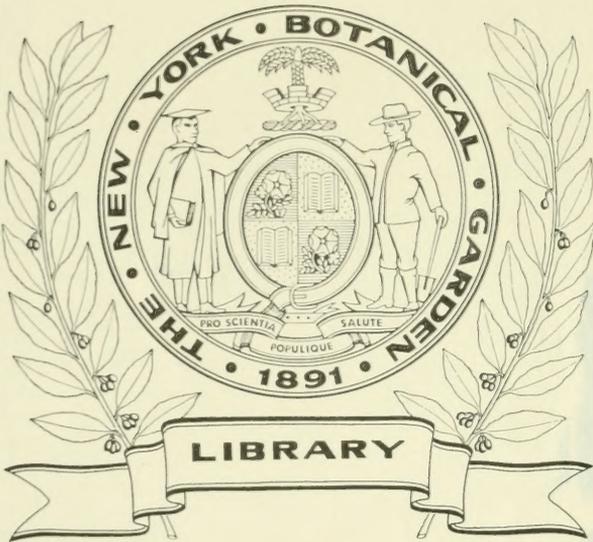


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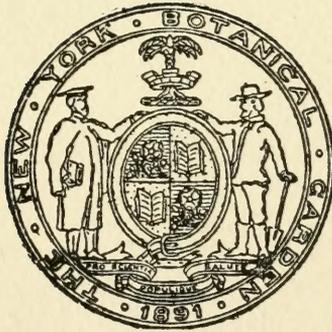


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ADDISONIA

COLORED ILLUSTRATIONS
AND
POPULAR DESCRIPTIONS
OF
PLANTS

VOLUME 9
1924



PUBLISHED BY
THE NEW YORK BOTANICAL GARDEN
(ADDISON BROWN FUND)

XA
D35
Vol. 9
1924

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NUMBER 1

MARCH, 1924



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(ADDISON BROWN FUND)

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CHRYSANTHEMUM "JOAN EDWARDS"

CHRYSANTHEMUM "JOAN EDWARDS"

"Joan Edwards" Chrysanthemum

Of Horticultural Origin

Family CARDUACEAE

THISTLE Family

The first six plates of this number represent some of the favorite varieties of hardy chrysanthemums in the collection at the New York Botanical Garden. This collection was formed in 1918, from American sources, principally from the Charles H. Totty Co. of Madison, New Jersey. Some varieties had been grown since 1910 new varieties were added to those, among them some of the best liked of the most hardy sorts, including "White Doty," a sport of one of the wholly satisfactory pompons. "Lillian Doty," from which it sported, was also in the collection, together with some excellent singles represented by "Joan Edwards," here illustrated, "Cardinal," brilliant crimson, "Miss Ruth S. Bergen," purple, "Mrs. H. Shoebridge," pink, "Richard Delafield," red, "Josephine Scholtman," lilac to white, "Ida Katharine Skiff," amber, and "Supreme," a rich crimson. The early flowering section is represented by the varieties "Cranfordia," pictured here, "Carmelite," rich yellow, "Mrs. Harrison Craig," yellow and red, "Normandie," white, dwarf, and early, and "Nellie Blake" (plate 293).

In 1923 the collection was increased by eleven magnificent new varieties from the establishment of the Charles H. Totty Co., sent through and to be tested for the Garden Club of America. This test, along with similar ones in various parts of the country, was arranged by the representative of the Chrysanthemum Society of America on the committee of special plant societies of the Garden Club. The beautiful new variety "California" (plate 295), "Red Doty" (relative of the variety on plate 290), "Mrs. Charles H. Stout," and other newer sorts were tested the first year and others are to be added in 1924.

"Joan Edwards" represents the single varieties in this collection, and was illustrated from a flower cluster cut November 2, 1923, perhaps the latest date at which this flower would be showy.

The flowers of the variety "Joan Edwards" and others of the single type are in heads about two inches in diameter, made up of usually two rows of about thirty ray-flowers and a cushion-like

hemispheric disk substended by a several-bracted involucre. The ray-flowers are pistillate and usually fertile, with short cylindric greenish tubes and inch-long ligules which are oblanceolate or oblong, obtuse, often with two or three lines and ridges, colored pink grading to white near the center of the head. The disk consists of many perfect fertile tubular flowers, which together with the rays develop four-angled achenes. All are on a convex receptacle. The involucre has about three series of imbricate bracts, the inner oblong and hyaline except for a light green center rib, the outer lanceolate to linear and tomentose. The size, shape, and position of the inflorescence depend on the method of growth, the usual system resulting in wide-branching, flat-topped clusters. The flower-stalks are white-tomentose, angled, and occasionally bear short linear leaves. The stems are also tomentose and angled, the older ones becoming woody at the base. From the crown grow many simple or branching, creeping, rooting suckers and many short, tough, fibrous roots. The leaves are triangular to ovate in general outline, three- to five-lobed and variously toothed, and average three inches long by two inches wide; they are usually whitish-tomentose beneath, and slightly so or else green and glabrous above. All the foliage is strongly scented.

KENNETH R. BOYNTON.



Henry Ealón

CHRYSANTHEMUM "WHITE DOTY"

CHRYSANTHEMUM "WHITE DOTY"

"White Doty" Chrysanthemum

Of Horticultural Origin

Family CARDUACEAE

THISTLE Family

The chrysanthemum of the florist and gardener, which is placed by Dr. L. H. Bailey under the head of a cultigen, a distinct garden strain of specific rank, is probably derived from species indigenous to China. The forms known to gardeners have been cultivated for a long time, some of them by the Japanese, to whom they are a sacred flower, for centuries, and by the Chinese perhaps before that. It is said by many authorities that the pompon or button chrysanthemum originated from a hybrid between the Chusan Daisy, first brought to England by Fortune for the Royal Horticultural Society in 1846, and the Chinese *Chrysanthemum sinensis* or *morifolium*. Mr. E. H. Wilson says that he found both *Chrysanthemum sinensis* and *C. indicum* growing wild in Ichang, China, but thinks that the former has gone more into the modern chrysanthemum than the latter. Especially in France the small half-double button type was well received. The improvement of the type has produced a large wonderful pompon such as "White Doty," a softer less artificial type in "Rena" (plate 291), small button types, called caps, similar small-flowered varieties for indoor culture, such as "Christmas Gold" (plate 295) and intermediate forms. In England, Australia, and America the large exhibition and commercial types of reflexed, incurved, and other sorts of great size and range of color have been produced.

America has done a great deal in developing the large-size exhibit blooms, and has introduced many kinds from England and Australia. The increasing popularity of the hardy flower in this country has brought several interesting observations regarding its history to light. Any person interested in flowers can perhaps remember some garden or yard where a free-flowering, perfectly hardy, often rather strikingly colored one has grown for years. There are many of these in old gardens. They were perhaps planted out after being inmates of the household as potted plants from the florist, some were probably obtained from friends, and others from nurseries and seedsmen with other perennial herbaceous plants. The

newer, better varieties have been introduced here from England and France or originated here since the present century began.

"White Doty" has been in the flower gardens of the New York Botanical Garden for over ten years. Plate 290 was made from the group planted in the chrysanthemum garden in 1918. This variety is hardy, durable, free-flowering, and it and its companions "Lillian Doty" and "Red Doty" are good sorts for the beginner to plant.

"White Doty" chrysanthemum, as grown with the hardy sorts, has flower-heads from one to two inches across, arranged two or three to many in closely bunched clusters due to the short flower-stalks, and all blooming at about the same time. The disk-flowers of the single type are here changed to pistillate flowers with normal tubes but with showy ligules like the outer flowers of the single type. The white ligules are oval or oblong, acute, about an inch long, with about ten faint lines, not ridged, but all slightly concave, incurved, and rather stiff, making a formal, hemispheric head, somewhat resembling a straw-flower.

KENNETH R. BOYNTON.



CHRYSANTHEMUM "RENA"

(Plate 291)

CHRYSANTHEMUM "RENA"**"Rena" Chrysanthemum***Of Horticultural Origin*Family **CARDUACEAE****THISTLE** Family

The variety "Rena" was planted in the horticultural collection in 1920, having been introduced by Totty in 1919; it is the better of the two of its color in the collection, the other being the variety "Baltimore." The illustration for plate 291 was made November 20, 1923, when the flowers were at their best. It grows 28 inches high and is a late bloomer, very lasting and quite hardy.

We have three, perhaps four, types of chrysanthemum in our hardy collection. The first and simplest type is the single chrysanthemum. There are varieties of this for cut flower sprays and pot-plants indoors, but it is the hardy garden section that is benefited by the single flowers. They range in color through white, yellow, bronze, red, pink, and lavender. Some strains of large-flowered hardy singles have been originated in this country, notably those by Francis Bergen of Summit, New Jersey. The early-flowering type of chrysanthemum is practically a small flower for greenhouses, shaggy, with loosely folded broad petals, some reflexing lightly, others incurved, not compactly as in a pompon, flowering early, and on shorter stalks. "Cranfordia" (plate 294) and "Nellie Blake" (plate 293) are of this type, the former being especially early, although the varieties "Normandie" and "Yellow Normandie" begin to bloom early in September. Nonin of France and Wells in England have originated and introduced the majority of these.

The pompon type, which is the best known, varies in size from the small cap or button sorts to the large showy ones like "White Doty." Some have incurved, others reflexed rays, but all have compact, rounded durable flowers on stiff stalks and are robust plants. They are hardy and lasting chrysanthemums. "White Doty" (plate 290) represents an incurved variety of the straw-flower type and "Rena" a recurved soft-petaled pompon of looser growth.

The flowers of "Rena" are those of an enlarged cap pompon, with petals tending to reflex rather than incurve. Each hemi-

spheric flower-head is composed of about one hundred pistillate fertile ray-flowers and about forty perfect fertile disk-flowers which are partially hidden, at least before the heads are fully developed. The ray-flowers have short slender tubes less than one quarter of an inch long and oblong to narrowly elliptic ligules one inch long and three eighths of an inch wide; these ligules or rays are slightly channeled and ridged, slightly recurving and folding back, obtuse or occasionally emarginate at the apex. The disk-flowers have short yellow campanulate tubes and five short triangular lobes, with slender styles and exserted two-lobed stigmas.

KENNETH R. BOYNTON.



CHRYSANTHEMUM "CALIFORNIA"

CHRYSANTHEMUM " CALIFORNIA "**" California " Chrysanthemum***Of Horticultural Origin*Family **CARDUACEAE****THISTLE** Family

"California" is one of the eleven new varieties placed in the chrysanthemum garden in 1923 through the Garden Club of America. The coloring attracted so much attention to this beautiful variety that this illustration was made when it was in full bloom, about November 23.

It was introduced into the eastern states by Mr. Totty, having originated in the nursery of R. Shibuya, at Menlo Park, California. Mr. Shibuya reports "California" to be a sport from "Mrs. Wm. Buckingham," a single pink variety, which he noticed in 1917. He propagated it and developed the variety, and Mr. Totty undertook to distribute it, naming it after the state of Mr. Shibuya's home.

The culture of the hardy chrysanthemum is that of the hardy herbaceous perennial. Some varieties lend themselves perfectly to such a culture, spread by their stolons, and form a permanent group in the garden. These require little care; if they are headed back once or twice early in the season more blooms will result, or in the case of plants in some old gardens, a judicious disbudding will insure fewer and larger flowers. Then we must consider that a great many of our named varieties are not quite hardy, and that we will lose a few plants of some sorts or all of a few varieties from the garden during some of our winters. In the same connection it is contended that better results in every case are obtained by using new young plants. There are two methods of insuring a supply, one by means of cuttings and the other by divisions.

