (northern arrowhead) are northeastern species that produce edible tubers. The latter species commonly produces floating leaf blades (rather than the emersed and upright leaf blades of the former species). *Sagittaria latifolia* flowers during mid-summer, and fruits mature in August and September.

Young flower shoots at an appropriate stage for collection.

The best and most widely known food of *Sagittaria* is the tubers. These are edible raw or cooked. They have a bitter citrus flavor flavor when raw that mostly dissipates after 15–20 minutes of boiling or roasting. They vary in size and are best collected in late or early season (i.e., early fall or early spring). Given that one must often enter shallow water (or wet mud) to collect

the tubers, they are best collected in early fall before the water becomes too cold (as it is in the early spring). Collecting tubers from tidal marshes (such as along fresh-tidal rivers) is an excellent option because the water is very shallow during low tide. The tubers are generally buried within 10–30 cm of the soil surface and can be gathered by hand or using a rake-like implement to dislodge them (they float, which makes them easier to gather). They usually have several flat, papery scales on the outside that can be removed (I do not bother removing them from smaller tubers because the scales become tender and are easily chewed on cooking). They can be boiled or roasted, dried and ground into flour, or crushed in a container filled with water to liberate the starch (after which the water is poured off and the starch allowed to dry for making flour or thickening stews). *Sagittaria latifolia* provides additional food items such as the expanding leaves. These are best collected while the leaf blades are still partially curled up because they become firmer in texture as the season progresses. The leaves should be boiled to eliminate the somewhat distasteful flavor (which reminds me of bitter citrus; again, it disappears on cooking). The young, tender, flowering shoots are also edible and can be collected prior to flower expansion. They should be prepared in a similar manner as the leaves (i.e., boiling). The young inflorescences are usually at the appropriate stage for collection in July, with occasional new flowering shoots produced until mid-August in some areas. Species of *Sagittaria* have been used as food by the Chippewa, Cocopa, Dakota, Klamath, Lakota, Omaha, Pawnee, Pomo, Potawatomi, Thompson, and other Native American tribes.

A small tuber forming at the end of the rhizome.

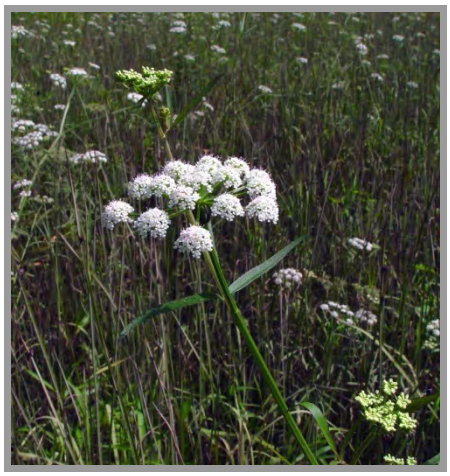
Salicornia depressa Standl. common glasswort

Left—Habit of plants growing in open salt flat. Right—flowers of *Salicornia*, which are arranged in clusters of three, are hidden within cavities in the stem and concealed by scales.

Salicornia depressa is a common plant of open salt marshes along the northern New England coast. It is an annual species that forms small colonies of branched, succulent stems. The leaves are very small, scale-like, and appressed to the stem (note: the leaves are difficult to detect, and most observers would describe this plant as lacking leaves). The flowers are arranged in clusters of three, with the central flower positioned above the two lateral ones. Other than the stamens, which sometimes protrude beyond the subtending scales, most of the flower is concealed within cavities in the stem and behind scales. This species tends to have red coloration on part or much of the fleshy stem. It has long been referred to as *Salicornia europaea*, but that is a different species and is restricted to the Old World. There are other species of annual glasswort that occur in the Northeast, including *Salicornia bigelovii* (dwarf glasswort) and *Salicornia maritima* (sea glasswort), both of which are rare and unlikely to be encountered. Identification is sometimes very difficult, but fortunately is not necessary as their uses are similar.

The stems of *Salicornia depressa* are edible and can be enjoyed raw as a crisp, salty food. They can be eaten alone or added to wild salads where they make a great addition. The shoots can also be boiled and eaten as a potherb. They are known to contain vitamin C and various minerals. The plants are available as a food for much of the growing season, making them a valuable plant to know when in coastal areas. The seeds, which are also edible, are much too small and difficult to collect to be useful. However, they are incidentally ingested when the stems are eaten later in the season. The seeds are rich in protein and contain a high-quality oil. The Coast Salish and Gosiute were known to have eaten various species of *Salicornia* (both annual and perennial species) for food.

Sium suave Walt. water-parsnip




Left—inflorescence. Right—emersed leaves (i.e., those borne higher on the stem, above the surface of the water).

Sium suave is a common wetland plant in the northeastern United States that offers food through most of the snow-free season. It is found along the shorelines of still or slow-moving water, often growing in soft, mucky soils. It has flowers with five small, white petals arranged in an umbel (all the branches of the inflorescence originate from a common point). Because it belongs to the same family as *Cicuta maculata* (water-hemlock), a deadly poisonous species, some authorities warn people to avoid this plant altogether. However, *Sium suave* is very distinctive. The leaves held above the surface of the water are once-pinnately divided into narrow leaflets (those of *Cicuta maculata* are twice- or thrice-divided). The lower stem leaves are sometimes submersed in water and then will be highly dissected into narrow segments (*Cicuta maculata* does not produce dissected, underwater leaves). The stems of *Sium suave* are prominently angled and have flat faces (those of *Cicuta maculata* are nearly circular in cross-section). Finally, the lateral veins of the leaf segments (i.e., those that branch off the midvein) do not consistently travel to the sinuses between the teeth as they do in *Cicuta maculata* (see image). *Sium suave* flowers primarily in August through the first half of September.

Leaf segment of *Cicuta maculata*. Note how the lateral veins of the segment run to the sinuses between the teeth.

The white, somewhat thickened roots of *Sium suave* offer a parsnip flavor and can be eaten raw or cooked (boiled or roasted to taste). They are generally easy to collect because the plants

frequently grow in soft soils that are easy to dig in. They are best gathered in the early spring or late fall when they are filled with starch. During the growing season they are more fibrous and do not lend as much of a return. The roots were eaten by the Bella Coola, Okanagon, Quebec Algonquin, Shuswap, Thompson, and other Native American tribes. The leaves are also edible and have a pleasant, aromatic flavor. The leaves are best in the early part of the growing season when they are thin. Later in the season they become firmer and, though still very edible, are best be boiled for a short time to soften the texture.

Roots of *Sium suave*. Note how some of the roots are thickened, especially toward the distal ends.

Solidago canadensis L. Canada goldenrod


Left—Array of flower heads. Right—fruiting plant with an abundance of fine, silvery hairs (which aid in dispersal of the fruit) that ignite readily from a friction-fire coal.

Goldenrods are a relatively familiar group of plants. They were used by the Omaha as a season indicator, telling them when *Zea mays* (corn) was ready to be harvested. Even today, *Solidago* is considered one of the first signs of the approach of fall. These species are identified, in part, by their small flower heads with yellow flowers. Close examination will show that members of the genus *Solidago* have two types of flowers in each head (or capitulum)—tubular flowers in the center of the head and strap-shaped flowers around the margin of the head. A similar group of plants called goldentops (genus *Euthamia*) are different in that their arrays of flower heads are flat-topped and the flower heads are often clustered (i.e., several heads are grouped together on one stalk; *Solidago* does not have flat-topped arrays and every flower head is borne on its own stalk). *Solidago canadensis* is a common species of fields, roadsides, forest clearings, and trail edges, flowering mainly in late August through September. It has very leafy stems with leaf blades that only gradually reduce in size toward the summit of the stem (some species of *Solidago* have large basal leaves, and leaf size decreases rapidly toward the summit of the stem). *Solidago canadensis* is further characterized by triple-nerved leaves (i.e., the leaf blades have a midvein and two prominent lateral veins that arch along the margin and travel much of the length of the blade) and branches of the flowering array that are one-sided and/or curve over at the apex. There are two other species of *Solidago* with this particular leaf morphology—*Solidago altissima* (tall goldenrod) and *Solidago gigantea* (smooth goldenrod). These species often grow with *Solidago canadensis*. Fortunately, being able to identify each species is not necessary because their uses are similar.

Triple-nerved leaf blade: note the midvein and two prominent lateral veins (one on each side of the midvein).

Note: *Solidago canadensis*, as well many members of the Asteraceae (aster family), may cause allergic reactions due to a group of phytochemicals called sesquiterpene lactones. Contact dermatitis has been reported in rare instances by people sensitive to these compounds.

The aerial portions of *Solidago canadensis* contain several terpenes (solidagolactones and elongatolides), saponins, the polyphenols rutin and quercetin, and other phytochemicals. It is one of the best plants to use when an anticatarrhal is needed (catarrh is excessive secretion of phlegm and mucus by the nasal membranes). I have successfully used infusions of the dried leaves to keep the nasal passages clear in order to sleep well at night. The Blackfoot were one group of Native Americans who used goldenrods for this purpose. *Solidago canadensis* also has use as an anti-inflammatory and antiseptic for the urinary tract, especially in cases of male urethritis. Though it is reported to have a special affinity (and hence application) for the male urinary system, I have seen infusions of this plant successfully used for urinary tract infections and candidiasis in women. Infusions can also be used as a gargle for laryngitis and pharyngitis. Because of its astringent properties, the leaves can be applied as a poultice to minor wounds to promote healing.

Solidago canadensis, as well as other members of the genus, is an important plant to know for fire making. The stems of *Solidago* are useful as hand drill spindles for friction-fires. They are relatively thin compared with some sought-after species for spindles, but with practice it is possible to adjust one's technique and become quite proficient in their use. Given that most of the preferred species for hand drills are non-native plants that occur in human-disturbed areas, *Solidago* is an important plant to know for this purpose, as there are species that grow in forested areas, even at high elevation. *Solidago canadensis* and its closely related species *Solidago altissima* and *Solidago gigantea* routinely produce taller and straighter stems than most other goldenrods (i.e., they are important species to learn). I have collected stems of these species nearly two meters tall. The fruiting arrays found at the top of goldenrod stems in the fall are an excellent tinder. The dried leaves that remain on the plant in the fall are also very good. They dry rapidly because they are held off the ground by the persistent aerial stem. Simply strip them off, crumble them up, and use them alone or, better, with the fruiting clusters. The flowers can be boiled in water to make a yellow to tan dye.

