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Poison-ivy and Its Kin

Nearly everyone has an acquaintance with poison-ivy, chiefly from the rash that it causes rather than from its nature as a plant. Most of what I shall write here, however, concerns this very interesting plant and its distribution in the world. Hopefully I can dispel myths — old wives’ tales — that persist in our folklore despite scientific findings to disprove them.

Benign Relatives

Poison-ivy is a member of the sumac family (Anacardiaceae) to which a number of other familiar plants belong. One of them is the common staghorn sumac (*Rhus typhina*) (See Fig. 1). Actually this plant has several relatives in the United States, all with the upright cone of red fruits in the late summer and fall, which differ very little from one another and which, in fact, occasionally hybridize. These are the smooth sumac (*Rhus glabra*) and the dwarf sumac (*Rhus copallina*), which has a winged petiole or rachis. Some other related species are found in local areas of the Southeastern United States.

Another member of the benign sumacs is the aromatic sumac (*Rhus aromatica*) (See Fig. 2). It is found in diverse places — generally in regions of well-drained sands with pine forest cover in the eastern half of this country. A cognate species, *Rhus trilobata*, exists in the western part of the United States. Perhaps it might be assumed that there is one species complex with distinguishable forms at geographical extremities of east and west. This matter needs to be examined much more carefully.

Additional relatives of the sumacs are found in North America. *Cotinus coggygria*, the smoke-tree, a native of Mediterranean Europe east into Central Asia as far as China, is cultivated in temperate North America. There also is an endemic smoke-tree (*C. obovata*) that is restricted to limestone and dolomite cliffs in the southern Appalachians, extending into eastern Texas. It has larger leaves and inflorescences than its Eurasian counterpart. The pepper-trees, *Schinus* spp. are native in Latin American countries. One, *Schinus molle*, has become weedy...
Fig. 1 — Staghorn sumac (Rhus typhina) in flower.
throughout Latin America way up into Texas and southern California. It is a tree with finely divided pinnae and long clusters of red drupes on the carpellate, or female, plants. Like most members of the Anacardiaceae, the plants are dioecious (i.e. either male or female). Another common member of this group, S. terebinthifolius, has become weedy in the southern part of Florida and is so well established there that it is called Florida holly. The name Brazilian pepper-tree is probably more appropriate, however, since it is no relation to the true holly (Ilex).

Poisonous Relatives

The familiar cashew nut (Anacardium occidentale), planted and escaped throughout the world Tropics, is originally native to India. The “nut” itself is the ripened ovary, but below this is an expanded pedicel and receptacle that become very much enlarged, fleshy and tasty at fruiting stage (See Fig. 3). It is called the “cashew-apple,” and may be eaten raw or made into jam. Because the cashew-nut has poisons in the shell that are closely allied chemically to those in poison-ivy, it is worth mentioning as a poisonous relative of poison-ivy. Cashew nutshell liquid despite its poisonous properties has been important in making heavy-duty brake linings and electrical insulations. During the Second World War, American servicemen overhauling planes in the Canary Islands (where there is no similar dermatitis-producing plant) repeatedly broke out with a rash that looked similar to poison-ivy dermatitis. It was finally traced to the fact that they were working with the brakes and electrical parts of the planes that had been coated with cashew nutshell liquid hardened to a lacquer-like finish.

A decade ago, a number of cocktail stirrers (See Fig. 4) came into the United States from Haiti. They were light in weight, took up little space in one’s luggage, and looked “exotic.” They were, hence, very popular as souvenirs among air travelers who needed to keep their baggage weight to a minimum. The trouble was that the “head” of this little stirrer (in the shape of a voodoo doll) was an unroasted cashew nut, complete with poisons intact! Moreover, the “eyes” were seeds of Abrus precatorius, the rosary-pea, containing one of the most dangerous poisons of the tropics. (Two chewed and swallowed seeds can kill an adult.) They have been banned from further entry into this country.

Fig. 2 — Aromatic sumac (Rhus aromatica) in flower.
Fig. 3 — Tiny flowers and large fruits of cashew (Anacardium occidentale) in the West Indies. Note the “cashew-apple,” the enlarged and swollen receptacle.

Fig. 4 — A cocktail stirrer or “voodoo doll” souvenir from Haiti made from unroasted cashew nut head. Eyes are of rosary-pea (Abrus precatorius).

Fig. 5 — Fruiting specimen of dhobi-nut. This one is Semecarpus gigantifolia, endemic to Taiwan and the Philippines.
In the Far East the fruits of the tree *Semecarpus* (chiefly *S. anacardium*) are used to make indelible laundry marks in clothing. The fruits have a poison similar to that in poison-ivy that will harden to a black, indelible, and unwashable substance. The fruits have been called dhobi-nuts (See Fig. 5) after the Indian name for the laundrymen, the dhobis. American service-men stationed in India during the war often broke out with poison-ivy dermatitis on the neck or waistband — i.e. those places where the dhobis had placed a laundry mark in their underwear.

Fig. 6 — Poison-sumac in a typical swamp habitat.
The poison-wood, *Metopium toxiferum*, a tall shrub or small tree, grows in the Bahamas, Greater Antilles, and in Florida as far north as Daytona Beach. It produces a rash no different from that caused by poison-ivy.

The most common member of the family in the Tropics is the mango (*Mangifera indica*). Even the mango has poisons in it, but they appear to be restricted to the exocarp ("skin" of the fruit) and pedicel. It is therefore advisable always to peel a mango before eating it. One will note that persons who live in regions of the world where the mango is common do so.

Poison-ivy's best known relative in this area is poison-sumac (*Toxicodendron vernix*), which grows only in swamps and other wet places in the eastern third of the United States (See Fig. 6). This is a shrub with a few stout, ascending stems, pale grey bark, compound leaves with smooth shining leaflets, and pendent clusters of greenish flowers followed by whitish fruits (See Fig. 7).

In Asia one of the close relatives of our poison-sumac is the lacquer tree of China and Japan (*Toxicodendron vernicifluum*), from which the beautiful oriental lacquer ware is made. This
lacquer actually is layer after layer of the sap with its natural poisons in oxidized and polymerized form. Those who work with the lacquer endure a painful apprenticeship until they become insensitive to these poisons.