Late in the fall one or more crowns are taken up and placed in pots or flats in the cold frames. There the suckers or side shoots are taken as cuttings late in the winter and placed in the cutting bench, rooted, and potted up, ready to be planted out from pots when the garden is opened. Thus young plants are ready for the chrysanthemum bed if the winter has killed the old ones. Another method is followed in the growing of reserve supply plants for the varieties pictured here. It differs from the cutting method only in that the suckers are separated from the crown in the spring and

used as new plants. The crowns or stock plants can be kept over in a light cellar. Old plants which do survive the winter in the garden will furnish extra young plants in the spring, to enlarge the planting or enrich a neighbor's garden.

"California," considered a pompon flower, has many perfect, fertile disk-flowers in the center. These are hidden at first, but as the flower-head develops the center shows its cushion-like disk as in the single type. Otherwise the flowers of this variety are like those of "Rena." The color of the disk is yellow, the bases of the rays are light yellow and the rays pink. The flower-heads are quite closely bunched and open uniformly.

KENNETH R. BOYNTON.



CHRYSANTHEMUM "NELLIE BLAKE"

(Plate 293)

CHRYSANTHEMUM "NELLIE BLAKE"**"Nellie Blake" Chrysanthemum***Of Horticultural Origin*Family **CARDUACEAE****THISTLE** Family

Plate 293 was made from a cluster of this variety when at its best bloom, showing the possibilities of these for cut flowers and indoor decoration. For this purpose and for garden decoration it is one of the best sorts. "Nellie Blake" was introduced in this country in 1918 by Charles H. Totty Co., who imported it from England, where it was originated.

Chrysanthemum plants may be set out soon after the season is open, in any good garden soil which has been enriched with well rotted cow manure. In the test garden they are placed about ten inches apart, with a two-foot space left between varieties. As additional fertilizer a small quantity of bone meal is stirred into the soil soon after planting. Any plants of spindling growth are pinched back. Three or four months of slow continuous growth elapse, so frequent cultivation of the soil is advisable although it will be found impossible to do this as thoroughly as with many other plants because these chrysanthemums are shallow-rooted, and the crowns are almost on the surface of the soil. During a dry summer frequent watering is beneficial. Late in June the whole chrysanthemum garden is pinched or cut back, to insure a wide-branching habit and many-flowered flat-topped clusters late in the year.

The flower-heads of varieties of the "Nellie Blake" type are usually the largest of the hardy section. They measure about three inches across and are made up of uniform flowers throughout, with the possible exception of the very center, where shorter, rolled or curled ligules may make a small area dissimilar to the flower-head as a whole. This is made up of several hundred ray-flowers whose ligules are from one to two inches long, rather narrower than in the other types, not incurved or reflexed, with ends fringed or notched. Clusters of several heads develop and bloom uniformly.

KENNETH R. BOYNTON.



CHRYSANTHEMUM "CRANFORDIA"

CHRYSANTHEMUM "CRANFORDIA"**"Cranfordia" Chrysanthemum***Of Horticultural Origin*Family **CARDUACEAE****THISTLE** Family

Another early-flowering sort, one of those first introduced in 1909 from Europe through the Charles H. Totty Co., "Cranfordia," comes into bloom in October with us. From some of the later sprays the illustration was made. It is possible that the earlier, more typical blooms are darker in color, and the shape of the flower is more regular and the substance better in the normal flowers of late October.

The contributions of the hardy chrysanthemum to gardens are masses of autumnal color and bouquets for house decoration at a season when few flowers are available. While certain methods are being tried with some success in various parts of the country, the growing of large flowers outdoors is not feasible in the home garden. By keeping the growth pinched back early in the season, thereby causing side growths, bushy plants, and quantities of smaller but showy flowers, garden color in mass is available in October and November. First the dwarf early-flowering types such as "Normandie" and "Cranfordia," followed by early singles like "Joan Edwards," then the mid-season pompons of "White Doty" and "California" types, and finally the late-flowering varieties of both single and pompon type give a fairly long season of bloom. Most of the varieties will suffer from the first severe frost to the extent that their fully developed flowers will be spoiled, but the buds and partially opened blooms will be unharmed. In the vicinity of New York there is frequently a period of two or three weeks of mild weather after the first killing frost. At this time the hardy chrysanthemum is the only flower left in the garden. Mr. Arthur Herrington, in his book "The Chrysanthemum," recommends that stocky plants be held in reserve and bedded out in the flower garden in the autumn after other plants are gone. He suggests that a careful lifting and planting out of these on a cloudy day, with plenty of water, will not hurt their blooming.

"Cranfordia" is a variety of the early-flowering section, semi-dwarf, with thickly clustered flower-heads nearly three inches in

diameter. The heads are shaggy, loosely made up of yellow ray-flowers, not more than fifty in number, which are broadly lanceolate in shape but variously curled and twisted and of various lengths, some long and merely revolute or others short and rolled tightly, giving the flower-head the appearance of some of the Japanese varieties.

KENNETH R. BOYNTON.



CHRYSANTHEMUM "CHRISTMAS GOLD"

CHRYSANTHEMUM "CHRISTMAS GOLD"**"Christmas Gold" Chrysanthemum***Of Horticultural Origin*Family **CARDUACEAE****THISTLE** Family

The beautiful exhibition and commercial chrysanthemums are too large to be illustrated properly in ADDISONIA. Of the other greenhouse types, the baby or button pompon is one of the newer favorites, rapidly coming into favor both as a potted plant and for cut-flower work. Plate 295 represents "Christmas Gold," one of ten of these baby chrysanthemums exhibited in the autumn of 1923 in the Central Display House at the New York Botanical Garden. These were the smallest sorts among a collection of about sixty new varieties given to the Garden by Elmer D. Smith & Co., of Adrian, Michigan, but not by any means the least attractive. "Christmas Gold" is one of those developed for lateness of bloom, the originators, Bate Brothers, of Cleveland, Ohio, thus contributing to the movement to have chrysanthemums on the market until Christmas. Some varieties of this type shown were "Ethel," bright red, "Dainty Maid," pure white, both Smith's introductions of 1922; "Marguerite Clark," dark rose pink, and "Mary Pickford," pure white, introduced in 1921; and others, ranging down to the white variety "Dorothy Gish" with blossoms only one half inch in diameter. These varieties were bred, according to Mr. Smith, for small, compact bloom by crossing the old baby pompon variety "Baby" with other pompons of various colors. They may be grown for specimen pot plants, the growth being continually pinched out so as to make the plants dense and symmetrical. If potted up in June and pinched back often these little plants can be kept to about one foot high. In greenhouse benches they may be grown for cut-flower decoration by the usual methods. The colors obtained by using these baby pompons are white, yellow, bronze, red, and pink; the flowers are durable, the sprays graceful, and the foliage attractive.

The baby pompon "Christmas Gold" has small, hemispheric flower-heads three fourths of an inch in diameter, carried on slender aower-stalks in graceful sprays or clusters. Each head contains flbout a hundred ray-flowers with narrow lanceolate ligules, slightly

recurved and tightly compressed to form a compact button-like head. The stems are slender but strong and the leaves smaller than in most varieties, rounded or their lobes obtuse.

KENNETH R. BOYNTON.



CHRYSANTHEMUM "EMMA"

CHRYSANTHEMUM "EMMA"

"Emma" Chrysanthemum

Of Horticultural Origin

Family CARDUACEAE

THISTLE Family

The Anemone chrysanthemum "Emma" was exhibited first as a specimen exhibition type on a fan-shaped standard, at the opening flower show of the Central Display House, Range 2, in 1918, by Mrs. Payne Whitney, Manhasset, Long Island. George Ferguson, her gardener, says that this variety originated in the Whitney conservatories, was of unknown parentage, and was grown as a seedling and distributed in a limited way from there. Mr. Ferguson had grown a magnificent fan carrying hundreds of blooms by leading selected shoots along the ribs of the fan and allowing buds to develop around the rim and at intervals over the surface of the fan. This plant was given to the Garden and was used as a stock plant to be propagated from. Each season since then several plants of "Emma" have been grown from cuttings which are rooted about March 1, and potted up. They are pinched out three or four times, before August 15, so that bushy plants are developed and many flowers bloom at once on a stem. Such a chrysanthemum is free flowering, showy, and with flowers of good substance which last longer than most of the other exhibition types.

Our illustration was made from plants grown in the autumn of 1923, and shown with the exhibition and pompon varieties at the Central Display House of the New York Botanical Garden.

"Emma" is of the Anemone section or type of chrysanthemum, the distinguishing feature of which is the enlarged and prominent disk. Each flower-head is about two and one half inches in diameter; the outer series of each head includes from forty to fifty fertile pistillate ray-florets whose ligules are about three fourths of an inch long, broadly lanceolate, acute, somewhat concave, rolled more or less so that some approach the quilled petals of the Japanese types. The disk consists of a hundred or more flowers, with tubular, lobed corollas which are larger and longer than those of the ordinary chrysanthemum, being about one half an inch long and conspicuously colored, making the disk portion of the flower showy and more conspicuous.

KENNETH R. BOYNTON.

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HELXINE SOLEIROLII

HELXINE SOLEIROLII

Creeping Nettle

Native of Corsica and Sardinia

Family URTICACEAE

NETTLE Family

Helxine Soleirolii Req. Ann. Sci. Nat. 5: 384. 1825.

In the magnificent collection of plants brought to the New York Botanical Garden from the Royal Botanic Garden at Kew, England, in 1901, perhaps the smallest and most inconspicuous was one without any designated common name, but with the difficult title given above. This little plant has proved a most useful one, being used to cover small rockeries, and the bare spaces beneath benches in our greenhouses, and to make the green moss-like carpet which covers the floor of the exotic forest in the Central Display House at Conservatory Range No. 2. Hundreds of rapidly creeping stems cover the soil in all directions, making a mat of rich green. Boxes, pots, and pans can be quickly covered with green by this plant, and despite its humble character, it attracts much attention from plantsmen. The garden has introduced it into many public conservatories. In all mild climates *Helxine* is a most excellent rock garden plant; in our locality it can be used for that purpose if covered securely during the winter. *Helxine* is a monotypic genus related to the pellitory of medicine and the artillery plant, a greenhouse curiosity.

Helxine Soleirolii is found covering sea-washed rocks and banks on the coasts of Corsica and Sardinia. In the rapidly growing state which it usually shows in greenhouses it does not often flower, but if grown in a drier location in a pot it will produce the inconspicuous flowers and smaller leaves. This was done to obtain the flowers for our illustration.

The creeping nettle is a running herb with very slender four-angled zig-zag pink stems, at the nodes of which are alternately placed a leaf or another branch and roots. The leaves on slender petioles are half an inch or less across, oblique, kidney-shaped, and hairy on the upper surface. The flowers are monoecious, very small, the staminate appearing in the axils of the leaves on the ends of the branches, the pistillate in the axils of the lower leaves. The staminate flower consists of a reddish calyx, with four triangular ovate hairy lobes, and four green stamens on thick filaments about as long as the calyx-lobes. The pistillate flower has a tubular

hairy 4-lobed calyx, enclosing a feathery white stigma. Each kind of flower is surrounded by a three-lobed involucre, and the pistillate involucre, contracted under its three lobes, at maturity contains a minute round or oval achene.

KENNETH R. BOYNTON.