A glowing ember using a *Solidago gigantea* hand drill and a *Tilia americana* (American linden) fire board.

Sonchus arvensis L. field sow-thistle


Left—flower head (i.e., capitulum) composed of yellow ray flowers. Right—clasping base of stem leaf.

Sonchus arvensis is a non-native, herbaceous plant of human-disturbed habitats (e.g., fields, roadsides, abandoned lots). It has alternate leaves with spiny margins, the lower of which are usually pinnately lobed. The stem leaves have auricles at their base that clasp the stem. The heads (i.e., capitula) are composed of many small, yellow ray flowers, similar to *Taraxacum officinale* (common dandelion), that collectively resemble a single flower. Each individual flower in the capitulum matures as a small, flattened, seed-like fruit called a cypsela. The cypsela, which lacks an apical beak in this genus, is composed of a mature ovary and a set of thin, white bristles (called pappus bristles) that are attached to the top of the ovary. The pappus bristles aid in wind dispersal of the fruit. *Sonchus arvensis* flowers primarily in the latter half of July through early September. There are two other species of *Sonchus* that occur in New England—*Sonchus asper* (spiny-leaved sow-thistle) and *Sonchus oleraceus* (common sow-thistle). These latter species are annuals with taproots and have smaller capitula (15–25 mm wide). *Sonchus arvensis* is a perennial from deep-seated rhizomes and has larger capitula (30–50 mm wide). Identification of the three species is not necessary because their uses are somewhat similar (though the other species have thick stems that can be peeled and eaten, and each species has subtle differences in the prominence of spines on the leaf margin). Note: *Sonchus arvensis*, as well many members of the Asteraceae (aster family), may cause allergic reactions due to a group of phytochemicals called sesquiterpene lactones. Contact dermatitis has been reported in rare instances by people sensitive to these compounds.

Young leaves collected early in the spring prior to production of an aerial shoot can be used as salad greens. When collected at this time, the marginal spines are soft and do not reduce the enjoyment of consuming this plant. Young leaves and those slightly older can also be used as a potherb after boiling for a short time (ca. 5 minutes). The leaves of sow-thistles, known to contain vitamins B_1, B_2, B_3, and C, can be bitter, even in the early season (i.e., there is variation among the populations). Boiling them in water can soften the bitterness (as can diluting the greens with other, milder flavored species). As the season progresses, the marginal spines stiffen,

rendering the leaves less desirable as a wild food. The budding capitula, as well as the open ones, are also edible, but they are quite bitter. I occasionally snack on them while hiking through open areas (bitter is an acquired taste). However, I much prefer the budding capitula of related species such as *Tragopogon pratensis* (meadow goat's-beard) to those of *Sonchus arvensis*.

Species of *Sonchus* contain polyphenols (e.g., flavonoids, tannins), terpenes (e.g., saponins), and alkaloids. Preparations of *Sonchus arvensis* possess anti-inflammatory and antispasmodic properties. The fresh leaves can be chopped or ground and applied to wounds and burns as a poultice to reduce inflammation. Internally, the dried leaves can be taken as an infusion for this effect. The rhizome and roots are useful for treating coughs, asthma, and the symptoms of bronchitis. These would be decocted after drying to obtain the antispasmodic action. Members of the genus *Sonchus* possess various flavonoids that are potent antioxidants. Therefore, the plants have a role in protecting people from the damage caused by environmental pollutants and toxins.

Stellaria media (L.) Vill. common stitchwort

Left—close-up of flowers showing the five deeply notched petals (which create the appearance of ten petals). Right—habit of plant.

Stellaria media is a short, annual plant of lawns, trail edges, fields, and open forests. It was introduced from Europe but sometimes grows in forested areas, especially those along rivers, as if it were a native species. It has small flowers with five white petals, each petal so deeply notched as to appear to be two separate petals on quick examination. The opposite leaves have narrow-ovate to ovate blades that are borne on short stalks (this a critical identification feature). Most other species of stitchwort found in the Northeast have sessile (i.e., unstalked) leaves. The genus *Stellaria* is easy to confuse with two other genera—*Cerastium* (chickweed) and *Myosoton* (giant-chickweed). *Stellaria* has flowers with three styles and capsules that dehisce (i.e., split open) by six valves. *Cerastium* and *Myosoton* have flowers with four or five styles and capsules that dehisce by five valves (in *Myosoton*) or eight or ten apical teeth (in *Cerastium*). *Stellaria media* flowers during the latter half of May through August. Plants that grow near the sunny side of a building often flower weeks earlier than counterparts from less developed habitats.

The leaves and young stems make an excellent salad plant. They remain tender and palatable for most of the growing season and contain vitamin C, making it a valuable species to know. Because *Stellaria media* often grows in small colonies, it can be easy to collect in quantity necessary for use as a wild salad. The plants can also be boiled for a short time as a potherb.

Stellaria media contains saponins (a terpene), coumarins and hydroxycoumarins (polyphenols), and other medically active phytochemicals. It can be used as a vulnerary, emollient, and antirheumatic. Fresh plants can be poulticed and used on minor wounds to promote healing. A juice made by crushing a heaping handful of fresh plants in a liter of water serves as a useful wash to alleviate itching due to minor skin maladies, especially when dealing with eczema. Poultices of the fresh plant can be used similarly to provide more concentrated medicine for problematic regions. Dried leaves taken internally as an infusion can benefit those dealing with rheumatoid arthritis.

Suaeda maritima (L.) Dumort herbaceous sea-blite

Left—close-up of flowers, which have a single cycle of five green sepals. Right—branch of plant, showing the thick, succulent leaves and red pigmentation (this coloration is common in some populations).

The genus *Suaeda* is a group of fleshy, annual plants of saline environments, typically found in salt marshes and along coastal shorelines. The alternate leaves are very fleshy and thick (i.e., not conspicuously flattened). The inconspicuous flowers have a single cycle of five green sepals and are consistently borne in clusters of three in the axils of shortened leaves. The ovary matures as a small, dry, seed-like fruit called an achene, which remains concealed within the persistent sepals. Three species of *Suaeda* are found in New England. *Suaeda maritima* is the most common and is identified by its five sepals being equal in size and without a thin keel. It was introduced to coastal areas of eastern North America from Eurasia (other species in New England are native). Identification is not critical because all three species can be used similarly. The flowers appear in mid-summer, and the fruits normally mature from the latter half of August onward.

The tender young stems and leaves can be eaten raw or cooked. As a potherb, they can be boiled for a short time. They are crisp, succulent, and salty tasting. As the season progresses, the stems become too tough, but the leading branches and leaves can be collected well into summer. Though the seeds are edible, it is very tedious to collect them in quantity.

Some Native American tribes used various species of *Suaeda* as dermatological aids (e.g., Hopi, Paiute). The normal route of administration was as a poultice (fresh or dry plants). It was used to allay itching and as a vulnerary.

Taraxacum officinale G.H. Weber *ex* Wiggers common dandelion




Left—habit of plant and flowering head. Right—fruits with attached arrays of white bristles, which aid in wind dispersal.

Taraxacum officinale is a common, weedy plant of lawns, fields, and other human-disturbed or human-mantained places. It has a basal rosette of pinnately lobed leaves and a hollow stalk that supports a single head with many small, yellow, strap-shaped flowers (the tiny flowers collectively appear to be a single, large flower). The small, seed-like fruits are borne on a common receptacle and are tipped by an elongate, narrow beak, to which are attached an array of white bristles, which aid in wind dispersal. The leaves and flower stalks yield a white latex when bruised. There are three other species of *Taraxacum* that occur in the northeastern United States (*Taraxacum laevigatum*—red-seeded dandelion, *Taraxacum latilobum*—large-lobed dandelion, and *Taraxacum palustre*—marsh dandelion); however, their uses are similar, so collectors need not worry about the identification. The leaves appear in early spring (i.e., April) and are best collected prior to flowering (which usually starts around mid-April to early May, depending on the latitude and elevation). Note: *Taraxacum officinale*, as well many other members of the Asteraceae (aster family), may cause allergic reactions due to a group of phytochemicals called sesquiterpene lactones. Contact dermatitis has been reported in rare instances by people sensitive to these compounds.

Taproot that can be used to make a coffee-like beverage.

The young leaves of *Taraxacum officinale* can be eaten as a salad green and are also an excellent potherb when boiled in water for a few minutes.

They are extremely high in pro-vitamin A and contain other nutrients as well, including vitamin B complex, vitamin C, and vitamin E. The leaves and other parts of the plant were eaten by the Apache, Cherokee, Iroquois, Micmac, Ojibwa, and many other Native American tribes. As the leaves get older, especially after the flowers appear, they become more bitter. They can still be used as a potherb but are more palatable if boiled in a change of water to remove the bitter principles. The fleshy taproots are edible. The younger roots (i.e., from first-year plants) are light brown and relatively smooth on the outer surface and have a pale, uniform interior. They are much better as a boiled root vegetable than the older plants, which have tap roots that are darker and rougher on the outer surface and can develop a firm, darker core. The taproots make a good coffee-like beverage (but with numerous health benefits). Dig the roots, clean them well, and then dry them for a time (such as in the sun or on a rack over a bed of coals). Then, roast the roots on the coals to ensure they are completely dry and brittle (this also imparts a characteristic flavor to the beverage). At this point the roots can be ground or pounded using a smooth stone. A tablespoon of roasted, ground root per cup of water, allowed to infuse for five to ten minutes in hot water, makes a drink that is reminiscent of dark chocolate and coffee, with a somewhat bitter overtone (the bitter taste comes from the compound lactucaprin; it is not too strong and can be softened with dairy). The flower buds are also good boiled in water (note that they can be gathered while still at ground level or after the aerial stem has been produced). The open flower heads can be eaten raw or infused to make a tea.

Taraxacum officinale can be used as a diuretic. This effect is believed to be caused by two groups of chemicals—eudesmanolides and germacranolides (both are types of terpenes). Therefore, it can be used to help reduce excess fluid and play a role as an anti-inflammatory. Infusions of any part of the plant can be used for this purpose. Because of its diuretic effect, this plant can also aid in alleviating the symptoms of bladder infections (it cannot cure the problem, but frequent urination helps to remove some of the bacteria). *Taraxacum* is also highly recommended for liver ailments (i.e., it is a cholagogue and hepatic). This is related to its bitter content and the presence of lecithin (especially in the flowers and roots). Lecithin is a nutrient that has been experimentally shown to have many benefits. Lecithin increases the solubility of fats and cholesterol, which decreases their ability to form deposits and, therefore, obstruct arteries. Lecithin helps prevent liver degeneration by metabolizing clogging fats and assists with the absorption of several important, fat-soluble vitamins (e.g., vitamins A, D, E, and K). Further, it may have a role in preventing age-related memory decline and preventing and/or reducing the size of gallstones.