The poisons in poison-ivy have been determined chemically by Dawson (1954, 1956) as being catechols with long side chains:

\[
R = (\text{CH}_2)_n \text{CH}=\text{CHCH}=\text{CHCH}=\text{CHCH},
\]

Morphology

Poison-ivy can grow to a rather large size, although the stems commonly do not exceed an inch or so in diameter. There are some records of poison-ivy vines that have achieved 5 or 6 inches in diameter (See Fig. 8), and there is at least one tree of it on record from Sanibel Island, Florida that stands 15 to 20 feet high (Cooley, 1955). The wood is not poisonous because the poison is carried in special ducts in the phloem, not the xylem.

When the leaves are missing from the shrubs and vines during the fall and winter, poison-ivy may be seen with its stems climbing a number of trees, especially elms. The aerial stems nestle in the corrugations of the bark (See Fig. 9), while the aerial roots hold the vines fast to the tree. In the autumn and

Fig. 7 — Fruits of poison-sumac (Toxicodendron vernix) in winter.
winter the buff or pale yellow fruits that remain on the carpellate plants are harvested by a variety of birds; certain species of flicker make up nearly a third of their diet from poison-ivy fruits. Because these fruits are eaten by birds the plant is common around trees, fence-rows, under telephone wires, and wherever birds are likely to perch. Incidentally, I refer to the disseminules as fruits rather than seeds because the fruits of *Rhus* and *Toxicodendron* species are drupes with the seed wall firmly attached to the endocarp of the fruit wall. What is disseminated is the entire fruit, with the possible removal of the papery exocarp.

Occasionally poison-ivy and poison-sumac are used in decorative indoor arrangements because of their autumn coloration. Poison-sumac, with its bronze-red or cherry-red leaves in autumn, is one of the most attractive of our shrubs at that season. Poison-ivy has fall colors ranging from yellow through orange to dark red. The flowers which are produced in June and July often are overlooked because people do not wish to approach the plant closely enough to see them. They are rather tiny, rarely exceeding 3 mm. in diameter, with the staminate more obvious than the carpellate because of the exserted stamens with yellow anthers. The flowers are greenish-cream in color and blend into the background of leaves (See Fig. 10).

**Distribution**

The total world distribution of the genus *Toxicodendron* includes Eastern Asia and North America south to Colombia in South America. One will note that it is found in North America and Eastern Asia, a classical distribution pattern first noted for a number of plant species by Asa Gray over a hundred years ago (Gray 1846, 1889). A somewhat reduced range is occupied by the Section *Toxicodendron*, in which poison-ivy and its immediate relatives, the poison-oaks, belong (See Fig. 11).

Poison-ivy is found only in North America and Eastern Asia. It presumably originated in North America about 80 million years ago and migrated across the Bering Straits when there was a land connection between North America and Asia, and when the climate was much milder. In the intervening time, with the formation of the Bering Sea and Straits and the subsequent cooling of the Arctic, plants that were left in North America went their own way evolutionarily from those in Eastern Asia (MacGinitie, 1937). There are similarities in the morphology of both forms of poison-ivy (Asiatic and North American) to suggest their common ancestry. Chief among these are hairs on
Fig. 8 — Section of poison-ivy wood nearly six inches in diameter.

Fig. 9 — Poison-ivy vines nestled in corrugations of elm bark.

Fig. 10 — Close-up of staminate poison-ivy flowers. The flowers are about 3 mm in diameter.
the fruits which are common in plants along the Atlantic Coast (T. radicans subsp. radicans) and the two taxa in Asia (T. radicans subsp. orientale of Japan and T. radicans subsp. hispidum of China and Taiwan).

Although poison-ivy was unknown in Europe prior to the colonization of North America, references to it are known in Eastern Asia in writings of Chinese scholars back as far as the seventh century (Toyama, 1918). Capt. John Smith (1609) first described poison-ivy to Western Europe when he reported that it "causeth itchynge." Although the plant was known much earlier than the writings of Linnaeus, the specimen upon which the name is based is one which Peter Kalm collected about 1751 in the vicinity of Philadelphia.
Most of the diagnostic features of the poison-ivy taxa are found in the carpellate plant, especially in the fruit; therefore it has been difficult in the past to place the original name of poison-ivy among the several subspecies because the type specimen is a staminate plant in flower.

One form of poison-ivy (*T. radicans* subsp. *radicans*) is essentially an Atlantic coastal dweller that occurs from southern Nova Scotia south to the Florida Keys and the western Bahama Islands, and west to eastern Texas. Although there is some variation throughout its range, there is no clear-cut division between populations with specialized characters. I have had to recognize all of these populations as one continuous, although variable, subspecies. A character that unites all of this group along the Eastern Seaboard — and incidentally is shared with populations in Asia — is small tufts of hairs in the vein axils on the lower surface of the leaves. These may be either clear and hyaline or reddish-brown, with a predominance of hyaline ones in the New World and reddish-brown ones in the Old. This subspecies of poison-ivy is the one that can become most dense in its growth. It is perhaps nowhere more abundant than along the sandbars off the coast of New Jersey, Long Island, through the Carolinas, and along the rocky coast of New England. At Island Beach, New Jersey, for example, it forms a dense thicket and carpet that covers the rear dunes and swales — essentially 100 to 200 yards wide — for about ten miles down the undisturbed barrier beach.

In the lower Mississippi River basin there is a form of poison-ivy (*T. radicans* subsp. *pubens*) that is virtually confined to the cotton-growing area of rich soils in places such as the “Delta” region of Arkansas, Louisiana, and Mississippi. On the Edwards Plateau region of Texas and continuing north to the Arbuckle Mountains of Oklahoma another subspecies of poison-ivy is found with sharply pointed lobes on the leaflets (*T. radicans* subsp. *verrucosum*) (See Fig. 12). In recent years, with the activities of man disturbing the habitat, both of these have begun to migrate and come into contact with other subspecies of poison-ivy, with which they interbreed. Because a number of subspecies impinge upon sections of Arkansas and southern Missouri, it is most difficult to name the taxa in these areas due to the great extent of hybridization, introgression, and the blurring of subspecies lines.

Two subspecies of poison-ivy are encountered in Mexico. *T. radicans* subsp. *barkleyi* seems to follow the Sierra Madre Oriental, extending into western Guatemala to the ruins at Zacaleu;
T. radicans subsp. divaricatum, which is common in the Sierra Madre Occidental, extends northward into the southeastern corner of Arizona, and to the southern tip of Baja California. There are a few outliers of both of these forms in isolated regions of Mexico, presumably the result of long-distance dispersal, probably by birds. Where the subspecies overlap—chiefly in the trans-Mexico volcanic belt—occasional hybrids between these two subspecies appear.