EXPLANATION OF PLATE. Fig. 1.—Plant, in vegetative condition. Fig. 2.—Branch, with pistillate flowers. Fig. 3.—Pistillate flower, $\times 8$. Fig. 4.—Pistillate involucre, $\times 8$. Fig. 5.—Unripe fruit, $\times 8$. Fig. 6.—Fruiting involucre, $\times 5$. Fig. 7.—Achene, $\times 5$. Fig. 8.—Branch, with staminate flower. Fig. 9.—Staminate flower, $\times 4$. Fig. 10.—Staminate involucre, $\times 4$. Fig. 11.—Staminate calyx, $\times 4$.



ACER RUBRUM

ACER RUBRUM

Red Maple

Native of eastern North America

Family ACERACEAE

MAPLE Family

Acer rubrum L. Sp. Pl. 1055. 1753.

The wonder of a red maple swamp with the tree in bloom in early spring must surely have delighted our earliest colonists, as it has since annually delighted all who have enjoyed seeing it, for there are few if any more elegant and cheering sights after the browns and grays of winter. In the autumn again its red or scarlet foliage is conspicuous. The tree has a wide range and is of rapid growth; it is abundant in swamps or along streams, from Nova Scotia to Manitoba, Florida, Nebraska, and Texas, but also occurring on hillsides and elsewhere in relatively dry soil, ascending to at least four thousand feet in the Virginia mountains. The species consists of numerous slightly differing races. Closely related to it and sometimes regarded as varieties are the Carolina maple (*Acer carolinianum* Walter); Drummond's maple (*Acer Drummondii* Hooker and Arnott); and the narrow-fruited maple (*Acer stenocarpum* Britton), the latter known only from Missouri. Its wood is light reddish brown, hard but not strong; it is used for furniture and for woodenware; a cubic foot weighs about thirty-eight pounds. It is known also as scarlet maple, water maple, swamp maple, and sometimes as hard maple. Like other maples, of which more than one hundred species exist, natives of the north temperate zone, the flowers are polygamous or dioecious, the leaves opposite. Our illustration is from a wild tree in the New York Botanical Garden.

The red maple reaches a maximum height of about a hundred and twenty feet with a trunk sometimes four and one half feet in diameter, the bark of old trees separating in scales or strips, that of young trees smooth and gray. Its slender young twigs are reddish. The leaves are ovate or nearly orbicular in outline, rather thin, long-stalked, from two to about six inches long, glabrous or somewhat pubescent, bright green above, pale green or whitish beneath, rounded or cordate at the base, with three or five sharp lobes which are irregularly toothed. The red, scarlet or yellowish flowers, borne in small clusters, appear in early spring, much before the leaves, on short slender stalks; some of the clusters are of staminate flowers, some of pistillate, either on different trees or on the same tree; the usually five sepals are oblong, about as long

as the similar but narrower petals; the staminate flowers have from three to eight stamens with very slender filaments; the pistillate flowers have a smooth ovary with two long styles, and some very short stamens. The drooping long-stalked fruits consist of two samaras, about an inch and a half long or less, the wing from a quarter to about five twelfths of an inch wide, the seed-bearing part striate, about a quarter of an inch long.

N. L. BRITTON.

EXPLANATION OF PLATE. Fig. 1.—Branch, with pistillate flowers. Fig. 2.—Pistillate flower, $\times 4$. Fig. 3.—Branch, with staminate flowers. Fig. 4.—Staminate flower, $\times 4$. Fig. 5.—Fruiting branch, with leaf.



Mary E. Eaton

ISOTOMA LONGIFLORA

ISOTOMA LONGIFLORA

Quedec

Native of Jamaica

Family LOBELIACEAE

LOBELIA Family

Lobelia longiflora L. Sp. Pl. 930. 1753.*Isotoma longiflora* Presl, Prodr. Monog. Lobel. 42. 1836.

The genus *Isotoma* includes some eight species, which present an interesting example of the anomalies of geographic distribution. Seven of its species are natives of Australia or of the islands of Oceanica, and the other of Jamaica, almost half-way around the world from its relatives. There are some structural differences separating the West Indian plant from the antipodal species, indicating that their geographic separation may have been very ancient, but these distinctions are not sufficient to warrant the division of the genus.

The quedec was first noted in Jamaica by Sloane, more than two centuries ago. Since that time, doubtless through the development of commerce, it has spread from its original home and is now established in various West Indian islands and in Mexico. Nearly or quite a century ago it was introduced into cultivation in England. In the glass houses of the New York Botanical Garden it grows readily from seed, produces a short, stocky stem with crowded leaves, and develops its showy white flowers in profusion. Our illustration was made from such plants, grown from seed received from Mexico through Mr. E. P. Bigelow.

In striking contrast to the attractiveness of its flowers, the quedec is considered one of the most poisonous of all known plants. John Lindley says of it: "In its native country it is said to prove fatal to horses which eat it. * * * Taken internally, it acts as a violent cathartic, the effects of which no remedy can assuage, and which ends in death. The juice of the bruised leaves or stem applied to the eyes or lips excites a severe inflammation; as Jacquin tells us he found to his cost, having accidentally allowed some of the juice to remain upon his hands."

The quedec is an erect herb one to two feet high, with stout, angled stems and crowded foliage. The leaves are thick and firm, three to six inches long, one half inch to two inches wide, and coarsely, sharply, and irregularly toothed. The white flowers are produced on stalks about half an inch long, arising from the base of

the upper leaves. At the lower end of the flower is a somewhat pear-shaped, inferior ovary, marked with five strong ribs, and terminating in five linear toothed sepals. The corolla is three to five inches long, with a straight, slender, greenish tube and five spreading petals, an inch long and almost uniform in size. The five stamens are attached to the corolla at their base, while the upper portions of the filaments are connivent and the anthers united into a short, somewhat curved tube. The long, slender style extends between the stamens and the two-lobed stigma protrudes beyond the anthers at its maturity. The ovary ripens into a dry capsule containing numerous minute seeds.

H. A. GLEASON.

EXPLANATION OF PLATE. Fig. 1.—Summit of stem, with flowers. Fig. 2.—Stamens, style, and stigma, $\times 3$. Fig. 3.—Immature fruit, $\times 3$.



ERYTHRONIUM GRANDIFLORUM

ERYTHRONIUM GRANDIFLORUM

Star-strikers

Native of the northern Rocky Mountains

Family LILIACEAE

LILY Family

Erythronium grandiflorum Pursh, Fl. Am. Sept. 1: 231. 1814.

This lily is known among the miners and settlers of western Montana and northern Idaho as "star-strikers." It is closely related to our eastern *Erythronium americanum* Ker, which is known under several names. The most common of these are "yellow adder's tongue" and "dog's-tooth violet," both very inappropriate, for "adder's-tongue" belongs to a fernwort, *Ophioglossum*, and the plant is not a violet nor has it any dog-teeth. The European species of the genus, *E. Dens-canis* L., has two sharp teeth at the base of the petals, but this character is not found in any of the American species. The eastern species are sometimes called "trout-lily," "trout-flower," "yellow-bells," "lamb's-tongue," "deer's-tongue," "yellow snowdrop," "rattle-snake violet," etc., but these names are not used in the West. The "yellow bell" of the Rockies is *Amblylirion pudicum* Raf. (*Fritillaria pudica* Pursh).

Erythronium grandiflorum was first discovered by Captain Meriwether Lewis, of the Lewis & Clark Expedition to the Oregon in 1803-6, on the Kooskoosky, now the Clear Water River in Idaho. It is rather common in the mountains of Alberta, British Columbia, Washington, Idaho, Montana, and northern Wyoming. There are four other yellow-flowered species in the Rocky Mountain region. In three of these the veins of the petals and sepals are nearly equally spaced, but in *E. grandiflorum* there is a veinless strip on each side of the strong mid-rib, giving the petals a "banded" appearance.

The plant grows in rich soil, in open places on the hillsides, especially where humus has been deposited from washouts or from prospectors' diggings, or in talus under cliffs, but also in rich valleys or open woods.

Erythronium grandiflorum grows from obovoid bulbs two to three fifths of an inch in diameter and about an inch and a half long, somewhat oblique at the base, and with a loose outer coat. The leaves are usually two sheathing the scape at the base, the blades broadly lanceolate, or oblanceolate, three to six inches long, and an inch or two wide, acute or blunt at the apex, with many

parallel veins, but very rarely spotted as are those of our eastern species. The scape is eight to twelve inches tall, bearing one to three yellow flowers. The petals and sepals (the inner and outer lobes of the flower) are similar, lanceolate, long-tapering at the apex, in age reflexed, with a prominent midrib, bordered with a veinless band on each side and then with rather equally spaced veins, slightly divergent. The fruit is club-shaped, bluntly three-angled, about half an inch thick and two inches long, three-celled and many-seeded.

P. A. RYDBERG.

EXPLANATION OF PLATE. Fig. 1.—Plant. Fig. 2.—Flower, with parts cut away.



UNIFOLIUM CANADENSE

UNIFOLIUM CANADENSE

False Lily-of-the-Valley

Native of the eastern United States and Canada

Family CONVALLARIACEAE LILY-OF-THE-VALLEY Family

Maianthemum canadense Desf. Ann. Mus. Paris 9: 54. 1807.

Smilacina bifolia canadensis A. Gray, Man. ed. 2. 467. 1856.

Unifolium canadense Greene, Bull. Torrey Club 15: 287. 1888.

The oldest name of this genus is somewhat misleading, as the mature plants have always two to three leaves, but the young shoots have but one, hence the name *Unifolium*.

Two North American and one European species have been distinguished in this genus, both natives of the cooler regions of the northern hemisphere. Only one is recognized in the "Index Kewensis" and both our North American species are referred to the European *Maianthemum Convallaria* (the oldest specific name of the European plant is *bifolium* of Linnaeus). That species has the berries almost black as figured by Redouté in 1809 on *plate 216* of volume four of his beautiful colored plates of the *Liliaceae*. Many plants now distributed among other families were included in this superb monograph.

As in many other similar cases, our western species is probably the same as that of eastern Asia, which has been recognized as the variety *kamschaticum* of *U. bifolium*, being a much taller, stouter plant with longer-petioled leaves, the base reniform, the racemes of flowers longer and looser, and the berries larger and black, instead of red. It ranges through Siberia to Japan and Kamchatka. *U. dilatatum* of the west coast of North America extends from Alaska south to Marin County, California, and eastward to Longitude 121.25° in the Rocky Mountains of British Columbia: it is quite distinct from both *U. bifolium* of Europe and *U. canadense* of the eastern United States and Canada.

Unifolium canadense has not been reported any further west than Manitoba and Keewatin and in the Black Hills of South Dakota. In eastern Canada it ranges from Ontario to Labrador and Nova Scotia. In the United States it grows from Maine to North Carolina and Tennessee along the Alleghanies and ascends to five thousand feet in Virginia.

As a ground-cover, in moist shady woodlands, no plant could be found more charming than this little native American wild flower. It forms large patches, and takes care of itself when once established, spreading by underground runners. All it requires is a cover of leaves in winter and the shade of the trees in summer. It does not seem to prefer any particular kind of forest, and still survives in the Hemlock Grove in the New York Botanical Garden.

In rich woodlands the false lily-of-the-valley or two-leaved Solomon's-seal sometimes grows to be more than six inches high, with two or three glossy leaves. The stems are erect and sheathed at base, the lower leaf often broader and heart-shaped, two to three inches long by an inch and a half wide, either sessile or with a short petiole. The second leaf is narrower and more tapering, and occasionally a third leaf serves as a bract to the flower-cluster. These clusters are terminal on the stems and vary from one to three inches in length. The flowers have only one series of perianth-segments consisting of four white divisions, with four stamens, and a superior sessile ovary, which develops into a small, globose, shining berry, turns red, and becomes mottled when ripe, and is greedily eaten by our native birds.