Trifolium pratense L. red clover


Left—flowering spike, which is closely subtended by a pair of leaves (one or both of these leaves may be reduced in size). Right—leaves showing the crescent-shaped pale markings on the leaflets.

Trifolium pratense is a common clover of fields, roadsides, and other human-disturbed or human-maintained habitats. This European native is a member of legume family (Fabaceae) and, as such, has bilaterally symmetrical flowers that resemble those of peas and beans (just much smaller). The individual flowers in the crowded spike are sessile (i.e., unstalked) and have red petals that are clearly longer than the narrow sepals. Each leaf has three leaflets, which usually possess a crescent-shaped pale mark on the upper surface. There are 14 species of *Trifolium* known to occur in New England; however, only seven of them are common. *Trifolium pratense* is the only common species with red flowers and with petals clearly longer than the sepals. Other common species include *Trifolium campestre* (pinnate hop clover, a species with yellow flowers), *Trifolium hybridum* (alsike clover, a species with pink flowers), and *Trifolium repens* (white clover, a species with white flowers). The genus *Trifolium* belongs to a group of genera that have minutely toothed leaflets (sometimes seen only on careful examination near the tip of the leaflets due to the small size of the teeth), a rare feature in the legume family. Related genera that possess toothed leaflets include *Medicago* (alfalfa), *Melilotus* (sweet-clover), and *Trigonella* (fenugreek). *Trifolium*, as a genus, is identified by its marcescent corolla (i.e., the petals wither but do not fall) and its straight or slightly curved fruit, which is mostly or entirely included within the persistent sepals (among

The white flowers of *Trifolium repens* (white clover), a species with a prostrate stem from which leaves and flower stalks emerge.

other technical details). *Trifolium pratense* flowers primarily from June through August (occasionally into even the first half of September).

The leaves and flowers of clovers are edible raw or cooked. The leaves are best in the early season because they develop, to my palate, a mildly unpleasant flavor by midseason. They contain much protein (for plant tissue) and are best prepared by boiling for a short period. The flowers (fresh or dry) can be used to make a pleasant tea. They are best collected by gathering the entire inflorescence. The dried flowers can also be ground to make flour (best mixed with other types of flour). Care must be taken when using *Trifolium* as a wild food. Due to the coumarins present, only fresh or completely dried plants should be ingested, as coumarin can be converted to dicoumarol (a poison) during spoilage by molds.

The flowers of *Trifolium pratense* contain many polyphenols. These include the isoflavones biochanin A, daidzein, formononetin, genistein, pratensein, and trifoside, the flavonoids pectolinarin and kaempferol, and the coumarins coumestrol and medicagol. These phytochemicals work in concert to create expectorant and antispasmodic actions, making infusions of the flowers a useful remedy for coughs, including those associated with measles, bronchitis, and laryngitis. It also can be used as an alterative for dry skin maladies (e.g., eczema, psoriasis) and nervous system tension. Recent research has shown that biochanin A inhibits the activation of certain cancers and that genistein is both antineoplastic and a potent antioxidant. Some authors also consider *Trifolium pratense* to act as a mild antimicrobial, with action against some bacteria. Other species of *Trifolium* can likely be used with similar results given that they contain many of the same pharmacologically active compounds (note that research has focused mainly on *Trifolium pratense* and *Trifolium repens*).

Trillium erectum L. red wakerobin

Left—*Trillium erectum* in flower. Right—*Trillium undulatum* in fruit; note the short leaf stalks (this is the only species of *Trillium* in New England with this character state).

Trillium erectum is a relatively common, herbaceous plant found most abundantly in moist, deciduous forests with an overstory of species such as *Acer saccharum* (sugar maple), *Fraxinus americana* (white ash), and/or *Tilia americana* (American linden). It is easily recognized by its single whorl of three leaves near the summit of the stem and showy flowers with red petals and a dark maroon ovary. Though the flower tends to arch or nod on its stalk, the fruit stands straight upward (i.e., the stalk straightens as the ovary matures); hence, the specific epithet *erectum*. Three other native species of the genus *Trillium* occur in New England. *Trillium cernuum* (nodding wakerobin) has small, white flowers that nod beneath the leaves on drooping flower stalks. *Trillium grandiflorum* (white wakerobin) has large, upright, white flowers and often grows in profuse colonies. *Trillium undulatum* (painted wakerobin) is the other common species in northern New England (along with *Trillium erectum*). It has white petals with a red, crescent-shaped mark near the base of each petal and stalked leaf blades (the only native *Trillium* to possess these features). *Trillium erectum* flowers primarily during May and the first week of June (sometimes as early as late April).

The leaves are edible raw or cooked. In the early season they have a pleasant taste that is reminiscent of *Cucumis sativus* (cucumber). The flavor gradually becomes harsher and more unpleasant as the season progresses. Emergence of the leaves generally occurs during the last two weeks of April and the first week of May (later in high elevation or latitude sites). The leaves can generally be collected over a two- or three-week period before their flavor becomes unpleasant. Though the leaves are best in quality collected prior to flowering, I have gathered and eaten them (and enjoyed them) past flowering. I favor the early, unfolding leaves for wild salads and the fully expanded leaves as a potherb. Interestingly, there do not appear to be many accounts of Native Americans consuming various species of *Trillium* (though they were used extensively for medicinal purposes).

The roots contain the terpenes trillarin and trillin (which are saponin glycosides), as well as starches, tannins, and a fixed (i.e., nonvolatile) oil. They are astringent and antiseptic. *Trillium* is most often employed in medicine to allay hemorrhaging or other irregular discharges, including blood in sputum from the lungs, blood in urine, unusual or heavy menstruation, unusual vaginal discharges, and coughs with copious phlegm. The dried and ground root can be taken as a decoction (or infusion if ground fine enough). Externally, the poulticed root has been used on minor wounds, insect stings, and other dermatological problems. Both the Cherokee and Iroquois used *Trillium erectum* as a medicinal plant. The Karok, Menominee, Quileute, Wailaki, and Yuki used other species of *Trillium* for their therapeutic effects (including *Trillium grandiflorum*).

Tussilago farfara L. coltsfoot

Left—Flowering stems, which appear in early spring prior to the expansion of the leaves. Right—underside of a young leaf blade, showing the dense gray hairs that cover that surface.

Tussilago farfara is a non-native plant originating from Europe that grows in disturbed soils. It is found frequently along the edges of paved and gravel roads, growing in the sandy shoulder. It is also found often along swift-moving streams where the current erodes the bank and creates habitat for this weedy species. Its flowers appear in late April and early May and precede the leaves. The single head of this aster family member sits atop a fleshy stem with highly reduced leaves. The head has both strap-shaped flowers (called ray flowers) around the margin and tubular flowers (called disk flowers) near the center. The leaves emerge after the flowers, are densely gray-woolly on the underside of the blade, and have large, angular, tooth-like lobes on the margin. The leaf blades eventually become almost rubbery in texture. Note: *Tussilago farfara*, as well many members of the Asteraceae (aster family), may cause allergic reactions due to a group of phytochemicals called sesquiterpene lactones. Contact dermatitis has been reported in rare instances by people sensitive to these compounds.

Many parts of *Tussilago farfara* can be eaten. The flower heads (while in bud or fully expanded) can be eaten raw and make a good salad ingredient. They can also be infused to make a pleasant tea. The stems that support the flowers are fleshy and can be eaten raw or cooked. The young, unfolding leaves also can be eaten raw as a salad plant. The white hairs should be removed prior to consumption to avoid possible irritation. As the leaves get older, the texture becomes less desirable, and they should be boiled in one or more changes of water. The leaves can be burned in a container and the ashes collected as a salt substitute. My method of collecting the ashes is to place fresh leaves in a clay pot and set this over coals. *Tussilago farfara* is known to contain pyrrolizidine alkaloids. It should not be eaten in large quantities over extended periods because it can damage the liver. Cooking does help to reduce the amount of these phytochemicals.

This plant has long been used as a medicinal herb. It contains compounds that are antitussive (i.e., partially or completely abate coughing) and anti-asthmatic. Some of the important phytochemicals include the flavonoid polyphenols rutin, hyperoside, and isoquercetin, the

pyrrolizidine alkaloids senkirkine and tussilagine, and mucilage (a carbohydrate consisting of polysaccharides based on glucose, galactose, fructose, arabinose, xylose, and inulin). It achieves anti-asthmatic action by suppressing the body's production of platelet-activating factor (a lipid involved in narrowing the air passages). It is also a demulcent due to its mucilage content and can be very soothing to irritated mucous membranes. Combine these traits with the fact that *Tussilago farfara* is an expectorant, and you have a very potent herb for cough- and asthma-related ailments. Though all parts of the plant can be used, it is safest to use the leaves (the leaves contain less of the pyrrolizidine alkaloids). These can be used as a strong infusion or dried and smoked to gain the desired effects.

Typha latifolia L. broad-leaved cattail


Left—Mature, seed-bearing inflorescence, the pollen-bearing flowers (now absent) were positioned above the brown spike earlier in the season. Right—base of plant showing underground rhizome and a new shoot at its tip.

Typha, the cattails, are common members of many, shallow-water wetlands throughout the northeastern United States. They possess elongate, grass-like leaves and a slender, cylindrical inflorescence divided into two sections—carpellate (i.e., seed-bearing) flowers that ultimately become a rich brown color positioned below the staminate (i.e., pollen-bearing) flowers that ultimately become yellow when pollen is being shed. The native species, *Typha latifolia*, is found inland along river and lake shores and as a component, sometimes dominant, of inland marshes. It has relatively broad leaf blades (10–29 mm wide), thick carpellate spikes (24–36 mm thick in fruit), and the staminate and carpellate spikes are usually contiguous. There is also a non-native species of saline marshes, *Typha angustifolia* (narrow-leaved cattail), with relatively narrow leaf blades (4–12 mm wide), with slender carpellate spikes (13–22 mm thick in fruit), and the staminate and carpellate spikes are usually separated by a gap 10–80 mm long. Both species have similar uses, but *Typha angustifolia* has narrower and thinner parts and, as such, provides less mass of food. A very robust hybrid occurs between these two species. The staminate flowers of *Typha latifolia* mature first, sheding pollen from early June to mid-July. The carpellate flowers mature into fruit in late July and August, and the fruits remain on the plant through most of the year.