The most unusual form of poison-ivy is T. radicans subsp. eximium. I say it is unusual because it has leaf forms quite divergent from all other poison-ivy populations, and because it is rarely collected (not between 1937 and 1964, for example). It is restricted to the tributary valleys of the Rio Grande in Texas and Mexico with one outlier in southern Sonora. The leaflets resemble the “club” on a deck of playing cards. The leaflets of shade leaves are very much smaller than those growing in open sunlight, a general principle with poison-ivy and one that is quite contrary to our usual ecological concept of sizes of sun- and shade-leaves of other plants. Figure 13 shows a single collection in which the shade-leaves are very different from those growing in the sun. These two leaf forms are from the same individual plant from Big Bend National Park, Texas.

In the center of the United States (the midwestern states generally north of the Ohio River), there is a subspecies of poison-ivy that has no distinctive characteristics of pubescence, leaf form, etc. The eastern boundary of this subspecies (T. radicans subsp. negundo) is the Allegheny ridge, especially clearly delimited in the vicinity of Tuscarora Mountain in Pennsylvania. On the east flank of the Alleghenies is subsp. radicans and on the west is subsp. negundo (See Fig. 14).

One of the closest relatives of the poison-ivy of our East Coast is found in Japan (T. radicans subsp. orientale) (See Fig. 15). It extends from the southernmost portions of the Kurile Islands and the lower half of Sakhalin Island (under Russian mandate) to the northernmost of the Ryukyus (Yakushima) and the Bonin Islands. The Japanese poison-ivy is not nearly so abundant in Japan as poison-ivy is in this country. I believe that this phenomenon is due to the fact that all poison-ivies are essentially plants of disturbed habitats, and respond to the activities of man. Most of the land that is under cultivation in Japan has been thus for a long time with little additional disturbance by the removal of forests and construction of cities, the making of new roads, etc.
Fig. 12 — Poison-ivy (Toxicodendron radicans subsp. verrucosum) from the Edwards Plateau, Texas.

Fig. 13 — Herbarium specimen of poison-ivy from Big Bend National Park, Texas (Toxicodendron radicans subsp. eximium). Both sprigs are from the same individual. The upper one with large leaves is from a climbing cane in the sun; the lower one with small leaves is from a prostrate branch in shade.
Fig. 14 — A barn leaning under the weight of a poison-ivy vine in Michi-
gan (Toxicodendron radicans subsp. negundo).

Fig. 15 — Poison-ivy (Toxicodendron radicans subsp. orientale) from the 
Boso Peninsula, southeast of Tokyo, Japan.
Poison-ivy also occurs in China where it has bristly hairs on the fruits (*T. radicans* subsp. *hispidum*). It is found both in northern mountainous regions of Taiwan and also in the interior of Szechuan, Yunnan, and Hupeh provinces of mountainous western China, the area least visited by western explorers.

A peculiarity of the various subspecies of *T. radicans* is that they will climb trees if given the opportunity. If there is no fence or tree to climb, or if the original support is removed, the plant will continue to grow as a sturdy shrub, often up to 5 and 6 feet high. Also peculiar is the fact that the ranges of these subspecies stop as one reaches the 44th parallel of latitude on the north and approximately the 100th meridian of longitude on the west. North and west of these boundaries is a form of poison-ivy that normally does not climb trees. It has a number of other characteristics that set it apart from the viney poison-ivies. It never produces aerial roots; it will grow in different ecological settings from *T. radicans* (e.g., it will grow in vegetation containing abundant bracken fern, whereas *T. radicans* usually does not); its leaflets are on much longer stalks than are the leaflets of *T. radicans*; its leaves tend to be much broader and its fruits far larger. This form is recognized as a separate species, *T. rydbergii*, because it differs in so many characteristics from all the other forms of poison-ivy both in America and in Asia. It is the most widespread and the most uniform of all the poison-ivies. Although it occurs all the way from Central Arizona to the Gaspé peninsula and to the Rockies in southern Canada, it is impossible to distinguish any one geographical race from any other throughout this range (See Fig. 16).

The reference to the 44th parallel of latitude as being a boundary is intriguing for it can be detected along north-south rivers such as the Hudson and the Connecticut as well as it can be seen to be a dividing line between the southern portion of Nova Scotia and the northern part. This parallel of latitude marks an ecotone that has had significance in the past, being the dividing line between the agricultural Indians and the hunter-gatherer Indian in parts of Michigan, for instance (Cleland, 1966). This line also separates the region of presence and region of absence of mastodon skeletons. It presumably is an ecological boundary of some importance, on either side of which two forms of poison-ivy have evolved.

*The Poison-oaks*

Now to poison-oak. The term “poison-oak” means different
Fig. 16—Herbarium specimen of Rydberg's poison-ivy (Toxicodendron rydbergii). Note long petioles and orbicular leaflets that have a tendency to fold along the midrib.
Fig. 17 — Distribution of western poison-oak (Toxicodendron diversilobum) and poison-ivy (T. rydbergii) in the Columbia River gorge of Oregon and Washington, and location of intergrades between them.

Fig. 18 — Eastern poison-oak (Toxicodendron toxicarium) in an oak-pine forest, Bastrop County, Texas.

Fig. 19 — Poison-ivy fruits (left) in dry arrangement.
things to different persons. It generally is applied to plants in
the sumac family, and not to any true oak (Quercus). The term
evolved because of the shape of the leaflets among some of the
trifoliolate Toxicodendrons that appear to resemble leaves of
true Quercus species. The leaflets of the western poison-oak
resemble leaves of one or another of the western oaks such as
Quercus agrifolia, and the leaflets of eastern poison-oak look
like small leaves of Quercus alba.

There is a western poison-oak (Toxicodendron diversilobum)
that is indigenous to the region from southern British Columbia
to northern Baja California, wedged between the deserts and
the Sierras and Cascades on the east and the Coast Ranges on
the west. Neither poison-oak on the western flank of the moun-
tains, nor poison-ivy (T. rydbergii) on the east crosses the Cas-
cades (except for one population of poison-oak known from a
low-elevation pass in northern California). On the other hand,
they come into contact in the Columbia River gorge. Where
western poison-oak and Rydberg's poison-ivy overlap in range
in the Columbia gorge, they form intergrades (See Fig. 17). The
western poison-oak is similar to T. radicans in that it may grow
as a healthy vine or shrub, and that it is found in a multitude of
habitats. In fact, it exhibits one of the broadest ecological
amplitudes of all the species of plants in the west.