ELIZABETH G. BRITTON.

EXPLANATION OF PLATE. Fig. 1.—Plant with inflorescence. Fig. 2.—Flowers, × 4. Fig. 3.—Cluster of fruit.



AGLAONEMA MARANTIFOLIUM

AGLAONEMA MARANTIFOLIUM

Maranta-leaved Aglaonema

Native of Malaya

Family ARACEAE

ARUM Family

Aglaonema marantifolium Blume, Rumphia 1: 53. 1835.

The genus *Aglaonema* is represented by about 15 species in tropical Asia and tropical Africa. The Malayan kinds are most numerous and some of these have been in cultivation for their decorative foliage, notably *A. pictum*, with green leaves blotched white on either side of the midrib, and *A. costatum*, with white midrib and white spots scattered over the leaves. The present subject has the leaf variegation in the form of uneven grayish-white zones on either side of alternate lateral veins. It has in addition very decorative bright red fruits.

Aglaonemas are easily grown in ordinary greenhouse compost, in a warm moist house such as will accommodate anthuriums and caladiums. They are propagated by division or by cuttings of pieces of the stem, rooted in sand.

The species shown here has been in our collection for twenty-five years, plants coming originally from the Cambridge, H. A. Siebrecht, and Fairmount Park collections; from one of the latter plants this illustration was taken.

Aglaonema marantifolium is an erect herb, with stems one inch or less thick, ringed below with leaf-scars, bearing above many leaves, and flower- or fruit-stalks from the petiole-bases. From the bases of old stems young shoots often arise. The leaves are obliquely ovate-oblong, four to six inches long and from two to three inches wide; they have somewhat cordate bases and acuminate apices with sharp awl-like tips. The petioles clasp the stalk, and are sheathing for more than half their length. The flowers are clustered on a white cylindrical spadix two inches long, subtended by a concave greenish-white spathe of equal length; they are white and staminate on the upper two thirds, greenish and pistillate on the lower third of the spadix. As the fruits develop the spathe falls and they become red, berry-like, elliptic, and translucent.

KENNETH R. BOYNTON.

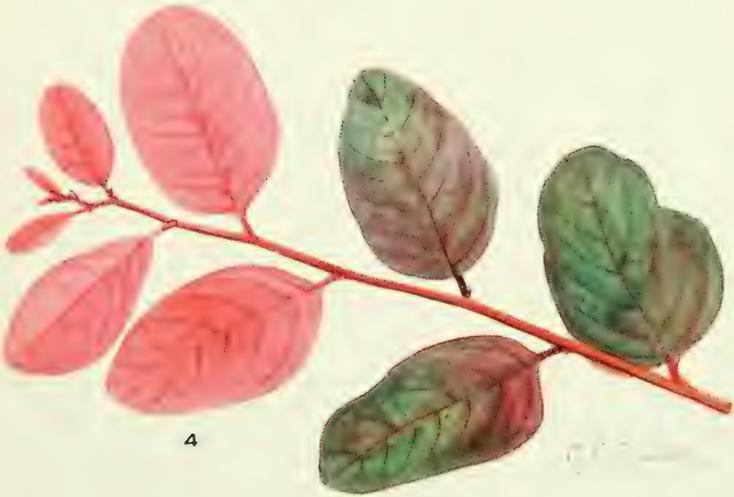
EXPLANATION OF PLATE. Fig. 1.—Fruiting plant. Fig. 2.—Spathe, with inflorescence. Fig. 3.—Pistillate flower, $\times 4$.



2



3



4

BREYNIA NIVOSA

(Plate 303)

BREYNIA NIVOSA**Snow-bush***Native of the New Hebrides*

Family EUPHORBIACEAE

SPURGE Family

Phyllanthus nivosa W. J. Smith, Floral Magazine *pl.* 120. 1874.*Breynia nivosa* Small, Bull. Torrey Club 37: 516. 1910.

The South Sea Islands have been the source of many horticultural plants conspicuous on account of their highly colored, often variegated, foliage, in lieu of attractive flowers. The spurge family contains many plants of this class. The shrub here concerned is one of the later representatives to have been brought into general use in regions where the climate is suitable for its culture.

The genus *Breynia*, here introduced to ADDISONIA, commemorates the name of Jacob Breyn, a merchant of Danzig who flourished as a botanist and botanical writer in the second half of the seventeenth century. The snow-bush, which in some tropical regions is called "ice-plant," is native in the New Hebrides. Its great value in horticulture lies in its versatile qualities. It is adaptable for hedges, borders, and mass plantings. It thrives well in almost pure sand or nearly pure humus. Thus it is easily grown and may be propagated by cuttings. Shade is agreeable to it, as is also full sun, in which, moreover, the foliage assumes its more showy hues. Green gives way to red, pink, or white, usually variegated. Sometimes white dominates to such a degree that a mass of the plant resembles a sheet of snow, hence the specific part of the botanical binomial, *nivosa*. This idea is conveyed in some tropical countries by the popular name "nevada." In southern Florida the snow-bush is almost universally used for hedges and borders. There, on account of its showy foliage and graceful habit, it is one of the first of the cultivated plants to attract the eye of the new-comer. Naturalized plants are sometimes met with, having sprung up on roadsides, in waste places and in woods from old plants and discarded trimmings. In the West Indies the snow-bush is used mainly as an ornamental.

The snow-bush is a monoecious shrub with lax, irregular, glabrous branches. The bark is red or brown, or pink on the twigs. The stipules are triangular or lanceolate, acute or acuminate at first, broader and scarious-margined in age. The leaves are alternate, frequently distichously spreading, persistent. The blades are thinnish, oval, varying to ovate or obovate, mostly one to two inches long, deep-green or green blotched with white, or often

mainly white, pink, and red, obtuse or rounded at the apex, glabrous, entire, abruptly narrowed or rounded at the base, short-petioled. The flowers, borne in the axils of leaf-like bracts, are nodding on slender pedicels, green or sometimes whitish. The staminate flowers are longer-pedicelled than the pistillate, sometimes several together in an axil, with a turbinate calyx-tube about one eighth of an inch wide and six very shallow lobes folded in horizontally about the minute orifice. The stamens are erect, united into a column, with the sacs opening vertically. The pistillate flowers are solitary, much larger than the staminate, one third to two fifths of an inch wide, with a short broad calyx-tube, and six very broad reniform, imbricate lobes, which are minutely pointed. The ovary is three-celled and three-lobed, not surrounded by a disk as are those of its relatives in North America. The three styles are very short, and each terminates in a two-lobed stigma. The fruit is a somewhat depressed berry, or capsular when very ripe, scarcely a half inch wide.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Flowering branch, showing staminate and pistillate flowers. Fig. 2.—Pistillate flower, $\times 2$. Fig. 3.—Staminate flower, $\times 4$. Fig. 4.—Branchlet showing green and red leaves.



GRAPTOPETALUM RUSBYI

GRAPTOPETALUM RUSBYI

Rusby's Stonecrop

Native of Arizona

Family CRASSULACEAE

ORPINE Family

Cotyledon Rusbyi Greene, Bull. Torrey Club 10: 125. 1883.*Dudleya Rusbyi* Britton & Rose, Bull. N. Y. Bot. Gard. 3: 13. 1903.*Graptopetalum Rusbyi* Rose.

The little plant here illustrated has a very interesting history. It has already been placed under two genera and we now find it must go to a third one. It was first described over forty years ago by E. L. Greene, who referred it to the genus *Cotyledon*, a South African genus which Bentham and Hooker had enlarged so as to include several very distinct genera found in Eurasia as well as the Americas. In 1903, Britton and Rose in their treatment of the Crassulaceae excluded *Cotyledon* from North America. For certain Mexican species referred to *Cotyledon* the genus *Echeveria* was restored, while the species on the California coast were referred to a new genus called *Dudleya*. Britton and Rose found that this plant was clearly not an *Echeveria* nor did it seem to be a true *Dudleya*. It then really represented an undescribed genus but the herbarium material was so meager that they reluctantly transferred it to *Dudleya* with the statement: "A very rare and interesting species perhaps not properly referable to this genus." There is still further confusion with regard to our plant. Greene based his description on two collections: The herbarium specimens of H. H. Rusby from Arizona, and his own plant obtained on San Francisco Mountain. Of the latter collection nothing seems to have been preserved and there is doubt whether it is the same as Rusby's plant, which, Dr. Rusby informed us, was collected in Copper Mine Cañon, near Clifton, Arizona, not at Prescott, Arizona, as stated in North American Flora (22: 35).

In January, 1920, Edwin B. Bartram, a keen collector of mosses, found in the Sabino Canyon of the Santa Catalina Mountains, Arizona, a little sterile plant which he distributed as *Sedum Griffithsii*. Seeing that the plant was wrongly named and unknown to us, we asked for living material. In January, 1923, Mr. Bartram was kind enough to send us specimens which flowered both in Washington and in the New York Botanical Garden, and from which material our illustration is made.

As is readily seen, the corolla, which has a rotate limb, is very different from all the species of *Dudleya*. In its rotate limb as well as its spotted petals and general appearance it is like the genus *Graptopetalum*, to which we would refer it. The genus *Graptopetalum* was described by Rose in 1911, based on a single species, *G. pusillum*. He has since described a second species, *G. pachyphyllum* in this journal (see PLATE 247).

Rusby's stonecrop is stemless, often growing in large compact clumps formed of small rosettes of spreading leaves. The leaves are flat, fleshy, almost an inch long, glabrous but with the whole surface papillose roughened. The flowering stem is four to eight inches long, usually erect, bearing a few small bract-like leaves, and is two- to three-branched. Each branch is a second raceme of five to eight flowers, the pedicels a half inch or less long. The five, or sometimes six, sepals are green, turgid, and erect. The corolla when in bud is strongly five or six-angled, even when very young, but when open it has a broad rotate limb about half an inch broad. The petals are keeled on the back, channeled on the face, mucronately pointed, dark red, banded or spotted, with greenish yellow on the face. The ten stamens are borne on the short corolla-tube, at first erect, but in age reflexed. The five carpels are erect.

J. N. ROSE.

EXPLANATION OF PLATE. Fig. 1.—Plant. Fig. 2.—Calyx, $\times 2$. Fig. 3.—Part of corolla, with stamens, $\times 2$. Fig. 4.—Gynoecium, $\times 2$.

RECENT PLATES

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PLATE 274. DUDLEYA ARIZONICA
PLATE 275. ROSA PALUSTRIS
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ADDISONIA

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OF
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ANNOUNCEMENT

A bequest made to the New York Botanical Garden by its late President, Judge Addison Brown, established the

ADDISON BROWN FUND

"the income and accumulations from which shall be applied to the founding and publication, as soon as practicable, and to the maintenance (aided by subscriptions therefor), of a high-class magazine bearing my name, devoted exclusively to the illustration by colored plates of the plants of the United States and its territorial possessions, and of other plants flowering in said Garden or its conservatories; with suitable descriptions in popular language and any desirable notes and synonymy, and a brief statement of the known properties and uses of the plants illustrated."