The starchy tips of new growth found at the ends of the rhizomes.

Typha latifolia offers an array of foods throughout much of growing season. The rhizomes (i.e., underground stems) are a good source of food after one learns how to process them. They will vary within a population and through the season. Seek those that are white (not gray or brown;

these underground stems are to be avoided). If you cut the rhizome in cross-section with a sharp blade, you will notice two layers—an outer, spongy layer and an inner core. The outer layer is very fibrous and of poor quality for food. The inner core contains much starch and is a valuable food source. It is best to discard the outer layer (you may feel as though you are wasting much of rhizome, but, in fact, you are removing a portion of the underground stem that has very little value as food). The outer layer can be stripped off by peeling or pushed off with your thumbnail or a blade. Alternatively, the entire rhizome can be dried intact and the outer portion peeled away at a later time. The freshly collected, clean core can be eaten raw (you can bite through the fibers that run along its length) or made into flour. Two methods exist for producing flour from the rhizome cores, each with its own drawbacks. The dry method involves drying the underground stem and then grinding the rhizome cores to liberate the starch that clings to the fibers, after which the fibers must be filtered from the ground starch. It is difficult to remove all the fibers from the starch with primitive tools, but the resulting flour is bland (i.e., it does not have a strong flavor that detracts from enjoying it). The wet method involves placing the rhizome cores in a container of water and then pressing, twisting, and otherwise agitating the rhizome cores to liberate the starch. One then simply needs to let the starch settle, pour off the remaining liquid, and allow the starch to dry to have flour. However, if the weather does not cooperate, the starchy liquid may mold (dry, sunny weather is a must). Some filtering may be necessary to eliminate any errant fibers. I often allow the flour to partially settle, remove some of the water, and then use the wet, gloppy, starch-rich liquid in cooking—it provides both the starch and liquid for various recipes. This abbreviated wet method helps use the "flour" prior to spoilage. Additional foods can be found near the growing tips of rhizomes. One of these is simply in the leading tip of the rhizome. It is white, pointed, pleasantly starchy, and does not contain fibers. It can be eaten raw or cooked. Eventually this leading tip will form a horn-shaped sprout that will turn upward and form a new shoot. Collected before the green leaves begin to appear, the horn-shaped shoots are similar to the leading tip of the rhizome in texture and flavor and are excellent raw or cooked. The white, horn-shaped shoots will eventually develop green leaves and become a new plant. Before they become too tall, the green, outer leaves can be peeled to expose a starchy core near the base, which can also be eaten raw. These begin to appear in early to late May. New shoots and leading tips of the rhizomes will be produced continually through the growing season. The flowers are also an important food source. When they first appear, they are concealed within pale, sheathing bracts that can be easily peeled away to reveal the immature,

Cross-section of the rhizome. Note the two distinct layers. The outer material is very fibrous, unlike the inner core, which is easier to process into various foods.

Progression of development of pollen-bearing flowers (left to right). The right-hand two spikes have flowers at the correct stage for collecting (note the yellow tinging and lumpier appearance).

green flowers. Both the staminate (pollen-bearing) and carpellate (seed-bearing) flowers can be eaten raw or boiled and eaten like corn-on-the-cob (I much prefer them cooked). Collection time is generally best from mid-June through mid-July. The spikes will be at an appropriate stage of collection for approximately two weeks (or a little longer) in a given area. Though both are pleasant, the staminate flowers are sweeter (to my palate), have much more substance, and are easier to remove from the axis of the spike (I do not usually collect the carpellate portion when foraging for the spikes). The pollen can be collected in a bag or pouch when it is being shed and used as a flour substitute. It does not stick together very well, so it is best mixed with other types of flour to make breads, ash cakes, etc. However, it is much easier to collect the entire pollen-bearing flowers themselves because they are easy to gather large quantities in a short time (I have collected an entire liter of flowers in just over five minutes when conditions were good—try gathering the pollen as it is being shed and see how long it takes you to gather an entire liter!). For this food, gather those flowers that are soon to shed pollen, avoiding those that are shedding or have shed pollen. The best time for collecting the pollen-bearing flowers is when the staminate spikes are beginning to bulge, showing yellow tints of color, and are becoming a bit spongy. It is too early when the staminate spikes appear as smooth cylinders that are uniformly green and rather firm; too late when the pollen is noticeable and some of the flowers are brown and withered. The pollen-bearing flowers can be mixed with various types of flour (especially those that stick together better, such as cold-leached acorn flour), added to soups, or boiled for a type of hot cereal. Its flavor is mild and enjoyable. The pollen is highly nutritious, being rich in protein, fat, fiber, calcium, iron, and vitamin C.

There is a clear, mucilaginous material that can be collected from the leaf bases of *Typha latifolia*. Simply separate the leaf bases where they sheathe one another and you will easily find a slimy substance. It has been used as an antiseptic and analgesic for cuts, abrasions, and other minor wounds. The crushed rhizomes are an emollient and can be used on minor wounds and as a cool dressing for burns (use them in conjunction with antimicrobial plants).

Typha latifolia offers some excellent materials for friction-fires. The dry, brown fruits that can be found most of the year are one of the best coal extenders for tinder bundles. They will not burst into flame but will allow the coal to grow in size, providing more heat to ignite other tinder materials. To use them as a coal extender, place a small amount of the dry fruits on the top of the tinder bundle where the glowing ember will be placed. The stems are excellent for hand drills but usually require a relatively soft wood for the fire board (e.g., *Tilia americana*—American linden). Though they are best collected in late summer and early fall and dried for future use (this makes for the strongest spindles possible from this plant), they can still be collected in the winter. However, the upper portion of the stem (i.e., that which is exposed to the elements) is usually very fragile during this time of year and will crush when downward pressure is applied to it. Therefore, during the winter season, it is best to collect the stems that are protected by the persistent leaf sheaths. The thinner section nearer the apex of the stem will be relatively dry and can be used immediately or after a brief period of drying. However, this section of the stem is thin, and some may find it difficult to use as a hand drill. Lower down the plant the stem increases in diameter but is often damp, even in the dead of winter, and must be dried prior to use. The leaves can be collected and used for weaving and low-grade cordage. They are best prepared by separating them from the stem, flattening the cells using your fingers, and drying them in the shade on warm days. They can be split lengthwise for different widths of fiber (such as for coil baskets) or left full width for mats, hats, and baskets. If reverse-wrapped, the fibers are acceptable for some uses that will not see much abrasion (e.g., certain types of clothing, quivers). The leaves can also be used as thatching for shelters.

Urtica dioica L. stinging nettle


Left—inflorescence with inconspicuous, wind-pollinated flowers. Right—young shoot in the early season.

Urtica dioica is a familiar plant to many (especially those who have accidentally stumbled upon it). The stems, petioles, and leaf blade surfaces have very distinctive, stinging hairs (many of them!). Each hair is made up of a narrow, tapering, closed cell and a sac-like base filled with fluid. When you bump into *Urtica*, the tip of the hair breaks off, producing a sharp point that can penetrate the skin. This also compresses the sac-like base and forces the fluid under the skin. The fluid contains histamines and acetylcholines, chemicals that create a painful, itchy sensation. *Urtica dioica* is further characterized by its perennial habit (the stems arising from rhizomes), opposite leaves, and inconspicuous, wind-pollinated flowers that mature as achenes (small, dry, seed-like fruits). It grows usually in riparian forests adjacent to medium-sized or large rivers, and less frequently along other water bodies (such as lakes). Two subspecies are found in our region. Subspecies *dioica* is native to Europe (though well established in parts of New England). It has stinging hairs on both leaf surfaces and has leaf blades that are cordate (i.e., with a basal notch that gives it a heart-shaped appearance). Subspecies *gracilis* is native to North America. Its stinging hairs are usually confined to the lower leaf surface, and the leaf blades have a rounded or weakly cordate-shaped base. The flowers of *Urtica dioica* appear primarily in late June through September.

Close-up view of the stinging hairs found on the stems and petioles. Note also the pale stipules at the petiole base.

The very young shoots, picked when less than 6 cm tall, can be eaten raw. They are found at this stage in mid-April through early May and are a very good addition to wild salads. At this stage, the stinging hairs have not yet developed, and they can be

collected without fear. As the season progresses, the tender leaves (especially those from near the summit of the stem) can be gathered and cooked as a potherb. Even though the stinging hairs are well developed, careful movement and collection avoids discomfort (gloves are recommended by many authors; I sometimes use them). Later in the season, when the plants are flowering and/or beginning to fruit, additional new shoots will be produced in the shade of the taller shoots (i.e., fresh greens are available from this plant for much of the spring and summer). Steaming or boiling the leaves for a few minutes nullifies the toxins in the stinging hairs, making a very good and nutritious cooked green. The leaves contain much protein, pro-vitamin A, vitamin C, iron, and chlorophyll. Fresh or dried they make an excellent and healthful tea. The shoots and leaves of *Urtica dioica* were eaten by the Iroquois, Makah, Mohegan, Okanoagan-Colville, and Thompson.