In the eastern United States, the second poison-oak (Toxi-
codendron toxicarium) occurs from southern New Jersey to
Marion County, Florida, west to eastern Texas and Oklahoma.
Eastern poison-oak, ecologically very different from western
poison-oak, is seldom found outside of scrub-oak forests on the
coastal plain, commonly where there are ericaceous shrubs,
some pine, and bunch- and wire-grasses (Andropogon and Aris-
tida) (See Fig. 18). In eastern Oklahoma, outside the range of
pine, all the typical associates are present with T. toxicarium,
minus the pine. The sands of poison-oak habitats are usually
excessively drained and coarse, low in nutrients, especially cal-
cium. This species never climbs and is always a sub-shrub, like
T. rydbergii.

There is some variation in the morphology of the poison-oaks.
In the western poison-oak, it is chiefly expressed as a response
to variation in site, and not geography. Poison-oak from southern
California may be indistinguishable from that growing in north-
ern Washington, but two forms growing within a mile of one
another may differ considerably.

In eastern poison-oak this variation pattern seems to hold as
well, but there are greater differences in leaf morphology between staminate and carpellate plants than there are in reference to site, geography, etc. As a standard pattern (occasionally reversed), the staminate plant will have considerably more deeply lobed leaflets than the carpellate. In fact, many female plants have leaflets with undulate or entire margins. The late Prof. Fernald described an elobate form of poison-oak from Virginia, never having noticed that all the plants were carpellate!

If the reader feels that he has always been confused by the true definition of poison-oak, he is not alone. On the sheet that was examined by Linnaeus and is the first known herbarium specimen of eastern poison-oak, there are two different species attached: eastern poison-oak and aromatic sumac! The name that Linnaeus applied was *Rhus toxicodendron*. For strict application of this name among those who believe that the toxic sumacs belong with the benign ones in the genus *Rhus*, the only plant to which this binomial can properly be applied is eastern poison-oak. Yet the literature is rife with the name *Rhus toxicodendron* applied to all forms of poison-ivy and to both species of poison-oak. The great French botanist Michaux (1803) ignored the name *Rhus radicans* and made all the toxic American sumacs varieties of *R. toxicodendron*; the Swiss botanist DeCandolle (1825) did just the converse. There must be something particularly euphonious about the binomial *Rhus toxicodendron* that has made so many persons latch onto it for use in such a multitude of contexts! For those like myself (Barkley, 1937), who employ a segregate genus (*Toxicodendron*) for the poison-ivies and poison-oaks, the rules of nomenclature preclude any combination using the word *Toxicodendron* as both a generic and specific epithet (a tautonym). Thus, in *Toxicodendron*, one must employ the next oldest specific epithet legitimately published for this plant. Eastern poison-oak thus has become *T. toxicarium*.

Although typical poison-ivy (both species) and both poison-oaks normally have but three leaflets, occasionally additional leaflets are formed. Added leaflets are especially common in western poison-oak, in which nearly every clone studied can be found to have some leaves with five or more leaflets. I have seen one population that consistently produced additional leaflets, ranging even up to seventeen!

*The Generic Name*

The use of *Toxicodendron* as a generic name is an old one,
dating back to 1700 in the writings of Tournefort. Few topics can steam up a group of taxonomists so much as arguing the merits of *Rhus* over *Toxicodendron* as the name of poison-ivy and its kin. For the poisonous species that have axillary inflorescences, pendent fruits, smaller pollen grains, and fruits without glandular hairs, I use the generic name *Toxicodendron*, as do Barkley (1937), Heimsch (1940), and others. Dr. Joe Henne of Purdue University has found rust parasites that attack only *Toxicodendron* species and others that parasitize only *Rhus* species. It appears that these rust fungi are fairly competent taxonomists in noting biological distinctions to add to the morphological ones mentioned above.

**Uses**

When I give a talk about poison-ivy, generally someone in the audience will ask, "Well, what good is it?" It is surprising to most persons that poison-ivy does have some value. The Dutch of Friesland Province in the north of the Netherlands have used it since early in this century to stabilize dikes (Van Der Ploeg, 1966). It has been cultivated in England (as far back as 1640!), in New Zealand, and Australia for its ornamental attributes, probably chiefly the autumn coloration (Conner, 1951, Anonymous, 1908, and Anonymous, 1949). Many birds feed on its drupes, some flickers and wren-tits making up at least a quarter of their diet from poison-ivy fruits (Martin et al., 1951). Bees can make a nontoxic honey from its nectar (Rostenburg, 1955). A number of small mammals use it for cover. And there are those intrepid flower arrangers who employ poison-ivy fruits in dry arrangements (See Fig. 19).

Poison-ivy and the poison-oaks have been known among the American Indians and have been considered both poisonous and useful in their cultures since pre-Columbian times. In a few American Indian languages the word for poison-ivy is equivalent to "bad woman" or "venereal disease." In a few cases the Indian language word for this plant reflects an attempt on the part of the culture to appease the species; the word may be roughly translated as "you are my friend" in Cherokee language.

The Pomo Indians of California used the poisonous sap to dye basket fibers (Balls, 1965). The Meskwaki, Ojibwe, and Potawatomi Indians used it as a poultice to remove warts or on a swelling to make the skin open (Smith, 1928, 1932).

In the Wetherill project diggings at Mesa Verde some poison-ivy was found among the medicine man's possessions. The seeds
that were radiocarbon-dated as having grown around the 13th
century have been preserved intact simply by the dry desert air.
They are clearly identifiable to this day as *Toxicodendron ryd-
bergii* (See Fig. 20). The use to which the medicine man put
these plant products is unknown.

As stated in one of my earlier publications (Gillis, 1971): “The
Ramah Navahoes made an arrow poison from poison-ivy mixed
with deer’s blood and charcoal from a lightning-struck tree, the
latter no doubt a connection with black Magic (Vestal, 1952). Another
version of making this arrow poison added the juices of *Phacelia crenulata* var. *ambigua* Macbr. (Wyman and Harris, 1941). The Navahoes also used poison-ivy (*T. rydbergii*)
for good luck in gambling: they chewed a small piece of leaf
and gave it to an opponent (Vestal, ibid.). The Karok Indians
used sticks of *T. diversilobum* to spit salmon steaks while smok-
ing them over a fire, and its leaves to cover soaproot (*Chlorogala-
um pomeridianum* Kunth) when baking it in an earthen oven. The Concow Indians of northern California even mixed the
leaves of *T. diversilobum* into their acorn meal when they baked
bread. Other northern California tribes simply wrapped their
meal in its leaves while baking (Balls, ibid.). Some, too, used
its supple stems as the warp in weaving baskets (Balls, ibid.).