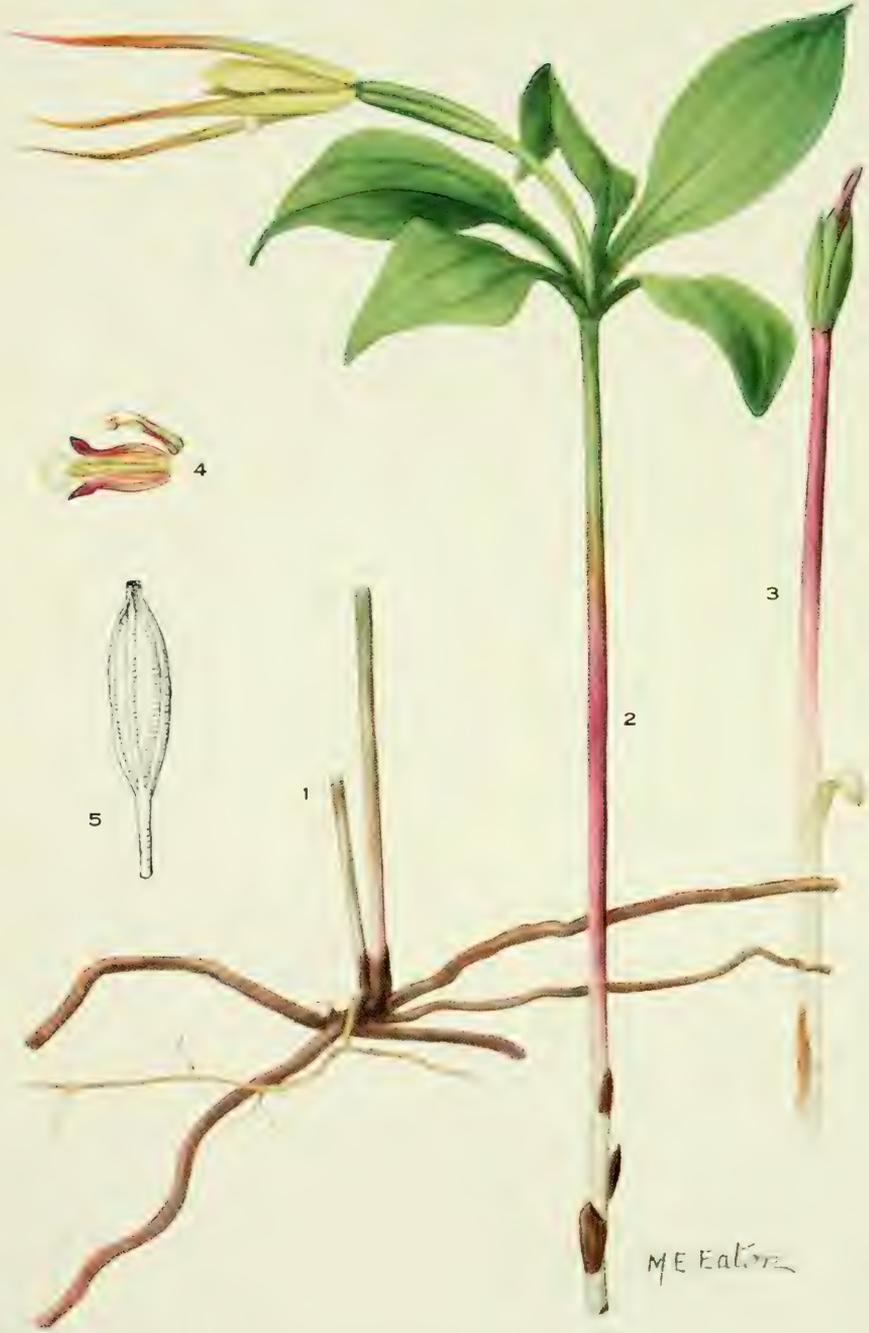
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ISOTRIA VERTICILLATA

ISOTRIA VERTICILLATA

Whorled Pogonia

Native of eastern North America

Family ORCHIDACEAE

ORCHID Family

Arethusa verticillata Willd. Sp. Pl. 4: 81. 1805.*Isotria verticillata* Raf. Med. Rep. II. 5: 357. 1808.*Pogonia verticillata* Nutt. Gen. 2: 192. 1818.

This attractive orchid is well distributed over the United States east of the Mississippi River, but is not so generally known as some species that are less frequent or abundant. Though the flower is bigger in outline than in most of our native orchids, the parts, except the lip, are slender and not highly colored; the flowering precedes the full development of the leaves; the life time of each flower is brief, a few days at the most; the plant seldom attains a height greater than ten inches above ground and is frequently overshadowed by adjacent shrubs. For these reasons this species is not detected easily, when in flower, even where it is known to be growing. Later in the season, when the leaves are fully grown, so that the whorl has a diameter of six inches or more, and especially if the capsule has developed, the plant is more readily seen. Even then it is likely to be overlooked in a rapid glance or to be mistaken for *Medeola*, the Indian cucumber root, to which it has indeed a sufficient similarity to have suggested to one botanist the specific name *medeoloides* for some forms of this species. The leaves of *Isotria*, however, are of firmer texture and a darker green, not translucent, not lanceolate, and there is only one whorl, without the colored spot in the center which is found in *Medeola*.

Isotria accommodates itself to varied conditions. It seems to prefer a moist soil with good drainage, in places where the roots are shaded and the growing plant can reach the sunlight; it thrives in association with *Kalmia latifolia*. It is found also in pine-barren conditions and in open dry woods near farm buildings. It is being exterminated in some places by cultivation of its habitats, but is still abundant in others.

Related to *Isotria verticillata* are forms that have been regarded by many botanists for nearly sixty years as constituting a distinct species, *I. affinis* (Austin) Rydb. Some, however, are reluctant to recognize a specific difference; particularly because *I. verticillata*

has an inclination to vary, as shown by some depauperate forms and by the occasional development of two flowers on one peduncle, with noticeable differences in the parts of these flowers.

The whorled pogonia is a low perennial herb, with a rootstock and a few rather fleshy fibrous roots, bearing at the top of the stem a whorl of five leaves. The leaves develop with the flowers; they are obovate in outline but abruptly pointed, sessile, two to three and a half inches long, the diameter of the whorl sometimes measuring seven inches. The flower is usually solitary, on a peduncle nearly or quite one inch long, at first declined, later erect, the erect peduncle of the mature capsule frequently exceeding one and three quarters inches. The sepals are narrowly linear, from an inch to two inches and a half long, spreading, dark purple; the petals erect, obtuse or acute, greenish yellow, about half the length of the sepals. The lip is shorter than the petals, three-lobed, crested, undulate. The mature capsule is usually about one inch long.

H. M. DENSLow.

EXPLANATION OF PLATE. Fig. 1.—Base of plant. Fig. 2.—Scape, with leaves and flower. Fig. 3.—Young scape, with bud. Fig. 4.—Column and lip. Fig. 5.—Capsule.



IPOMOEA BATATAS

(Plate 306)

IPOMOEA BATATAS

Sweet Potato

Probably native of tropical America

Family CONVULVULACEÆ MORNING-GLORY Family

Convolvulus Batatas L. Sp. Pl. 154. 1753.*Ipomoea Batatas* Poir. in Lam. Encyc. 6: 14. 1804.*Batatas edulis* Choisy, Mém. Soc. Genève 6: 435. 1834.

There is much difference of opinion as to the native home of this species. It was evidently not known to Europeans previous to the discovery of America and it is recorded that Columbus took roots of the sweet potato from the New World to the Old World. The evidence now available seems to favor an American origin for this plant.

At the present time the sweet potato is widely cultivated as a root crop for human food in all tropical countries. Rather recently its culture has been extended into temperate regions, as far northward, for example, as into New Jersey.

Throughout a wide area of the more northern range of its culture the sweet potato seldom blooms. Here the conditions, such as temperature, length of growing season, relative length of daylight and intensity of light, do not favor the production of flowers. Its behavior illustrates well the fact that plants may thrive vegetatively under conditions that do not permit them to bloom.

Although sweet potatoes bloom profusely in the tropics, fruit and seeds are seldom seen. It appears, however, that when two or more varieties are planted together, so that insects effect cross-pollination, seed may be had in abundance. Since sweet potatoes are propagated by "draws," young plants that arise from the roots, and by cuttings from the vines, all the plants of a variety are merely parts of one original plant and the inability to produce fruit and seed to self-pollination is automatically extended throughout the variety. This condition is frequently seen in many kinds of plants both wild and cultivated.

The sweet potato is not to be confused with the yams (species of *Dioscorea*), which belong in a very different family, or with the "Irish" potato, which is a member of the Nightshade family.

The plant here illustrated grew at the New York Botanical Garden from seed sent by Dr. B. H. A. Groth from Santo Domingo.

The plant bloomed in midwinter under greenhouse care. The capsule and seed shown came from Santo Domingo.

The sweet potato is naturally an herbaceous perennial; in common culture it is treated as an annual. The stems are smooth, much branched, long, trailing, and they strike root freely at the nodes. The leaves are alternate, simple, in general heart-shaped or triangular, either entire, shouldered, or lobed and deeply cut according to the variety. The roots are fleshy and edible, varying greatly in shape, size, color, character of flesh, and food value, according to the variety. They are formed in clusters directly below the crown of the plant. The flowers are perfect, in clusters at the end of a stout pedicel. The corolla is funnel-form, about one and one half inches across open flower, with margin white or purplish-tinted and throat deep purple. The five sepals are imbricated and persistent about the dry capsule. The stamens and style are not exerted. The five stamens are of unequal lengths, the longer about level with the stigma. The single style is slender, the stigma capitate. The ovary matures into a globular, dehiscent pod with four one-seeded cells. The seeds are nearly black, irregularly rounded, and about one eighth of an inch in diameter.

A. B. STOUT.

EXPLANATION OF PLATE. Fig. 1.—Basal portion of stem with cluster of roots becoming fleshy. Fig. 2.—Portion of stem with leaves, flower-peduncle, cluster of flower buds, and one fully open flower. Fig. 3.—Ripe capsule with dry persistent calyx-lobes. Fig. 4.—Seed.



NIEREMBERGIA RIVULARIS

NIEREMBERGIA RIVULARIS

White-cup

Native of Argentina

Family SOLANACEAE

POTATO Family

Nierembergia rivularis Miers, Lond. Jour. Bot. 5: 167. 1846.

Nierembergia was named in honor of Juan Eusebio Nieremberg, a Spanish Jesuit, author of a history of nature, published at Antwerp in 1685. The specific name, *rivularis*, was given on account of its growing upon river-banks in its native habitat.

This plant, said to have been introduced from La Plata in 1866, is a very hardy perennial bearing white flowers with pale yellow centers. It is a low-growing plant and continues in bloom from June to late autumn. Owing to its habit of spreading by underground roots it will, if left to itself, soon cover quite large areas of ground, and it is useful for covering banks and for rock-garden work. It is also used in cemetery decoration and when well grown soon makes a good ground-cover. In the New York Botanical Garden it is entirely hardy; the foliage dies in late autumn, the roots remaining in good condition until spring, when it produces leaves freely and is by June in full flower.

It is easily propagated from cuttings and small portions of the roots, which grow and produce leaves readily if placed in sand in a cold frame.

The white-cup, or trailing cup-flower, is a wholly glabrous plant, with a slender, decumbent or creeping, or rarely suberect stem, rooting freely at the nodes, forming a dense mat, the branches seldom rising more than six inches from the ground. The leaves are oblong to oblong-spatulate, obtuse, membranaceous, variable in size, with a long slender petiole. The flowers are sessile or short-peduncled. The calyx is cylindric, with lanceolate, slightly spreading lobes. The corolla-limb is broadly bell-shaped, one to two inches broad, with a golden yellow throat; the tube is elongate, so as to bring the limb far above the calyx, as in *Petunia*.