Urtica dioica is an important medicinal plant because of the range of ailments for which it can provide relief. The leaves contain several medically active polyphenols, including kaempferol, isorhamnetin, and quercetin (specifically, these three phytochemicals are called flavonol glycosides), and indole alkaloids, including histamine and serotonin. The leaves also contain high levels of vitamin C, chlorophyll, and magnesium, all of which reduce concentrations of oral bacteria. Therefore, this plant can help combat gingivitis and halitosis (i.e., bad breath). Both direct consumption of the herb and infusions (imbibed or used as a mouth wash) promote healthy gums and freshen breath. Research shows this species may have a beneficial effect on various types of arthritis and muscle pain. For example, gout is caused by uric acid crystals increasing in the blood stream and collecting in affected joints. Drinking infusions of *Urtica dioica* can increase the excretion of uric acid through urination, helping to relieve the pain and damage caused by gout. Taken for prolonged periods, the infusions are also useful for childhood and adult eczema (i.e., the plant is an alterative for dry skin ailments). Because they have diuretic and astringent properties, infusions can also be used for symptoms of hemorrhaging and diarrhea, as well as kidney infections and kidney stones. They also appear to help with bronchitis and asthma. *Urtica dioica* contains both hypoglycemic and hyperglycemic components. However, tests suggest that the hypoglycemic components override the hyperglycemic ones. Urticin (a glycoside) is the main phytochemical providing the hypoglycemic effect. The rhizome (i.e., the horizontal, underground stem) contains steroid alcohols (waxy substances), the coumarin scopoletin (a type of polyphenol), and nicotine (a kind of alkaloid). Decoctions of the rhizomes are used for relief of symptoms of benign prostatic hyperplasia (i.e., it does not reduce the size of the prostate but helps with the urinary difficulties). Studies indicate that *Urtica dioica* improves urine flow, reduces the frequency of urination, and decreases the volume of residual urine. The rhizomes are also useful for restoring sexual function in men and as a general male tonic. Decoctions both inhibit the binding of male androgens to sex hormone binding globulin and interfere with the natural conversion of testosterone to estradiol (an estrogen), thereby increasing free testosterone (only free testosterone is active and available to the body). In addition, infusions of *Urtica dioica* are considered tonic and hypotensive. Therefore, teas support and strengthen the body and promote relaxation. Many Native American tribes used *Urtica dioica* as a medicinal plant, including the Cherokee, Lakota, Nitinaht, Northern Paiute, Okanagan-Colville, Shuswap, and Thompson. They, as well as people of European origin, have also used this plant for "self-flagellation". During this practice, painful areas (e.g., lower back due to sciatica, arthritic joints) are struck with fresh plants to intentionally sting the target region. The pain and inflammation that follow causes the body to release natural anti-inflammatory compounds, which assist with the deeper pain of the primary ailment. Be forewarned, this practice produces painful and itchy rashes.

The stems of *Urtica dioica* have strong fibers. They are best harvested in the fall (mid-October through mid-November), after the plant has senesced and the stems have dried, in a manner similar to *Asclepias syriaca* (see that species). Cordage made from green stems in late summer tend to be much more brittle than cordage made from dried stems in the fall. Cordage made from *Urtica dioica* has high abrasion resistance and, therefore, is a good material to use for bow drill strings for friction-fires. It also is strong enough to make suitable bow strings for archery that are not too thick (thick strings rob arrows of their cast). Features of *Urtica*'s growth also make it ideal as a cordage plant, including unbranched stems and tall height (it frequently grows taller than one meter). The aerial stems and leaves can be used to make a green to green-yellow dye by boiling them in water.

Verbascum thapsus L. common mullein


Left—inflorescence with closely aggregated, bilaterally symmetrical, yellow flowers. Right—basal leaves that overwinter as a green rosette.

Verbascum thapsus is a biennial plant native to Europe. It occurs in open, relatively dry, and often sterile habitats, such as along roadsides and railroad tracks, in sandy fields and waste lots, and occasionally within forest openings (e.g., logging roads, cleared landings). It is easily recognized by its crowded, unbranched spikes with five-petaled, yellow flowers that are bilaterally symmetrical. The stem arises from a persistent rosette of green, softly hairy leaves. The leaves borne along the stem are decurrent (i.e., a wing of green tissue extends down the stem from the base of each leaf). There are six species of *Verbascum* that have been introduced to New England. *Verbascum blattaria* (moth mullein) is the only other species of mullein that is common enough to be encountered with any frequency in New England (but it is much less common than *Verbascum thapsus*). It has a sparely flowered inflorescence, so the axis is clearly visible, and nearly spherical capsules (the fruits of *Verbascum thapsus* are longer than wide). *Verbascum thapsus* flowers from the latter half of July through August.

Remnant fruiting stem in the fall.

In the spring, the new shoots can be gathered, peeled, and eaten raw. The crisp, flexible portion of the shoot near the apex is the preferred part. It is usually best as a food prior to the appearance of flower buds (latter half of May through early June). The dried leaves infused for 5–10 minutes (depending on personal taste) can be used to make a tea. The green leaves can be gathered during much of the snow-free season because they do not wither as many other herbaceous plants do.

The flowers and leaves of *Verbascum thapsus* contain several, medically active polyphenols (including the flavonoids verbascoside and herperidin), the iridoid glycoside aucubin (a kind of terpene), as well as mucilage, saponins, and tannins. They are expectorant, demulcent, anti-inflammatory, antispasmodic, and vulnerary. Mullein is perhaps best known for its use as a remedy for respiratory system ailments (it is also an alterative for this system). The plant reduces inflammation (i.e., anti-inflammatory) and stimulates fluid production in the lungs so that mucus can be cleared (i.e., expectorant). It also assists with relieving sore coughs associated with bronchitis (i.e., antispasmodic). The mucilage coats and soothes (i.e., demulcent) inflamed parts of the upper respiratory tract, especially the trachea and larynx. Inhaling smoke from the burning leaves (or smoking *Verbascum thapsus* as a tobacco) and infusions are the routes of administration. An oil-based infusion made with the leaves and/or flowers is beneficial for soothing inflamed and sore surfaces (i.e., vulnerary). This preparation is also often indicated for various ear problems (note: though most authors state the flowers must be used, the leaves also work very well in my experience). Oil-based infusions can be made in several different ways. One quick method begins with placing dried (or at least wilted) *Verbascum thapsus* flowers and/or leaves in a container and adding only enough oil to cover the material. Warm the oil without burning it for approximately 30 minutes and then allow it to cool until it is comfortable to touch. Strain out the plant material and place 3–6 drops in the ear every hour or so as needed (more frequent application is appropriate for acute problems). For infection in the ear canal, be sure to include a potent antimicrobial, such as *Allium tricoccum* (wild leek), in the recipe (*Verbascum thapsus* treats only the inflammation and pain).

Verbascum thapsus is often touted as one of the best hand drill spindle materials available. Though certain features of its growth do make it very good as a hand drill, such as relatively thick diameter and straight, tall growth, it is not as good as several other species that grow in New England. However, it is a good choice nonetheless and readily available in many places, especially areas with a history of human disturbance. The dried leaves on the fall stems make excellent tinder given they easily crumble and dry quickly because they are held off the ground by the persistent stem.

Viola cucullata Ait. blue marsh violet


Left—Leaves in the late spring when they are fully expanded. Right—flower.

The genus *Viola* is a large group of taxonomically complex species that occur in a wide variety of different plant communities. Species can be found at low elevations adjacent to salt marshes all the way to open, alpine plateaus of the region's highest peaks. Perhaps the most frequent group of violets that have specific use to neo-aboriginals are the species identified by the combination of stemless habit (i.e., the leaves and flowers arise from the ground level along nodes of a subterranean stem) and cyanic flowers (i.e., light blue to purple). *Viola cucullata* is a member of this complex and is normally found in moist to wet soils of swamps, meadows, and low-lying lawns. It is one of the species I prefer because its leaves are devoid of hairs. Other common species, such as *Viola sororia* (woolly blue violet), an upland species of floodplains and deciduous forests, usually has hairs on the leaves that are not as pleasant for consumption (though I do routinely eat this species as well). As previously mentioned, violets are extremely difficult to identify, in part due to the frequency of hybridization between different species. Fortunately, their uses are relatively similar. Most stemless violets in New England flower twice, once in the spring (these flowers are open-pollinated) and again in the summer (these flowers are self-pollinated). Look for the conspicuous open-pollinated flowers in the last weeks of May and early weeks of June.

The leaves and flowers are edible raw or cooked. In the spring, when the leaves are emerging, they are at their most tender stage and are excellent in wild salads. Later in the summer, as they mature, they become firmer and, though still quite palatable raw, are perhaps best cooked for a few minutes as a potherb. The leaves contain much pro-vitamin A and vitamin C (note: as with many wild plants, the pro-vitamin A content is highest in the early season leaves and gradually declines as the growing season progresses). The Cherokee were known to have eaten several different species of violets.

The leaves and flowers of violets are the parts most commonly used in medical herbology. They contain various polyphenols (the exact compounds present depends on the species). These include the phenolic glycosides gaultherin, violutoside, and methyl salicylate, and the flavonoids

rutin, violarutin, violanthin, violaquercitrin. They also contain various saponins (again, the exact compounds present depends on the species), such as myrosin and violin. In addition to mucilage, other phytochemicals are known to occur, such as the alkaloid odoratine in the rhizome of *Viola odorata* (English violet). Violets are an expectorant due to the saponins present and are especially useful for upper respiratory congestion and bronchitis. Because of the phenolic glycosides, they are also anti-inflammatory and are used in the long-term treatment of arthritis. Infusions using fresh or dried material are an appropriate preparation for this plant. In addition to the uses already mentioned, infusions using *Viola* leaves and/or flowers are also used as an alterative for the skin, helping to treat many types of minor maladies, including eczema, acne, and psoriasis. Topical preparations (i.e., washes, poultices) can be used for these ailments, in addition to drinking the teas. Given that infusions are also diuretic, they have use in the treatment of urinary tract infections (it cannot cure the problem, but frequent urination helps to remove some of the bacteria). Additionally, the presence of flavonoids (especially in the flowers) means that medicinal teas can assist with the prevention of bruising and broken capillaries, as well as edema. The rhizome is reported to be emetic in high concentrations.

Zizania palustris L. northern wild rice

Left—inflorescence, with pollen-bearing flowers below (spreading) and ovule-bearing flowers above (tightly upright). Middle—fruits with enclosing scales, the outer scale terminated by a long bristle. Right—close-up of mature grains removed from the enclosing scales.

This tall, annual grass is found in many still and slow-moving waters in our area, especially fresh-tidal portions of moderate-sized to major rivers. It is typically rooted in silty and muddy flats. *Zizania palustris* can also be found in various wildlife areas because it is sometimes planted by wildlife agencies for waterfowl food. This species is relatively easy to identify given its robust stature (plants are typically 1–2 meters tall) and broad leaves. The flowers on each plant are of two types—the lower ones are staminate (i.e., produce pollen) and spread away from the axis of the inflorescence; the upper ones are carpellate (i.e., produce ovules, which mature into fruits) and are held strictly upright, close to the axis of the inflorescence. The upper flowers produce the familiar, long, dark grain, which has several edible uses. There are two species that occur in New England—*Zizania aquatica* (annual wild rice) and *Zizania palustris*. *Zizania aquatica* is most easily distinguished from *Zizania palustris* through examination of the carpellate (i.e., upper) flowers. Those of *Zizania aquatica* are borne on branches that spread away from the inflorescence axis, whereas those of *Zizania palustris* are borne on branches that are strictly upright and appressed to the axis. Separation of the two species is not important because both produce edible and flavorful grains.