![Fig. 20 — Comparison of poison-ivy fruits (Toxicodendron rydbergii). Those on left are modern. The ones on the right were retrieved from cliff dwellings at Mesa Verde, and were radiocarbon-dated as having grown in the 13th century.](image-url)
"The Yuki tribe of California used sap from *T. diversilobum* to get rid of warts: they would cut off the wart and apply poison-oak sap to the wound. The same treatment was applied to ringworm and rattlesnake bites (Balls, ibid.). They also used the sap, mixed with mountain hemlock and suet, for tribal markings (John N. Taylor, personal communication). The Yukis also (especially the Tatu or Huchnom branch) used a sprig of poison-oak dipped in water to 'keep the women in due subjection.' The men, while attempting to conjure up the devil in their meeting-hall, would paint one of their peers, strip him, place a chaplet of leaves over his face to render him incognito, and send him through the village amid whoops and diabolical yells. As he cavorted through the village, he would sprinkle wet poison-oak branches in the squaws' faces. Screaming with uncontrollable terror, the women would fall prostrate on the ground. Sworn to silence lest they die while discussing a spook, they would never realize who had, in fact, been their attacker (Powers, 1877)."

**Fossils**

Fossils of poison-ivy (*Toxicodendron magnifolium*) have been known from the western part of the United States from Oligocene time (40 million years ago). Some fossils were quite common constituents of the Weaverville flora of northern California (MacGinitie, 1937), curiously enough a region that has no poison-ivy today, but only western poison-oak. The fossils resemble more closely the poison-ivies of eastern Asia than they do extant poison-ivies from this country today (See Fig. 21). This resemblance further strengthens our belief that the two populations were once continuous between the two continents. Fossils of western poison-oak have been found in Pleistocene deposits in the West. They seem to be little different from *T. diversilobum* of today.

**The Disease**

Now to the disease, which has been studied extensively by Kligman (1958) and Epstein (1958). The poison in the poison-ivies, poison-oaks, and poison-sumacs is carried in specialized vessels or resin ducts in the phloem. It is not, therefore, normally present on the surface of the leaves or twigs. But it is found within these resin ducts, in leaves, flowers, stems, or roots in all the *Toxicodendron* species. Should the leaves be bruised, chewed by insects, or otherwise damaged, then — and only then — will the poison exude from these resin ducts onto the leaf
surface. Being composed of chemically unstable compounds, the original clear liquid oxidizes and polymerizes in a few hours to a black, gummy substance, not unlike the lacquer exudates of the Asiatic sumac relatives (T. vernicifluum, T. succedaneum, and T. trichocarpum). It is transferable to the human being either directly by breaking the leaves and stems as one brushes against the plant, or it may be transferred by the blackened catechols that have come to the surface of the leaves and remained for some time. The poisons may be effective for an indefinite period of time in causing dermatitis. Several hundred-year-old herbarium specimens have been known to affect a sensitive person who has handled them!

The so-called “cures” employed by laymen to treat the dermatitis range from the desperate to the fantastic. A compilation of such treatments (see Kligman, 1958) reveals the range of human imagination in dealing with disease. Some of the cures include drinking photographer’s hypo (sodium hypochlorite), applying either morphine, gunpowder, cream and marshmallows, or aqua regia to the skin. There are those who swear by the application of sap of Impatiens capensis or I. pallida (jewel-weed),
and one pharmaceutical company once sold a decoction of jewelweed for this purpose. Some New Englanders claim that the "sure cure" is application of the boiled concentrate of stems, leaves, and fruits of sweet-fern (Comptonia peregrina).

The dermatitis may be induced in man via the smoke of burning poison-ivy, but not for reasons commonly supposed. The poison is not volatile, even at the temperatures of bonfires. Any transmission of poison in the smoke is therefore by droplets on particles of dust and ash in the smoke, rather than as a gas. While raking up and burning leaves that may include poison-ivy, the wise householder should avoid standing in the smoke, especially if he is sensitive to Toxicodendron poison. The poisons may be transferred to human beings by the hair of animals such as dogs that may run through the poison-ivy or poison-oak; or they may be carried on gloves, boots, and other articles of clothing worn by a person who has been out for a tramp in the woods.

Originally — over 200 years ago — poison-ivy was placed in the genus Rhus. For this reason the dermatitis which is caused by poison-ivy and its relatives is known as "Rhus dermatitis" by the medical profession. Although I have attempted (Gillis, 1971) to make a good case for separating the poisonous species from the benign ones into a separate genus, Toxicodendron, (which, as a segregate genus, has a history dating back to 1700 in the writings of Tournefort and is therefore not a new idea), it is probably best for the medical profession to retain its general terminology for the disease as Rhus dermatitis — a kind of nomen conservandum for the medical folk.

**Herbicides**

There is no quick-and-easy way to rid oneself of the poison-ivy plant should one wish to do so; it is hardy enough to be little discouraged by weed killers. The surest method is to pull it up. Use cotton work gloves rather than rubber ones to protect the hands. The poisons are soluble in rubber and will eventually dissolve their way through the glove to the inside. After eradicating, discard both plants and gloves.

Herbicides that attack woody species will also do the job (commercial preparations of 2,4-D or 2,4,5-T, or a mixture of them), but application probably will have to be repeated inasmuch as the apparently "dead" plants will usually sprout from the not-so-dead roots.* As I said earlier, they're hardy. The dead vines and branches still must be dealt with and removed, and may cause poisoning even in the dead state.

* Amitrol-T is a weed killer that has been used with considerable success at the Arnold Arboretum. In our experience it is slow to act, but effective.
Plants With Which Poison-ivy Is Confused

Poison-ivy may frequently be confused with a number of other woody or vine plants with trifoliolate leaves. Each one will be described below with the differences that one can use in distinguishing it from poison-ivy.

1. Box elder (Acer negundo). This plant is in the maple family and, therefore, has opposite leaves. It frequently has leaves with five leaflets in addition to some with three. The young stems are bright, glossy green with an occasional glaucous patch. Poison-ivy always has brown or dull green young stems and alternate leaves. It also frequently climbs box elder trees, thus adding to the confusion.