EDMUND B. SOUTHWICK.

EXPLANATION OF PLATE. Fig. 1.—Plant, with flowers. Fig. 2.—Portion of plant, with flower. Fig. 3.—Calyx, with base of corolla-tube, $\times 3$. Fig. 4.—Ovary, with base of style, $\times 6$. Fig. 5.—Summit of style and stamens, corolla mostly cut away, $\times 3$.



MONARDA FISTULOSA

MONARDA FISTULOSA

Wild Bergamot

Native of the eastern United States and Canada

Family LAMIACEAE

MINT Family

Monarda fistulosa L. Sp. Pl. 22. 1753.

The genus *Monarda* is exclusively American, and throughout the eastern half of the United States one or more species are everywhere common. *Monarda fistulosa* is one of the more abundant species, and ranges from Ontario to the Gulf of Mexico, and from the Atlantic coast west to Kansas. Its natural habitat is in dry, well-drained soil, preferably clay, on hills and in upland thickets, where neighboring trees or shrubs give it partial protection from full exposure to the sun. It is accordingly especially common along woodland roads and in abandoned fields, and its showy heads of pink-purple flowers contribute notably to the beauty of our mid-summer landscapes.

The wild bergamot is closely related to the purple bergamot, *Monarda media* (ADDISONIA 5: 39. pl. 180. 1920), and is distinguished by a paler flower and by the softer and more spreading hairs on the leaves and stems. Like the purple bergamot, the wild bergamot responds readily to cultivation in any type of soil except a swamp and will soon produce large clumps which may need thinning and restriction. Our plate was prepared from a plant growing on the grounds of the New York Botanical Garden.

The wild bergamot is a perennial herb from two to three feet high, with its stems growing in clumps, simple below and branching above, the branches all terminated by close dense heads of flowers. The square stem is finely and softly hairy and bears pairs of opposite leaves at intervals of two to three inches, on leaf-stalks often an inch long. The leaf-blades are from two to four inches long, triangular or narrowly ovate in shape, usually broadly rounded at the base, tapering to a long point, sharply toothed along the margin, rather dull green in color, and very finely velvety-hairy on both sides. The flower-head is subtended by several bracts shaped like the leaves, but smaller and frequently pale or purplish in color. The calyx is tubular, about three eighths of an inch long, with five short sharp lobes and numerous white hairs at its summit. The corolla is an inch to an inch and a half long, hairy, and deeply two-lipped; the lower lip is three-lobed and decurved, the upper

almost straight. The two stamens ascend under the upper lip and barely surpass it in length. The ovary is deeply four-lobed, with a single style, and ripens into four one-seeded nutlets.

H. A. GLEASON.

EXPLANATION OF PLATE. Fig. 1.—Portion of a flowering stem. Fig. 2.—Calyx, $\times 3$. Fig. 3.—Stamens, $\times 3$. Fig. 4.—Fruit, and a single detached nutlet, $\times 3$.



ASTERANDRA GRANDIFOLIA

ASTERANDRA GRANDIFOLIA

Tobillo

Native of tropical America

Family EUPHORBIACEAE

SPURGE Family

Phyllanthus grandifolius L. Sp. Pl. 981. 1753.*Phyllanthus juglandifolius* Willd. Enum. Suppl. 64. 1813.*Phyllanthus quinquifidus* Sessé & Moc. Fl. Mex. ed. 2. 212. 1894.*Asterandra grandifolia* Britton, Mem. Brooklyn Bot. Gard. 1: 61. 1918.

The genus *Asterandra*, defined by Klotzsch in 1841, is composed of a few species of small trees, natives of tropical America, which have been included by some authors in the Linnaean genus *Phyllanthus*. They have alternate, short-stalked, two-ranked leaves and small monoecious apetalous axillary flowers, solitary or fascicled. The calyx is composed of five or six nearly equal segments. The staminate flowers have four to six stamens, their filaments connate. The pistillate flowers have a three-celled ovary, united styles and a dilated peltate stigma. The fruit is a small hard three-lobed capsule.

Tobillo is the Porto Rico name of this small tree, which there inhabits thickets, wooded hills, and river banks at lower and middle elevations. It is also found in Cuba, Hispaniola, Mexico, and northern South America; it has also been recorded as growing on the island of St. Thomas, but it has not been found there recently. The tree is unusual in cultivation; the plant which furnished our illustration was brought from the Leiden botanical garden to the New York Botanical Garden in 1902, and is now about 12 feet high.

The tobillo attains a maximum height of about twenty-five feet, with slender trunk and nearly horizontal branches. The leaves are borne upon the branches in an arrangement that at first glance suggests a compound leaf; they are ovate or ovate-lanceolate, entire, from two to six inches in length, rather firm in texture, very short-stalked, the apex pointed or blunt, the base narrowed, obtuse or subcordate. The flowers are green, borne on short stalks in the leaf-axils, the calyx of the staminate ones about one sixth of an inch long. The capsule is nearly half an inch broad, its lobes rounded.

N. L. BRITTON.

EXPLANATION OF PLATE. Fig. 1.—Portion of stem, with flowers. Fig. 2.—Pistillate flower. Fig. 3.—Staminate flower. Fig. 4.—Capsule. Fig. 5.—Valve of capsule. Fig. 6.—Seed, $\times 2$.



WHITFIELDIA LATERITIA

WHITFIELDIA LATERITIA**Brick-colored Whitfieldia***Native of tropical West Africa*

Family ACANTHACEÆ

ACANTHUS Family

Whitfieldia lateritia Hook. Bot. Mag. pl. 4155. 1845.

The name *Whitfieldia*, used in commemoration of Thomas Whitfield, an explorer, was given to a genus of African shrubs, now comprising about seventeen species. This species seems to be the only one in cultivation, although another acanthaceous shrub, *Jacobinia carnea*, which is often seen in conservatories, has been sold as *Whitfieldia*. Our species is distinct from any other greenhouse flowering plant in the color of its flowers, which under our cultivation are very light brick-red. *Whitfieldia* is related to *Strobilanthes*, one species of which, *S. Dyerianus*, the Burma conehead, is grown in greenhouses for its decorative foliage spotted with blue and pink, and to *Hemigraphis*, a genus of tropical herbs, of which *H. primulaefolia* and *H. colorata* are used as basket plants. *Whitfieldia* differs from these genera in having a colored calyx.

Our illustration was made from a plant raised from seed received from the botanic garden at Edinburgh. Several of these are growing in a warm greenhouse, where they flower in midwinter each year. Propagation is effected by cuttings taken in February and rooted in a bench with bottom heat. Young plants from these cuttings should be grown outdoors until September of their first year.

The brick-colored whitfieldia is a small shrub, with four-sided, round-angled hairy stems growing in cultivation up to about three or four feet high. At intervals of an inch or less along each stem are pairs of opposite lanceolate leaves, those near the base of the stem being two inches long by one wide, narrowed at the base into a short petiole and at the apex into a short point; their margins have only a few inconspicuous teeth near the apex; the leaves are prominently red-veined on the under side, and these veins, especially the mid-vein, show a short pubescence. The upper leaves are remotely toothed on the margins, occasionally oblique or irregular in shape and half the size of the lower; on well-grown specimens they take on a reddish color. The flowers are in terminal racemes, each on a slender pedicel subtended by short lanceolate bracts colored like the flowers, which have five-pointed, colored calyxes and corollas; the corollas are tubular or cylindrical, an inch long,

bent at the center, with the mouth widened, and somewhat two-lipped with five ovoid or oblong lobes. The four stamens are in pairs, two attached to the base of the corolla-tube, the other pair joined and attached thence to the base of the corolla-tube.

KENNETH R. BOYNTON.

EXPLANATION OF PLATE. Fig. 1.—Flowering branch. Fig. 2.—Corolla, split open, showing stamens. Fig. 3.—Upper part of stamen, $\times 4$.



PINUS RIGIDA

PINUS RIGIDA**Eastern Pitch Pine***Native of eastern North America*

Family PINACEAE

PINE Family

Pinus rigida Mill. Gard. Dict. ed. 8. Pinus No. 10. 1768.

Pinus rigida is one of three species to which the common name pitch pine is applied. The other two are the western *P. ponderosa* and the southern *P. palustris*. It ranges from New Brunswick and Ontario to Alabama and Georgia, and eastward from Ohio, West Virginia, and Tennessee to the Atlantic coast. It is the most abundant and typical tree of the low-lying pine barrens of Long Island and New Jersey, where in places it occupies hundreds of square miles to the almost total exclusion of all other arborescent vegetation. Elsewhere it grows mostly in more scattered groves, in rocky, hilly or mountainous situations, reaching an elevation of 3,000 feet in Virginia. It is one of the few species of pine that produce shoots, more or less freely, from the stumps of cut trees. These shoots grow vigorously for a few years, but are rarely long-lived. In the pine barrens of New Jersey, over large areas, the second growth largely consists of these shoots; but fire quickly destroys them, although the stumps may retain their vitality, and another succession of shoots may develop.

The wood is soft and brittle and is of little value for lumber. It is used in the manufacture of charcoal and for ordinary fuel. Its fuel value is equal to that of any other wood of the region, and it was formerly the source from which resin, turpentine, and tar were obtained in considerable quantity, until these products were replaced by those of superior quality from the southern pines.

The eastern pitch pine is a monoecious, evergreen tree which, under favorable conditions, may grow to a height of about eighty feet, but usually averages about fifty feet. The trunk is covered by a furrowed, flaky, reddish-brown bark. The branchlets are not so rough and are green at first, subsequently changing to orange-brown. The leaves are commonly in fascicles of three, but occasionally a fascicle may contain four. They are dark green in color, rigid, with sharp pointed apex, and vary in length from less than two inches on some of the mountain trees to four or five inches on those of the lowlands. The staminate aments are terminal and crowded on the young branchlets. They are cylindric, obtuse,

and about an inch in length. The pistillate aments, or cones, are laterally arranged, on the older branches, either in clusters of two to four, or solitary. When young they are oblong-ovoid or conic, but generally become more rounded or globular at maturity, when they expand and open. The scales are hard and woody, thickened into a triangular apex, which bears a stout, triangular, recurved spine or prickle.

ARTHUR HOLLICK.

EXPLANATION OF PLATE. Fig. 1.—Branch, with mature cone. Fig. 2.—Tip of branch, with ovulate ament on older portion. Fig. 3.—Staminate ament. Fig. 4.—Scales of staminate ament, $\times 6$.



M.E. Eaton

RUDBECKIA TRILOBA

(Plate 312)

RUDBECKIA TRILOBA

Thin-leaved Cone-flower

Native of the eastern United States

Family CARDUACEAE

THISTLE Family

Rudbeckia triloba L. Sp. Pl. 907. 1753.

The numerous members of the thistle family with showy yellow flowers, such as the sunflowers, tickseeds, and cone-flowers, are usually inhabitants of open sunny places, but some are characteristic of the forest, where flowers of such a vivid color are generally few. Such a plant is the thin-leaved cone-flower, which grows in rich, moist woodlands through most of the eastern states from Kansas to the Atlantic Ocean, except New England. Occasionally it ventures out of the full shade, especially along woodland roads, and in such situations is apt to grow taller, branch more freely, and bear many more flower-heads. It does not become a weed, like its ubiquitous relative, the black-eyed Susan, but sometimes persists in cleared fields, and in the open sun is shorter, rougher, more freely branched, and bears numerous smaller flower-heads.