The fruit of *Zizania*, called a caryopsis (or grain), is a wonderful food that can be used in a manner similar to that of *Oryza sativa* (cultivated rice), though it has higher amounts of many key nutrients compared with *Oryza sativa* (including protein, magnesium, phosphorous, potassium, and vitamins B_1 and B_2). It is also high in omega-3 fatty acids (for a grain). Wild rice fruits generally ripen from the last week of August through the first two weeks of September (depending on where in New England it is growing and how much rain has fallen that year). One should check stands periodically to assess the maturation of the fruits. When the wild rice is ripe, a knock with a stick (or a slap with the hand) will send a shower of spikelets falling from the plant. Use this method, rather than color, to assess maturity because wild rice grains are not always black when ripe (green is a common color of ripe grains). One can collect the rice by gently pulling the hand over the inflorescence and placing the spikelets in some type of container (for small batches) or leaning the inflorescences over a canoe and lightly striking just below the flowers to dislodge the spikelets (be sure the interior of the canoe is free

of dirt and debris). A pair of rice knockers is used to speed up collection of the grains when gathering is done from a canoe. These are tapered sticks, one of which is used to gather or bend over a small clump of wild rice plants, the other moves in a swiping or tapping motion (depending on the technique used) to dislodge the grains from the plants. Some spikelets will be empty. These are abortive spikelets that do not contain fruits. Care should be taken to collect only those fruits that are free from fungal infection (called ergot, which appears as a small, purple, egg- or barrel-shaped body). You will also collect some brown caterpillars, called rice worms (*Apamea apamiformis*), that live among the flowers, along with manner other insects. They generally depart from the collected rice during the drying stage. After the spikelets have been collected, they must be dried or they will mildew and spoil. This is best done by spreading the spikelets on mats or a tarp in the sun for three to four days. Once dried, identified when the grains snap in half (rather than bend), the wild rice is stable and can be stored for some time. Wild rice is not ready for consumption yet as the grain (technically called a caryopsis) is enclosed inside of two scales (called a lemma and palea) that must be removed prior to cooking or processing the fruit. The pair of scales and the caryopsis is collectively called a spikelet. The spikelets must be parched over dry heat to make the enclosing scales brittle. This can be accomplished by placing a portion of the spikelets in clay or metal pots or pans over low heat and turning the spikelets until they begin to slightly brown (but do not burn them or the caryopsis itself will become brittle and shatter as well). When properly parched, the enclosing scales should shatter and peel away from the grain when the spikelet is rolled firmly between the fingers. Once parched, the hardest work begins, which is separating the scales from the caryopses (called hulling). There are various ways to hull wild rice. For small quantities, one can vigorously rub the spikelets between the palms of the hands while sitting over a large mat or piece of fabric to catch the falling grains. For larger quantities, it is best to get one's feet involved by placing batches of rice in a large barrel of some kind or a pit lined with a thick hide (such as moose or deer that has been brain-tanned). Clean shoes or moccasins are used to tread upon and twist the spikelets to pry and rip the scales off the grain. This is best performed by placing weight on the balls of the foot and pivoting the heels back and forth. After a period of time, the collection of grains, empty scales, and spikelet fragments are winnowed. Winnowing separates the edible grain from the inedible material (often collectively referred to as chaff). There are several methods of winnowing, the easiest to describe simply uses gravity and a light breeze to separate the grains from the lighter scales. Slowly pour the grains and chaff above a fabric or hide mat. The heavier grain falls onto the mat while the lighter chaff is blown a short distance by the wind. It can take a couple of episodes of treading and winnowing to separate all of the scales from the caryopses (though I usually do it in one session). The grains can be stored for a long period of time if kept in a cool, dry location. Prior to cooking, the grains should be soaked for a minimum of a few hours to help neutralize the phytic acid (an antinutrient present in the bran that binds to important minerals and blocks their absorption by the body—some of the phytic acid will have been deactivated by the parching). Cooking is best done by boiling one part grain to two (or a bit more) parts water until the water is absorbed (more water may be required if the cooking container lacks a lid). The cooking time required will vary depending on the total amount of grain (the grains will be soft but not mushy when finished cooking). The grains can also be ground into flour. Though the Ojibwa may be best known for utilizing species of *Zizania* as an important food source, the Chippewa, Dakota, Menominee, Omaha, Ponca, Potawatomi, Thompson, and Winnebago also consumed either *Zizania aquatica* or *Zizania palustris*.

The author using a pair of rice knockers made from *Thuja occidentalis* to lean wild rice over the canoe and dislodge the ripe grains.

Amphicarpaea bracteata (L.) Fern. hog-peanut


Left—inflorescence. Right—leaf, note the asymmetry of the two lateral leaflets.

Amphicarpaea bracteata is a locally common plant that can form extensive colonies in open forests and along forest edges (including trailsides and logging openings). The stems are very thin, and later in the season begin to twine about other vegetation. This plant produces two types of flowers. The open-pollinated (i.e., chasmogamous) flowers are produced on the aerial stems and have purple to white petals. These flowers mature as a small, few-seeded legume. The plant also produces a subterranean flower that is closed-pollinated (i.e., cleistogamous). These flowers mature as a one-seeded fruit resembling a small bean.

Underground fruits of *Amphicarpaea bracteata*. The larger fruits are ca. 10 mm long (i.e., a little larger than peas)

The underground fruits can be carefully unearthed in early fall (late September on). They are usually found within a few centimeters of the ground surface, so they are not laborious to dig (though they are small and many are required for a meal). As the fall season progresses, they readily detach from the plant, so carefully clearing the soil about the base of the plant combined with a light tug on the stem base works well to uncover the bean-like fruits. Some Native Americans (e.g., Omaha) rubbed the fruits between the palms of their hands to remove the outer skin prior to consumption. I don't bother with this. The fruits can be eaten raw (in moderation) and taste somewhat like the uncooked seeds of *Phaseolus vulgaris* (common bean). They are best soaked for several hours (soaking deactivates phytic acid, an antinutrient) and then boiled until soft (10–20 minutes). At that point, the flavor is more starchy and reminiscent of potato. Given that many wild and cultivated legumes contain enzymes that can interfere with digestion, it is likely safest to cook them if they are to be eaten in quantity. They were utilized as a food by the Dakota, Omaha, Pawnee, Ponca, and Sioux.

Apios americana Medik. common ground-nut


Left—leaves, with usually 5 or 7 leaflets. Right—inflorescence, each flower 10–13 mm long.

Apios americana is an important food source that can be gathered at any time when the ground is not frozen. It is a vine that climbs over and twines around other vegetation. It is most often found along riparian forests, where the sand and silt soils allow relatively easy digging of the tubers. Occasionally it can also be found in forests and along forest edges and shorelines. Identification of this edible plant is uncomplicated (see notes describing the tubers).

Tubers along underground stem.

The rhizome (i.e., underground stem) of *Apios americana* usually has two or more starchy tubers along its length, separated by short, thin sections of stem. They are best gathered by digging carefully around the base of the aerial stem and following this down into the earth. By not breaking the underground stem, one can still find the tubers even if the stem has taken a curve and has grown in an unexpected direction (which happens occasionally). Confirm you have the correct species by cutting into the tubers—they should exude small amounts of milky latex from the fresh wound (some may need low magnification to see the latex). The tubers should be cooked prior to consumption, by boiling, roasting, or pit baking, because they contain trypsin inhibitors. Some people have adverse reactions to the cooked tubers (very rare), so err on the side

of cooking for too long when first sampling this excellent edible. Cooked tubers are somewhat similar in texture and taste to *Solanum tuberosum* (potato), but richer. My favorite way of cooking them is to leave the skin of the tuber intact and bake them in a bed of coals. When finished (after 15–30 minutes, depending partly on the size of the tubers), the tubers can be sliced open on one side and eaten much like a baked potato. The starch easily separates from the skin, alleviating the need to peel the tubers (as one would need to do if added to soups and the like). The tubers can also be dried and ground into flour. The tubers of *Apios americana* were eaten by the Cheyenne, Dakota, Omaha, Osage, Pawnee, and Sioux. The flowers are edible raw or cooked, and the seeds found in the small legumes of this species are also edible (they should be boiled similar to *Pisum sativum*—garden pea).

Smilax herbacea L. carrion-flower


Left—upper stem, showing leaf blades and stipular tendrils. Right—inflorescence with green-yellow flowers.