2. Hop-tree (Ptelea trifoliata). This plant grows as a shrub like poison-ivy. It does not have any well-defined buds, whereas poison-ivy does. The tips of the branches will be quite stubby. The twigs tend to be gray or black, rather than the brown of poison-ivy. The leaflets are borne in threes like those of poison-ivy, but the central leaflet tapers to the base, while that in poison-ivy does not taper. The edge of the leaflets on the hop tree is smooth, or occasionally has fine teeth, but that in poison-ivy (except along the Atlantic Coast and in the Orient) will tend to be notched. The fruits are samaras, that is, there is a dry, circular, papery wing surrounding the seed like a wafer. Poison-ivy fruits are berry-like drupes.

3. Bladder-nut (Staphylea trifolia). This plant, like the maple, has opposite leaves. It has sac-like persistent fruits which may be an inch or more in diameter and an inch and one-half to two inches long. It grows as a small tree.

4. Virginia creeper (Parthenocissus quinquefolia). This plant grows in some of the same habitats that poison-ivy does, and it climbs much as poison-ivy does. It has five leaflets, all originating from one point, unlike poison-ivy's three. However, some of the younger leaves at the tip of the growing Virginia creeper vine may have only three leaflets. One can look at the scars left from the places where the leaves used to be to determine the difference. In Virginia creeper, they are circular with a raised edge, looking very much like a crater. In poison-ivy, these leaf scars are triangular in shape, often quite narrow. The fruits of Virginia creeper are juicy, purple (almost
black) berries, not hard and light colored like those of poison-ivy.

5. Virgin's bower (*Clematis virginiana*). This plant grows as a vine, but has opposite leaves. The leaflets tend to be a light green and they are quite thin and never glossy. The leaves have veins that turn out from the middle vein and curve upward, almost parallel to the edge. The veins of the poison-ivy plant come out at 60 degrees from the midvein and then run into the edge. The flowers of Virgin's bower are quite conspicuous, cream-white, about three-quarters of an inch across. The fruits have long feathery tails on them.

6. Aromatic sumac (*Rhus aromatica*). This plant is related to poison-ivy, but has leaves more uniform in size. The notches are rounded, rather than pointed. The leaves are generally quite hairy, with their leaflets tapered to the base, unlike those of poison-ivy. The flowers are yellow and appear immediately as the buds open early in April. The fruits will be almost ripe by the time the poison-ivy flowers are just coming out. The fruits of the aromatic sumac are fuzzy and red.

**Facts Frequently Misunderstood About Poison-ivy**

I frequently have used the following 20 summary statements about poison-ivy — the plant and the disease — to help dispel much misinformation.

1. Poison-ivy is in the sumac family (*Anacardiaceae*) along with staghorn sumac and its close relatives: pistachio, cashew, mango, squawbush, poison-sumac, and some poisonous trees of the tropics. It is not closely related to Boston-ivy nor English-ivy.

2. Some poisonous relatives of poison-ivy are poison-sumac (*Toxicodendron vernix*), poison-wood (*Metopium spp.*), and guao or maiden-plum (*Comocladia*) of the Caribbean area, cashew (*Anacardium occidentale*), the dhobi-nut (*Semecarpus*), and the mango (*Mangifera*). In mango, the poison is in the pedicel and possibly in the "skin" of the fruit.

3. Poison-oak is not an oak, but a sumac. It is called poison-oak because its leaflets resemble the leaves of some native oaks.

4. There is no poison-oak in Massachusetts; elsewhere there are two species with this common name: one along the
Pacific Coast (*Toxicodendron diversilobum*), and one in the southeastern United States (*T. toxicarium*).

5. There are two species of poison-ivy in the United States (and Canada, Mexico, and Western Guatemala and the Bahamas). One, which may grow as a shrub or vine, is *Toxicodendron radicans*. There are a number of variants now recognized as subspecies. To the west of the 100th meridian of longitude and north of approximately the 44th parallel of latitude there is a non-climbing species, *T. rydbergii*.

6. The chemical nature of the poison in poison-sumac or in either of the poison-oak species presumably is related chemically to that in poison-ivy, but its actual identity has yet to be determined. It is possible that the human body can detect differences between these poisons, but this has yet to be demonstrated. It is likely that a person who is “allergic” to one of these plants is allergic to them all.

7. The poisons are not volatile and therefore cannot be contracted “out of the air.” A direct or secondary contact is necessary.

8. The poison may be spread in the smoke of burning poison-ivy because of tiny droplets of the poison present on the particles of dust and ash in the smoke.

9. Poison-ivy may be spread by animals. Petting a dog after it has run through a patch of the plant is a frequent way of contracting it.

10. Poison-ivy may be spread by articles of clothing. A person may reinfect himself by handling the same shoes he wore when he walked through a patch of the plant.

11. The poison cannot be spread by breaking the blisters on the skin.

12. There is little way of hastening the departure of the disease. Any medicines that are used on the skin serve to help dry the blisters, treat for secondary infection, or relieve itching. ACTH or cortisone derivatives will help cure the disease, but should be administered only with the advice and direction of a physician.

13. The level of sensitivity differs from person to person. Once one has surpassed his threshold of sensitivity, he will most likely alter the threshold. In some instances it appears that a severe case will herald more severe cases; in others it appears that one very virulent case precludes any others.
An initial contact is sufficient to give a person a rash if he is abnormally sensitive. Usually, however, one must be sensitized by an initial contact before he will react by producing a rash from subsequent exposures.

It is difficult to wash off this insoluble poison completely. Strong soap merely removes excess poison from the skin, but will not remove any which has already reacted, because the poison is believed to form a complex with skin proteins. It is therefore not removable short of removing the skin!

Injections are sporadic in effectiveness. They generally should be avoided as prophylactic measures, and definitely should be avoided during an attack of the dermatitis. At best, they may confer some degree of immunity; at worst, they may make a mildly sensitive person very sensitive.

Eating a leaf of poison-ivy may have disastrous results. One may surpass his normal level of immunity by the first bite; in this instance, he is headed for an internal case of poison-ivy, occasionally known to be fatal. The idea that American Indians chewed a leaf of poison-ivy to confer immunity is a myth that has never been documented.

The mechanism of sensitivity is not thoroughly understood. It does not behave like protein sensitivities such as hay fever pollenosis. It is a hypersensitivity of the delayed type, whose mechanism is related to that of organ transplant rejection.

There are some persons who appear to be immune to poison-ivy. Probably very few persons are potentially totally immune, but rather have (a) a high threshold of sensitivity or (b) have never been sensitized. Any survey of the population generally reveals about 50% of those surveyed are immune at the time of census. Some studies seem to indicate that red-heads are more susceptible than blonds, who seem in turn to be more sensitive than brunettes.