The thin-leaved cone-flower is seldom seen in cultivation and has little horticultural value in comparison with the golden-glow or the various species of native sunflowers, which are taller and more floriferous. Our illustration was prepared from a plant growing on the grounds of the New York Botanical Garden.

There are three species of cone-flower with lobed leaves in the northeastern states. The thin-leaved cone-flower is distinguished by its dark purple disk from the golden-glow, with a dull greenish-yellow disk, and by its sharp chaff (*fig. 4*) from the sweet cone-flower, in which the chaff is blunt.

The thin-leaved cone-flower is a branched biennial herb, from two to five feet high, with a rough or hairy stem, and with showy flower-heads terminating the branches. The lower leaves are distinctly stalked and deeply three-lobed; the upper have progressively shorter stalks and are smaller, ovate or elliptic in outline, and nearly or quite entire at the margin. All the leaves are bright green and rough on both sides. The flower heads are subtended by an involucre of a few linear-lanceolate, hairy, spreading or reflexed bracts, and include two kinds of flowers. The outer flowers, usually eight to ten in number, are sterile and without reproductive organs, and their corollas are expanded into yellow, broadly elliptic rays

usually somewhat less than an inch long. The numerous central, or disk, flowers are dark purple and crowded into a subglobose head; they are fertile, with both stamens and pistil. The inferior ovary of the latter ripens into a smooth four-angled achene. Each of the disk-flowers is subtended by a bract, usually termed chaff, oblong in shape and ending in a sharp point.

H. A. GLEASON.

EXPLANATION OF PLATE. Fig. 1.—Upper portion of flowering branch. Fig. 2.—Lower leaf. Fig. 3.—Disk-flower, $\times 5$. Fig. 4.—Chaff, $\times 5$.

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AND
POPULAR DESCRIPTIONS
OF
PLANTS

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ADDISON BROWN FUND

"the income and accumulations from which shall be applied to the founding and publication, as soon as practicable, and to the maintenance (aided by subscriptions therefor), of a high-class magazine bearing my name, devoted exclusively to the illustration by colored plates of the plants of the United States and its territorial possessions, and of other plants flowering in said Garden or its conservatories; with suitable descriptions in popular language and any desirable notes and synonymy, and a brief statement of the known properties and uses of the plants illustrated."

The preparation and publication of the work have been referred to Dr. John Hendley Barnhart, Bibliographer, and Dr. Henry Allan Gleason, Curator.

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IRIS CAROLINA

IRIS CAROLINA

Carolina Blue-flag

Native of the southeastern United States

Family IRIDACEAE

IRIS Family

Iris versicolor Walter, Fl. Car. 67. 1788. Not *I. versicolor* L. 1753.

Iris carolina Radius, Schr. Nat. Ges. Leipzig 1: 158. pl. 3. 1822.

The name *Iris* is from the Greek meaning rainbow, and is applied because of the bright, usually varicolored parts of the flower. When, in 1822, Justus W. M. Radius described and figured, in color, *Iris carolina*, little did he suspect that the species he was proposing was the most generally distributed iris in the low country of the Carolinas and Georgia. It was the rediscovery of this plant that is largely responsible for the study of North American *Iris*, some of the results of which are here indicated.

The nearest relative of *Iris carolina* is *Iris versicolor*; these two doubtless had a common ancestor in the Appalachian Highlands before the ice-age. As far as we know, this species was not driven from its native haunts by the glacier; it evidently has had a long and peaceful existence at the South. A relatively mild climate and a uniform soil has, apparently, resulted in less modification in its structure than in the case of *Iris versicolor*, which has had much to contend with, both in severe climates and variety of soils. The circular, lozenge-like seeds borne in one row in each carpel or capsule-cavity would indicate a more primitive type of fruit.

Iris carolina prefers a black silt loam with somewhat stagnant water, where partial shade softens the glare of the full sun; the dampness of its habitat protects it from forest fires. It is common in the Coastal Plain from Virginia to northern Florida, and thrives equally well in the primeval swamps and in artificial habitats; it also occurs in the Piedmont and on the edge of the Blue Ridge, its primeval home. There it may be found growing side by side with some of its preglacial companions such as the typically "southern" bamboo (*Smilax laurifolia*) and the "northern" sweet-gale (*Myrica Gale*). Although the flowers are usually deep-tinted, pale forms and even albinos are occasionally observed. The type specimen is merely said to have come from "Carolina"—whether North or South we do not know. The specimens from which the accompa-

nying illustration was made were sent from near Hartsville, South Carolina, by William C. Coker in 1919. They have flowered in the Garden in each succeeding year.

The Carolina blue-flag has a stout horizontal rootstock. The leaves are erect and mostly five to eight together, with narrowly linear, attenuate, pliable, glaucous blades up to one to two feet long. The flower-stalk is slender, as tall as the leaves or taller, often with a slender branch above the middle. The flower-cluster exceeds the leaves, elevated on a purple or green peduncle. The main bract is much shorter than the leaves. The flowers are much exerted from the involucre. The main bracts of the involucre are not foliaceous. The pedicels are one to two inches long. The hypanthium, surrounding the ovary, is shorter than the pedicel and bluntly three-angled. The perianth-tube is narrowly funnellform, about one quarter of an inch long. The three sepals are spreading, pandurate, two and a quarter to two and a half inches long; the blade is cuneate to elliptic-cuneate, lilac-purple or violet, with decided purple veins, crestless; the claw-like base is broad, nearly or quite half as wide as the blade, green or yellow-green and veined with purple, with a green or yellow ridge running half way up into the blade. The three petals are erect, spatulate or elliptic-spatulate, one and a quarter to one and three quarters inches long, about two thirds the length of the sepals; the broad yellowish claw shorter than the blade, which is deep or pale lilac and veined with purple. The three style-branches are linear-cuneate, one and a half to two inches long, two fifths to three fifths of an inch wide, with a lilac rib and two pale edges. The style-appendages are curled inward, two fifths to three fifths of an inch long, bluntly erose-toothed, semi-orbicular, or widest slightly above the middle or below it. The stigma is shallowly toothed, but otherwise entire. The three stamens are one and an eighth to one and a quarter inches long, the anthers and filaments about equal in length, or the anther a little the longer. The capsules are ellipsoid to ovoid-ellipsoid, mostly one and a half to two inches long, with a slight ridge on each side and a groove along each rounded angle, obtuse or sometimes short-beaked as a result of the failure of the ovules near the apex of the ovary to develop into seeds; the earlier ones of a cluster on pedicels exceeding their own length, the later ones on shorter pedicels. The seeds, in one row in each carpel or cavity of the capsule, are suborbicular, thick lozenge-shaped, pale brown and very corky, about five twelfths of an inch in diameter or less.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Inflorescence and foliage. Fig. 2.—Sepal. Fig. 3.—Petal. Fig. 4.—Capsule. Fig. 5.—Seed.



IRIS HEXAGONA

IRIS HEXAGONA

Angle-pod Blue-flag

Native of the coastal southeastern United States

Family IRIDACEAE

IRIS Family

Iris hexagona Walter, Fl. Car. 66. 1788.

Of the two species of *Iris* proposed by Thomas Walter and the four recorded by him from the region covered by his "Flora" *Iris hexagona* is the largest; in fact, it is the most robust of our eastern American species. It is a stout and rigid plant with a yellowish-green tint in the foliage, its flowers show the greatest amount of a very rich shade of purple in the perianth, and the crest of the sepal is most prominent.

Iris hexagona is confined to the southern Atlantic and Gulf coast strip, but its exact range is not yet known; from the coasts of South Carolina and Georgia it passes diagonally across northeastern Florida to near the angle of the Gulf Coast, whence it extends westward. If this plant grew further northward before the glacial period, there is no evidence that it ever attempted to regain the ground it may have lost. It seems more likely that, for some unknown reason, its ancestors took an eastward and southward course when they left the Appalachian plant reservoirs after the final submergence and uplift of the continent preceding the glacial period.

In its native haunts it demands a black silt loam, and much water, growing mostly in permanently wet ditches, in swamps, and in shallow slow-flowing streams. It is equally at home in the full sunlight or in the half shade of shrubs and trees.

In the Atlantic side of its range *Iris hexagona* seems to hug the coast, where it is associated with *Iris carolina*, perhaps on account of the lower land where water is more abundant. Near the Gulf coast it extends further inland, for there the land is very low and flat, and the rise inland is much more gradual than along the Atlantic Ocean.

This flag is a comparatively late bloomer. The flowers are peculiar in that they last for several days without wilting. The pods of the other species inhabiting the same region are formed or ripened when the plants of *Iris hexagona* begin to flower, and they are often decayed and discharging their seeds when its pods are still

green. A very rich and deep shade of purple is the rule in the flowers of *Iris hexagona*, but albino flowers have been observed.

As far as we can learn much of the material cultivated in gardens as *Iris hexagona* really does not represent that species. It seems that almost any large-flowered *Iris* from the southern Coastal Plain is distributed as "*I. hexagona*." The specimens from which the accompanying illustration was made, collected near Mount Pleasant, South Carolina, were sent by Agnes A. Auld in the spring of 1924.

The angle-pod blue-flag has a very stout rootstock. The leaves are stiffly erect, several together, with linear-attenuate, yellowish-green blades up to about three feet long or less, all glaucescent. The flower-stalk is stout, four feet tall or less, erect, strict or slightly zigzag, somewhat flattened, glaucous, simple or with one or more short, usually very short branches which are subtended by long foliaceous, usually elongate, bracts. The flower or flower-cluster is exceeded by the subtending bract. The pedicel is shorter than the ovary in anthesis. The hypanthium, covering the ovary, is longer than the pedicel, with six prominent ribs or angles, and six intermediate ribs. The perianth-tube is funnellform, nearly or quite a half inch long. The three sepals are remate, three and a quarter to four and a quarter inches long; the blade is oval or nearly so, rich purple, with an elevated linear coarsely hairy crest extending up from the claw, the green of the claw shading into yellow along the crest and the yellow shading into white flecks; the broad claw yellow-green within and distinctly striate-ribbed. The three petals are two and three quarters to three and a quarter inches long, narrowly spatulate, erect, the blade deep purple, often notched at the apex, the claw yellowish green at the base, whitish and lined and flecked with purple above. The stamens are about 4 cm. long, with the filament yellow and the anther linear, slightly longer than the filament. The three style-branches are broadly linear to linear-cuneate, about two inches long, greenish white and purple-tinged within. The style-appendages are scythe-shaped or somewhat falcate, one half to three quarters of an inch long, erose. The stigma is broadly two-lobed, with each lobe finely erose. The capsules are ovoid or oval-ovoid, one and a half to two inches long, blunt or stout-beaked, with a slight ridge or groove on each face, the angles with two lateral, elevated, often sharp ridges, all terminating in stout pedicels usually less than half their length. The seeds, borne in two rows in each carpel or cavity of the capsule or sometimes in one row in some of the cavities, are very corky, irregular from mutual pressure, pale brown, four twelfths to five twelfths of an inch in diameter.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Inflorescence and foliage. Fig. 2.—Sepal. Fig. 3.—Petal. Fig. 4.—Capsule. Fig. 5.—Seed.



IRIS FOLIOSA

IRIS FOLIOSA

Leafy Blue-flag

Native of the lower Mississippi valley

Family IRIDACEAE

IRIS Family

Iris foliosa Mack. & Bush, Trans. Acad. St. Louis 12: 80. 1902.