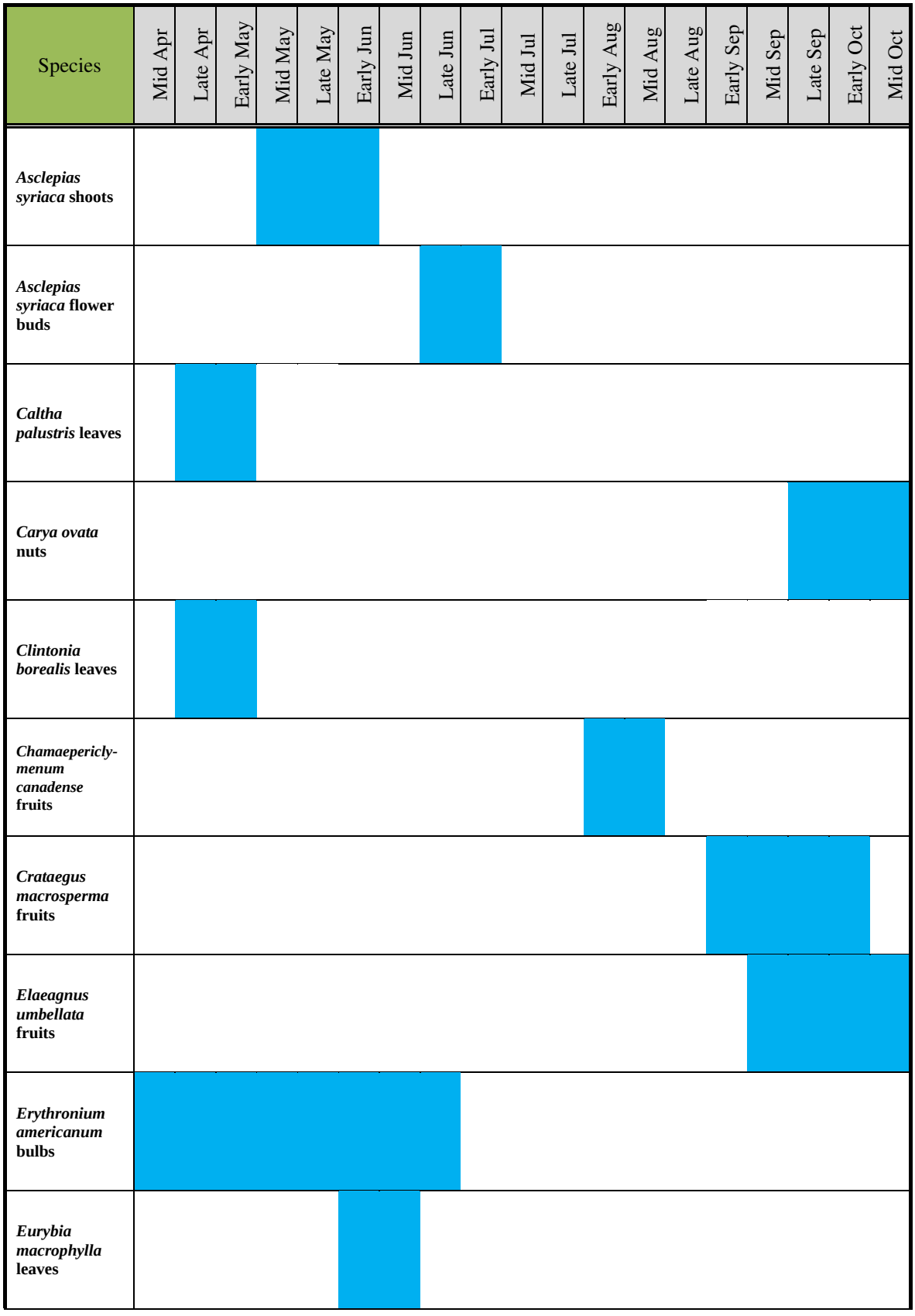
Smilax herbacea is at first an upright herb that, as it continues to elongate, eventually arches and climbs over other vegetation by means of a pair of stipules that are modified into tendrils. The leaves have a blade that abruptly tapers to a definite petiole (i.e., leaf stalk), an uncommon feature in monocotyledonous plants. The flowers, borne in a spherical umbel, have six green-yellow tepals (tepal is the name given to sepals and petals that cannot be told apart due to similarity in size and pigmentation). The flower matures as a dark berry. There are other species of *Smilax* in New England, but they are woody plants with sharp prickles along the stem. *Smilax herbacea* can be found along forest edges and in abandoned fields, but it is most common along the upper banks of rivers and in river shore meadows. The flowers appear from late June through July.

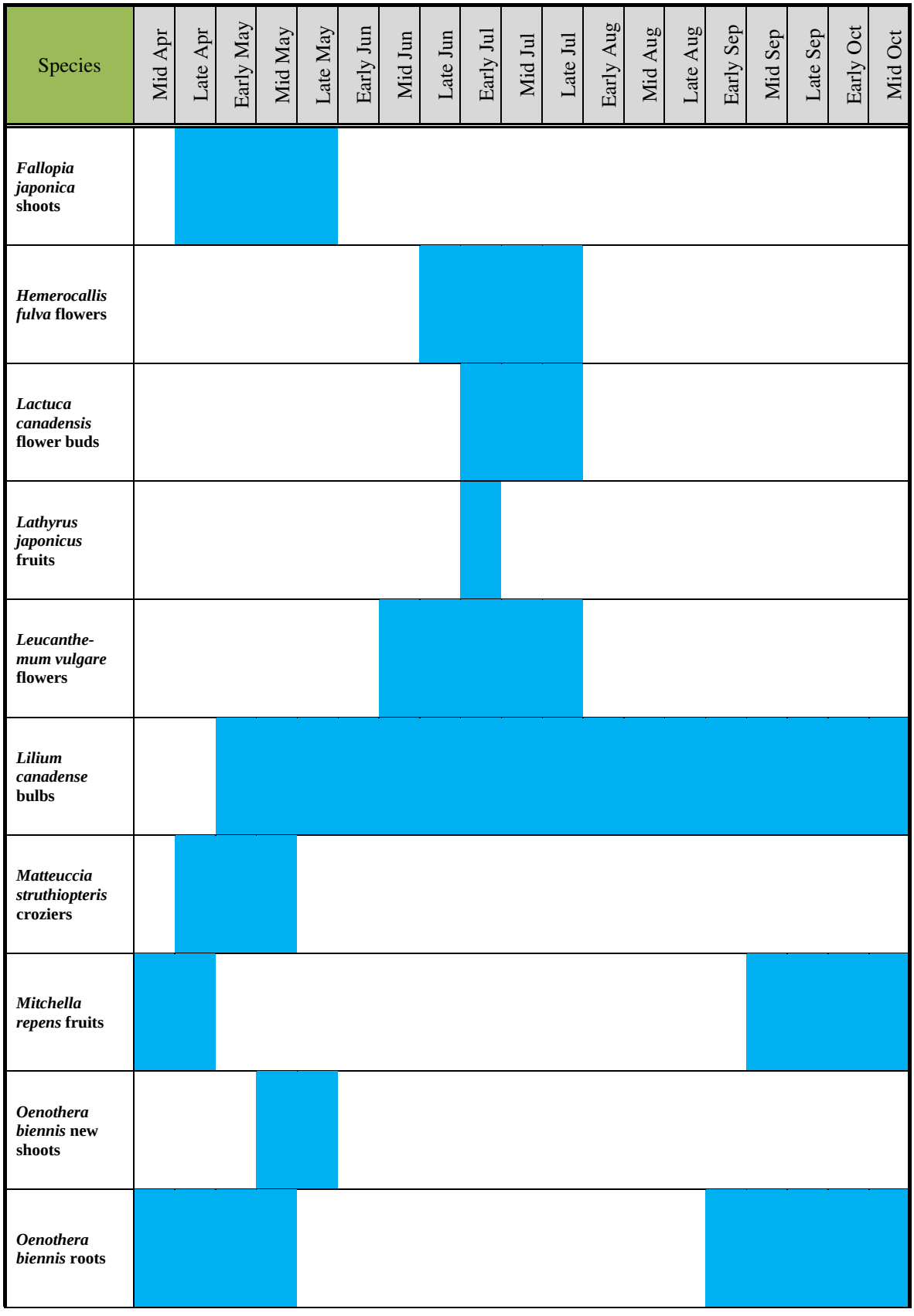
The tender growing tips of this plant in the early portion of the growing season are excellent alone or in wild salads. They can also be boiled for 5–10 minutes and served as a potherb. In places where this plant is common, it is easy to pinch off the shoot tips (including the unfolding leaves) in quantity in a relatively short period of time. Their taste is somewhat similar to that of *Asparagus officinalis* (asparagus). The mature berries, which are usually found in the late summer (i.e., September), are also edible. They occur in tight, spherical clusters and can be easily gathered in quanitity when numerous plants are present in an area. The flavor of the berries is variable and often vaguely resembles the fruits of *Phoenix dactylifera* (date palm), minus the sweetness, though sometimes they are overlaid with a mildly unpleasant taste. The Meskwaki and Omaha are two Native American groups known to have eaten the fruits of this species.

7.0 EDIBLE PLANT COLLECTION DATES

The following table provides collecting dates for selected wild plants in midcoast Maine. Choice collecting dates are highlighted with blue. Some species, especially those with edible foliage, can be collected outside the recommended dates; however, they may not be choice foods during that time. Collecting dates may differ in your region so be observant and keep careful records. It will be possible to calculate an offset for your area (i.e., you can learn to add or subtract days or weeks to make the calendar work for your local area).

Species	Mid Apr	Late Apr	Early May	Mid May	Late May	Early Jun	Mid Jun	Late Jun	Early Jul	Mid Jul	Late Jul	Early Aug	Mid Aug	Late Aug	Early Sep	Mid Sep	Late Sep	Early Oct	Mid Oct
***Aegopodium podagraria* leaves**		■	■	■	■	■	■												
***Allium tricoccum* bulbs**	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
***Amelanchier laevis* fruits**										■									
***Amphicarpaea bracteata* underground fruits**																	■	■	■
***Apios americana* tubers**	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
***Arctium minus* roots**	■	■	■														■	■	■
***Arctium minus* shooots**						■	■												


Species
Mid Apr
Late Apr
Early May
Mid May
Late May
Early Jun
Mid Jun
Late Jun
Early Jul
Mid Jul
Late Jul
Early Aug
Mid Aug
Late Aug
Early Sep
Mid Sep
Late Sep
Early Oct
Mid Oct
Asclepias syriaca shoots
Asclepias syriaca flower buds
Caltha palustris leaves
Carya ovata nuts
Clintonia borealis leaves
Chamaepericly-menum canadense fruits
Crataegus macrosperma fruits
Elaeagnus umbellata fruits
Erythronium americanum bulbs
Eurybia macrophylla leaves