There is no known easy method for getting rid of poison-ivy, either the plant or the disease.

One Man's Meat . . .

Although it would be useful to be able to give one sure-fire method of recognizing poison-ivy or poison-oak from all other
members of the plant kingdom, it is not possible to do so without indicting a large number of benign species in the wild. One can say that a person should beware of all plants whose leaves are made up of three leaflets, but by the time he has gotten close enough to see the number of leaflets, he is probably too close for comfort. Besides, the average tramper in the woods is not going to examine every plant before he steps on it or passes through it. Hence, only by experience will one be able to spot easily these plants in question among the many others in our woodlands and fields.

Of all animals in the animal kingdom, only man and a few of the higher primates are sensitive to the poisons. Even rhesus monkeys may be sensitized only with difficulty, and they lose their sensitivity relatively rapidly. A few instances are on record of deliberately sensitizing dogs once the poison was applied directly to the skin with the hair removed. But the fact remains that all medical experimentation on this dermatitis must be conducted on Homo sapiens himself. He may use no surrogate in his investigations.

We have seen that poison-ivy and poison-oak have value to animals other than man. Birds, small mammals, insects, etc. have made use of the plants in one way or another. Although occasionally browsed by deer, poison-ivy certainly is not a preferred food. All of this goes to show that “one man’s meat is another man’s poison.”

WILLIAM T. GILLIS
Department of Biology
Hope College
Holland, Michigan
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MacGinitie, H. D. 1937. Eocene flora of western America. iii. The flora of the Weaverville beds of Trinity County, California.
There was considerable response to the article "Streptocarpus 'Constant Nymph' and Its Mutants" published in the May/June 1973 issue of Arnoldia. Since recent developments have occurred of interest to indoor gardeners, it seems desirable to bring things up-to-date.

Several nurserymen throughout the United States have requested and received propagation material from us. At some of the Open Houses held for Friends of the Arnold Arboretum, 'Constant Nymph' and its mutants have been given away when stock was sufficient. This has led many indoor gardeners to tell us that these Streptocarpus are among the most satisfactory and exciting house plants they have grown. The author has
seen several very fine specimens that prove these plants can become quite large with a bounty of remarkable blue flowers if given proper care. They seem to be superior to other Streptocarpus used as house plants. An item of additional interest has been discovered by indoor gardeners: These plants set seed readily and the easily grown seedlings flower at an early age in an assortment of types, colors and sizes that best can be described as “motley.” Home growers therefore can make selections of their own favorite seedlings and propagate them with ease.

The five new clones introduced by the Arnold Arboretum were 'Blue Nymph,' 'Cobalt Nymph,' 'Mini Nymph,' 'Netta Nymph' and 'Purple Nymph.' They were carefully described in an article called "New Streptocarpus Varieties" by Carl D. Clayburg in The Gloxinian for September-October, 1970, where the fact was mentioned that the Arnold Arboretum was propagating them at that time.

When the first Arnoldia article was written it was pointed out that there was "more to come." At that time a fine white clone called 'Maassen's White' was causing a sensation in Europe. Soon after it was available in this country the demand was so great that growers found it difficult to keep it in stock. Its snow-white flowers are strikingly beautiful, making it a good companion for the various shades of blue of the earlier clones. 'Maassen's White' propagates readily, matures rapidly, and should be as popular as its blue relatives.

Continuing development in both England and Holland makes it clear that the best is yet to come. A Christmas card from the John Innes Institute in 1971 showed a remarkable mixture of new Streptocarpus seedlings obviously of 'Constant Nymph' alliance. Since the card was in color the startling new shades of soft pink, rose, dusty red and blue-violet had considerable impact. In the May, 1973, Journal of the Royal Horticultural Society, an article called "Hybrid Streptocarpus" by A. G. Brown of the John Innes Institute, Norwich, England reviewed the previous work done on Streptocarpus and described the new work in progress at the Institute. The whole article was reprinted in The Gloxinian for July-August, 1974. The plates accompanying the original article were in color; those used in the reprint appear to be the same but are in black and white.

Mr. Brown confirmed what we had found. He pointed out that 'Constant Nymph' or any one of its derivatives makes "an ideal flowering house plant not only tolerating but thriving in the
climate and conditions of the average house." He rightfully concluded that a much greater color range than the various shades of blue would be very desirable.

The cross that produced 'Constant Nymph' was remade several times but each time the Streptocarpus × hybridus parent used was in a shade of pink or red rather than blue. Nearly 3,000 seedlings were grown and evaluated in the second (F2) generation where the variation is great in a cross of this sort. The color range went from white through various shades of pink to red, to purples and new shades of blue. New flower patterns and markings resulted also. The same habit of flowering almost constantly from April to October was inherited. By using supplementary lighting to counteract shorter days in November through March, it would be possible to have bloom throughout the year, according to Mr. Brown.

Nine clones have been named so far. They are 'Diana,' a deep cerise with a white throat; 'Fiona,' a good pink; 'Karen,' a magenta-pink; 'Louise,' a deep blue-violet; 'Marie,' a dusky purple; 'Paula,' a reddish-purple; 'Tina,' bright magenta and pale pink; 'Olga,' described as "a bold cerise"; and 'Helen,' a pale blue.

A recent letter from Mr. Brown in answer to my request for propagating material from the above clones indicates that we may have a wait. He states that "we are a Government financed research station and so we have to take out Breeders' Rights on our new cultivars and the distribution is undertaken for us by a Government sponsored company . . . They relieve us of all the business side of propagation and distribution." Apparently, a two-year lapse is required from the time the "Government sponsored company" receives the plant material until it is released so that adequate testing may be done. The writer is waiting now to hear from this organization with the hopes that the Arnold Arboretum may be the means of bringing this whole new crop of fine plants to the American gardener.

In the meantime, news of an excellent "mini white" clone has come from Holland. Another, a tetraploid form of 'Maassen's White' called 'Albatross,' has been described as "very fine indeed."

GEORGE H. PRIDE

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Brown, A. G. Personal Correspondence

Arnoldia Reviews

Ximenia americana. From A Flora of Tropical Florida.


John Kunkel Small’s work on the vegetation of the southeastern United States culminated in the publication in 1933 of his Manual of the Southeastern Flora, an impressive volume of 1576 pages. Small was regarded as a “splitter” since he emphasized minor variations in form, structure or distribution as the basis for describing new genera and species. In the genus Chamaesyce Small recognized thirty species, seventeen of which he described.
He divided the wood-sorrel, Oxalis, creating three new genera and describing as new ten of the nineteen species.

The burden of proof that such splitting is not biologically sound unfortunately rests on the succeeding botanists who combined the taxa. Work at the generic level has been conducted at the Arnold Arboretum by Dr. Carroll Wood and collaborators, among whom was Dr. Long, senior author of the present volume.

To the student of the vegetation of southern peninsular Florida a new manual was needed presenting insofar as possible a modern treatment both of the taxonomy and the nomenclature of the plants. Long and Lakela's volume of 980 pages is physically as large as Small's and is not designed to be carried easily in the field. Included are treatments of 1647 species of ferns and their allies, gymnosperms and flowering plants. Many of the commonly cultivated plants or those escaped from cultivation are included.

A special introduction on the history of botanical collecting in southern Florida was contributed by Joseph Evan. The authors review the geology and the plant communities of the area which has its northern limit at the latitude of Lake Okeechobee and includes the Florida Keys. A useable key to families is supplied along with keys to genera and species. The 125 illustrations in general adequately represent the plants. There are some technical errors of fact and of nomenclature which other reviews have noted, but these are very few and can always be corrected in the next edition. The authors are to be commended for completing and publishing a useful volume for an interesting and much visited area of the United States.

Richard A. Howard


This volume is fundamentally the 24 papers presented during a conference on horticulture and field botany scheduled by the Royal Horticultural Society and the Botanical Society of the British Isles. The papers represent the interests and talents of the several speakers and form an extremely valuable compendium highly recommended for personal and professional libraries. The lead article titled "And never the twain shall
meet: Horticulture and Botany — allies not enemies” appropriately sets the stage for discussions of conservation; the roles of nurseries, private gardens and botanic gardens; the principles of botanical nomenclature and of horticultural nomenclatural problems; the relevance of genetics and the development of garden plants from wild plants; the value of the herbarium; the literature of plants and special treatments of such genera as *Alchemilla*, *Aceana*, *Hypericum*, “Mesembryanthemums,” Mints, *Hebe*, Arums, Dandelions and others. The editor apologizes that the colored slides used to illustrate the talks could not be included.

The symposium is an idea that should, and certainly will, be copied by other horticultural societies. The reviewer only regrets that he could not have been present for the Conference, for each article, excellently written, deserves the presence of its author. Copies of this volume are available from the Botanical Society of the British Isles, c/o Department of Botany, British Museum (Natural History), Cromwell Rd., London, S.W. 7.

RICHARD A. HOWARD


This is the third edition and is by a new publisher (the former having allowed the publication to go out of print). Corrections and additions are minor in the current edition, and it is handsome with 16 color and 99 black and white illustrations of more than 125 edible and poisonous wild or, occasionally, cultivated plants of Florida.

If not used for actual survival, the volume would be extremely useful to the casual visitor for the identification and lore of many of the common plants.

RICHARD A. HOWARD
Chimaphila maculata. *From Winter Keys to Woody Plants of Maine.*


The identification of plants in winter condition has always been a challenge to the professional as well as the amateur botanist. Nevertheless there are characteristics in the twigs and buds that enable one to name the plant to genus and occasionally to species.

The present volume, although in title limited to the state of Maine, will have a wider application, and has proven to be a pleasure to use. Dichotomous — two-choice — keys are supplied; the first enabling a determination to genus, and the second to species within the larger genera. Reference is made to the excellent plates that illustrate the critical portions, even to the appearance of the cut end of the stem. The drawings are alive and certainly among the best available for this purpose. A good glossary and an index combining common and scientific
names is supplied with reference both to plates and to the occurrence of the name in the keys.

I particularly appreciate the dedication of this volume to Professor Merritt L. Fernald who, I am sure, would have "humphed" his approval and appreciation.

Copies are available from the Secretary, Department of Botany, Deering Hall, University of Maine, Orono, Maine 04473. The book is highly recommended for enjoyable use on winter days.

Richard A. Howard


Although truly a beginner's book, this large (8½ × 11-inch) volume has exceptionally good photographs and drawings, a clarity of text and printing to enhance its basic information, and good suggestions. Chapters are devoted to planning; plant selection, culture and sources; lists of perennials, trees, shrubs and ground covers; suggested reading; and public gardens worth visiting. This would be an excellent guide for the new home owner or a fine housewarming gift.

Richard A. Howard


This work by an English author, dealing obviously with British gardening, arouses mixed feelings in the American reader. There is gratitude for a good deal of material that is useful even in a New England setting; yet there is envy that we cannot utilize all the good things here in the United States.

The concept of ground-cover embraces certain plants, mainly perennials and shrubs, that cover the ground. The height of the plants described ranges from a few inches to several feet. There are many pages of descriptive lists on site, micro-climate, native habitat, season, growth habit, as well as characteristics
of blossom, fruit, and leaf. Few of the cultivars cited are available at U.S. nurseries.

There is an interesting section on planting public areas such as highway slopes, but no reference to cushioning plants for softening the impact of ejected motorists. The discussion of cemetery planting makes sense. A very useful appendix, applicable here as well as in England, deals with the extermination of certain ground-covers that the author considers to be vicious weeds. Americans will endorse his opinion. In summary, a most useful book with the English orientation taken into consideration.

Elinore B. Trowbridge


The title of this work, now in its third printing, aroused expectations of coyness in this jaded reviewer. Examination quite erased the prejudice. This pleasant, readable, humorous account of sprouting and growing avocado pits, grapefruit, papaya, mango, kiwi and other seeds in an apartment is presented as the experience of a novice. The author is actually as knowledgeable as most people get to be in a lifetime. He teaches not only techniques of indoor gardening for a beginner, but the underlying generalizations about plant needs which usually are omitted from such books.

Material on containers, soil mixes, drainage, domestic hazards to furniture and marital harmony are included. Langer arouses the reader's interest in botany by his example of watching the potted mango seed and discovering grass blades. Although most of the experiments described involve seeds or cuttings of tropical plants, he also deals with others such as Jerusalem artichokes and sunflowers. No nicer gift than this little book can be imagined for the person just developing some curiosity about plants.

Elinore B. Trowbridge
Parts I and II of Low Maintenance Perennials have been combined into a handbook with an attractive cover. The price is $3.50 to Friends of the Arnold Arboretum; $4.00 to others.
ARNOLDIA is a publication of the Arnold Arboretum of Harvard University, Jamaica Plain, Massachusetts, U.S.A.