Species
Mid Apr
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Mid May
Late May
Early Jun
Mid Jun
Late Jun
Early Jul
Mid Jul
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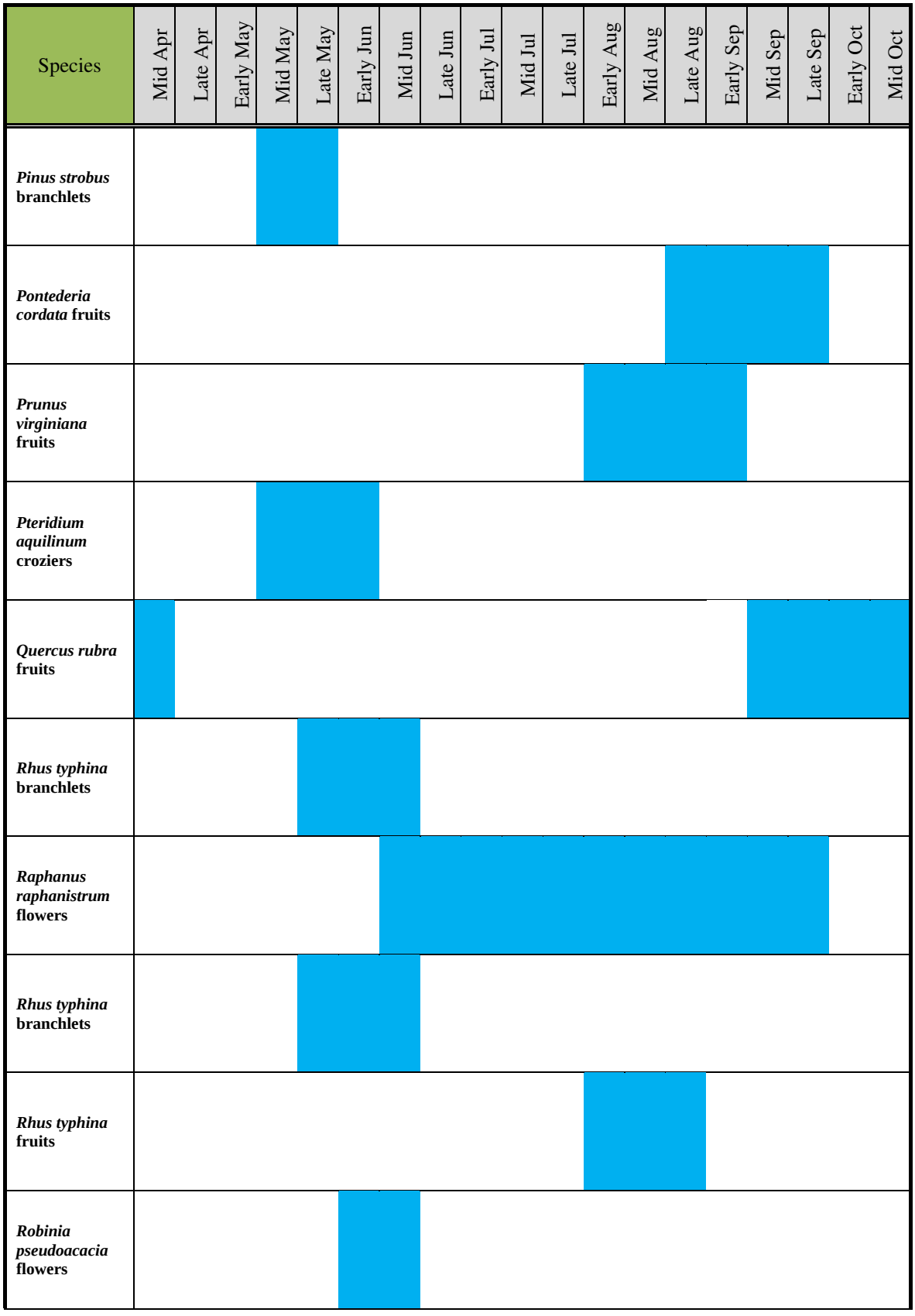
Early Aug
Mid Aug
Late Aug
Early Sep
Mid Sep
Late Sep
Early Oct
Mid Oct
Fallopia japonica shoots
Hemerocallis fulva flowers
Lactuca canadensis flower buds
Lathyrus japonicus fruits
Leucanthe-mum vulgare flowers
Lilium canadense bulbs
Matteuccia struthiopteris croziers
Mitchella repens fruits
Oenothera biennis new shoots
Oenothera biennis roots


Species
Mid Apr
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Early May
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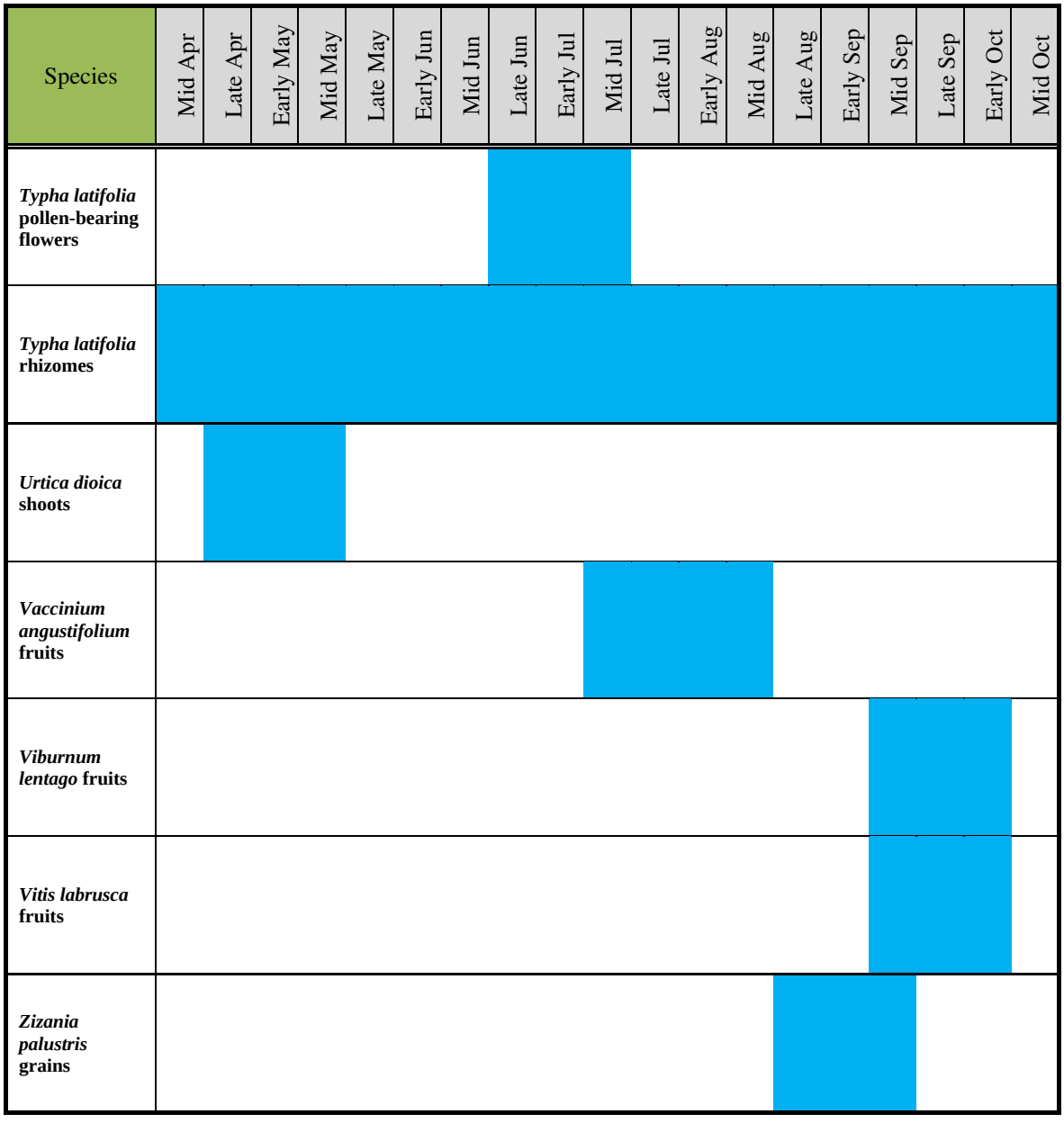
Late May
Early Jun
Mid Jun
Late Jun
Early Jul
Mid Jul
Late Jul
Early Aug
Mid Aug
Late Aug
Early Sep
Mid Sep
Late Sep
Early Oct
Mid Oct
Pinus strobus branchlets
Pontederia cordata fruits
Prunus virginiana fruits
Pteridium aquilinum croziers
Quercus rubra fruits
Rhus typhina branchlets
Raphanus raphanistrum flowers
Rhus typhina branchlets
Rhus typhina fruits
Robinia pseudoacacia flowers

Species	Mid Apr	Late Apr	Early May	Mid May	Late May	Early Jun	Mid Jun	Late Jun	Early Jul	Mid Jul	Late Jul	Early Aug	Mid Aug	Late Aug	Early Sep	Mid Sep	Late Sep	Early Oct	Mid Oct
***Rosa virginiana* fruits**																■	■	■	■
***Rubus allegheniensis* fruits**												■	■	■	■				
***Rubus idaeus* fruits**										■	■	■							
***Sagittaria latifolia* tubers**	■	■	■													■	■	■	■
***Sambucus nigra* fruits**															■	■	■		
***Smilax herbacea* fruits**																■	■	■	
***Taraxacum officinale* leaves**	■	■	■																
***Tilia americana* flowers**									■	■									
***Trillium erectum* leaves**		■	■																
***Typha latifolia* base of new shoots**				■	■	■	■	■	■	■	■	■	■						


Species
Mid Apr
Late Apr
Early May
Mid May
Late May
Early Jun
Mid Jun
Late Jun
Early Jul
Mid Jul
Late Jul
Early Aug
Mid Aug
Late Aug
Early Sep
Mid Sep
Late Sep
Early Oct
Mid Oct
Typha latifolia pollen-bearing flowers
Typha latifolia rhizomes
Urtica dioica shoots
Vaccinium angustifolium fruits
Viburnum lentago fruits
Vitis labrusca fruits
Zizania palustris grains

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Warning: Using wild plants can have profound effects on your health. Every attempt by the author has been made to provide complete and accurate information concerning the safety of using the plants discussed in this reference. However, the author, publisher, and printer accept no liability for any loss or injury as a result of use or misuse of ideas, preparations, and suggestions presented in this book. Further, this book is not intended to replace consultation with health and nutrition experts.

Plants have been and continue to be immensely important to people. They provide food, medicine, materials for shelter, fuel for heating dwellings and cooking food, fibers for cordage and clothing, wood for tools and hunting weapons, etc. Aboriginal people knew which plants could be used for various purposes, where to find them, and how to process them. They possessed an intimate relationship with plants that began with learning how to identify them and deepened as they learned their smell, their taste, the quality of their fibers, the timing of their flowers, and so on. Contemporary people still rely heavily on plants, but, unfortunately, most people in developed countries are no longer able to find, collect, and process the materials they need to sustain their lives. Not only has this led to populaces that are entirely dependent on agribusiness and manufacturers, but it has also removed people from direct participation in the circle of life. This, in turn, has created populations who do not know the functions and values of wild places (both large and small) and has led to apathy for protecting these open spaces. Anaskimin is interested in helping people regain the old knowledge of plants and help foster a connection between people and their local landscape. When people are involved in local ecology, they become champions for conservation and voices for the ethical treatment of the organisms we share this earth with. This is a natural outcome of people realizing that wild things are necessary for a sustainable, healthy, and rewarding future.