The proposal of this species of *Iris* in 1902 marks the second successful attempt to add a species to the genus in the eastern United States, following nearly a century of inactivity in studies in and interpretation of the blue-flags. The plant was really not unknown, even as early as the beginning of the nineteenth century, but it was not botanically named or described.

The present aggregates called *Iris foliosa* and *I. hexagona* doubtless had a common ancestor living in the biologic reservoirs of the Appalachian Highlands. After the latest elevation of the continent the plants that descended eastward developed *Iris hexagona*, while those spreading westward developed *I. foliosa*. The latter did not become as robust a plant as the former. The leaves are weak, and lie diffuse and more or less decumbent on the ground. The flowers are hidden among the foliage because the flower-stem is decumbent or prostrate. This habit has been brought about, perhaps, by the weight of the flowers and fruits that are borne along the zigzag stem from near the base, instead of merely a flower or two at the top of the stem, as in *I. hexagona*. Although *Iris foliosa* has sometimes been considered a variety of *Iris hexagona* or even conspecific with it, there are structural diagnostic characters in all parts of the flower. The lack of vigor, exhibited by the foliage and the flower-stem, is also evident in the flower itself. For example, while the flower of *Iris hexagona* with its heavy firm parts will stay fresh for several days, that of *Iris foliosa* with its evidently frail parts will last a day at the longest.

The type locality of *Iris foliosa* is Little Blue Tank, Jackson County, Missouri, collected June 6, 1897. The type is in the herbarium of K. K. Mackenzie. The plant grows in dense colonies, in open woods and on prairies, in Ohio, Kentucky, Illinois, Missouri, Kansas, and Arkansas. It is hardy in latitudes north of its natural range. Colonies derived from material sent in by Mr. Mackenzie, and from which the accompanying illustration was made, have

flourished in the plantations of the New York Botanical Garden since 1903.

The leafy blue-flag has a stout extensively creeping rootstock. The leaves are numerous, not glaucous, the larger ones sometimes two and a half feet long. The flower-stalk is relatively slender, one and a half feet long or less, decumbent or prostrate, thus usually hidden under copious leaf-growth, markedly zigzag, often strongly so, simple, but bearing flowers at several nodes, usually at short intervals. The flowers are solitary in the axil of the greatly elongate foliaceous subtending bract or two together at the top of the stem. The pedicel is as long as the ovary in anthesis, with six prominent ribs or angles. The perianth-tube is narrowly funnellform, as long as the ovary or shorter. The three sepals are remate, three and a quarter to three and three quarters inches long; the blade is ovate, somewhat longer than the claw, clear violet or bluish, except the white radii on either side of the clear yellow linear crest; the claw is about one third of an inch wide, whitish green and with deeper green fine striations, changing to pale yellow in the base of the blade. The three petals are mostly spatulate, about 8 cm. long; the blade is slightly longer than the claw, slightly paler than the sepal-blades; the claw is white with few green median striations. The three stamens are an inch and a quarter to an inch and a half long, with the filament about as long as the anther. The three style-branches are narrowly cuneate, an inch and a half to two inches long, about a half inch wide, pale green, except the thin lavender margins and the tip within. The style-appendages are semi-ovoid to ellipsoid-ovoid, an inch and a quarter to two inches long, usually blunt-beaked, with a shallow groove on each face, the angles with two lateral elevated sharp ridges, thus making the capsule unequally six-angled. The mature pedicels are usually less than half the length of the capsule. The seeds, borne in on two rows in each carpel or cavity of the capsule, or in one row in some cavities, are quite corky, semicircular or irregular from mutual pressure, brown, a half inch in diameter or less.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Inflorescence and foliage. Fig. 2.—Sepal. Fig. 3.—Petal. Fig. 4.—Capsule. Fig. 5.—Seed.



IRIS VERSICOLOR

IRIS VERSICOLOR

Common Blue-flag

Native of eastern North America

Family IRIDACEAE

IRIS Family

Iris versicolor L. Sp. Pl. 39. 1753.

The taxonomic botanical history of iris in America starts with this species. Linnaeus based the name, indirectly, on descriptions of plants said to have come from Virginia, Maryland, and Pennsylvania, including descriptions and figures which were supposed by Dillenius to represent two species. The name *Iris versicolor*, however, has now become settled upon the common blue-flag of the northeastern States and the highlands of the South. The remote ancestors of *Iris versicolor* in the high Appalachian Highlands evidently gave rise to various species of *Iris* as the descendants spread to all points of the compass. After the ice-age, *Iris versicolor* or its immediate relatives spread northward, eastward, and westward, but kept mainly to the higher provinces, particularly to the Piedmont, where as a species it has settled down to a very consistent aggregate. *Iris versicolor* and its relative *I. carolina* are the only large blue-flags that have retained a geographic continuity through all the plant provinces, from the original Appalachian Highlands to the coast.

As one would suspect, in the case of a plant that is widely distributed and an inhabitant of several plant-provinces of various altitudes, there is more variation in the size and vigor of the plants of *Iris versicolor*, although its flowers and fruits are reasonably constant in characters. It has had vastly more experience, so to speak, than its relative *Iris carolina*, and has for some reason developed a double row of seeds in each carpel. This character, which amounts to the doubling of the number of seeds, may have resulted in its maintenance in environments more rigorous and precarious than that of its southern relative.

Iris versicolor is quite flexible in regard to natural habitats, and hence tractible in cultivation; preferring a soil in which much humus has been deposited, its native haunts are swamps, marshes, meadows, stream-banks, lakes, and ponds. Different colonies and individual plants exhibit pale and deep shades of color in the flowers,

and albinos are not infrequently observed in the field. The specimen from which the accompanying illustration was made was from a native colony in the New York Botanical Garden.

The common blue-flag has a very stout horizontal rootstock. The leaves are erect and usually four to six together, with linear, often narrowly linear-attenuate, glaucous blades up to one and a half feet long. The flower-stalk is stoutish, as tall as the leaves or taller, simple or with a peduncle-like branch at the middle or above it. The flower-cluster usually exceeds the leaves, terminating a green or purplish peduncle. The main bracts are much shorter than the leaves. The flowers are much exerted from the involucre. The main bracts of the involucre are not foliaceous. The pedicels are mostly one and a half to three inches long. The hypanthium, surrounding the ovary, is usually shorter than the pedicel and bluntly three-angled. The perianth-tube is funnel-form, about one fourth of an inch long. The flowers are mostly two or three together at the ends of terminal and often of axillary peduncle-like, stoutish, glaucescent branches. The three sepals are spreading, remate, one and three quarters to two and a quarter inches long; the blade is ovate, slightly longer than the claw, crestless, mainly violet or purple and indistinctly veined with darker purple; the claw is rather broad, but less than half the width of the blade, green or yellowish green, veined with dark purple, the green running into the base of the blade where it turns to white which is veined with bright purple which runs down from the upper part of the blade. The three sepals are erect, narrowly spatulate, three fifths to four fifths as long as the sepals, purple and veined with darker purple, or whitish with purple veins near the narrow base. The three stamens are one to one and a quarter inches long, the anthers slightly longer than the filaments. The three style-branches are broadly linear, nearly or quite one and a half inches long, about one third of an inch wide, lilac with whitish margins. The style-appendages are one fourth to one third of an inch long, curved inward, semi-orbicular-quadrate, rounded at the apex and undulate-angulate. The stigmas are irregularly broadly rounded, entire. The capsules are prismatic-cylindric, or in the case of short ones somewhat ellipsoid, mostly one and a half to two and a half inches long, with a slight ridge on each side and a slightly more prominent ridge on each rounded angle, obtuse or slightly beaked, the earlier ones on pedicels shorter or longer than their length, the later ones often with longer pedicels. The seeds, borne in two rows in each carpel or cavity of the capsule, are semiorbiculate or lunate, rather thin, dark brown, slightly corky, about one third of an inch in long diameter.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Inflorescence and foliage. Fig. 2.—Sepal. Fig. 3.—Petal. Fig. 4.—Capsule. Fig. 5.—Seed.



IRIS SAVANNARUM

IRIS SAVANNARUM

Prairie Blue-flag

Native of the interior of peninsula Florida

Family IRIDACEAE

IRIS Family

Iris savannarum Small, sp. nov.

In abundance and size of flowers and fruits the prairie iris of the Florida peninsula outclasses our other species. The colonies are usually to be measured by the acres, often in extent further than the eye can reach—vast green seas of upward-pointing myriad sabres, broken only by brilliant flecks or patches of color in the early spring when the plants bloom. In the summer and sometimes in the fall, the stretches are just as green, but in addition to the leaves there are countless clusters of bright green cucumber-like pods, at first nodding from the stout erect stalks. At length the pods become so heavy that they are borne to the ground, and then lie on the turf, or if the water be high, float, ultimately decay, and then discharge the seeds which resemble brown corky lozenges. As in all the swamp-inhabiting species of iris, the seeds are buoyant as a result of the thick corky covering. Thus each seed with its float is not only well protected, but it can finally start a new colony of *Iris* at some destination determined by current or wind.

Like other Florida species of *Iris*, *Iris savannarum* has quite successfully “burned its bridges” behind it, for there is no vestige of it between peninsular Florida and the elevated Appalachian Highlands whence it, or its immediate ancestors, descended after the most recent extensive elevation of the continent. Its remote ancestors may have been those which gave rise to *Iris carolina* and *Iris versicolor*, but having passed into a land of perpetual growth and peculiar environment it assumed different characters. Its mode of life is now very simple. It inhabits prairies or savannahs wholly monotonous in topography with a climate almost equally monotonous. Its habitat is a rich loamy sand or a poor sandy loam, either wet all year or dry all year, as far as surface water is concerned. In most of the habitats the water-table is near the surface in the dry season. In the wet season the water on the surface vacillates with the local rains, varying from a few inches to a foot or more in depth.

The type specimens were collected on the southern side of the Caloosahatchee near Olga, Florida, in December 1923, by the writer, and are in the herbarium of the New York Botanical Garden. Specimens flowered at the Garden in the spring of 1924; from one of these the accompanying illustration was made. It is planned to set out plants in the open next spring in order to learn if they will be hardy and adapted to cultivation at the North.

The prairie blue-flag has a very stout, fleshy rootstock. The leaves are erect, several together, with bright green or glaucescent elongate linear-attenuate blades often up to three feet long. The flower-stalk is nearly three feet tall or less, almost or quite straight, nearly terete, somewhat glaucous, simple, or with a branch above the middle, or below it, which is subtended by a foliaceous bract. The flower or flower-cluster is exceeded by the subtending bract. The pedicel is slightly longer than the ovary in anthesis. The hypanthium, covering the ovary, is bluntly three-angled, and often with the faces ridged. The perianth-tube is funnelform, fully a half inch long or shorter, shorter than the ovary. The three sepals are spatulate, four to five inches long; the blade is elliptic to ovate-elliptic, longer than the claw, mainly blue or pale violet, except the flecks of white and lines of deeper blue on either side of narrowly linear yellow finely pubescent crest which extends up to about the middle of the blade; the claw is less than a half inch wide, light green, distinctly striate with darker green within and ribbed. The three petals are linear to narrowly linear-spatulate, three and a quarter to three and three quarters of an inch long; the blade is deep blue, about two thirds as long as the claw, blunt or acute; the claw is channeled, green with darker lines and pale margins. The three stamens are nearly an inch and three quarters long, with the filament about half as long as the linear anther. The three style-branches are linear-cuneate, two to two and a half inches long, purple-tinged with pale margins within. The style-appendages are inequilaterally ovate, about three quarters of an inch long, sharply and irregularly toothed. The stigma is broadly two-lobed, with each lobe dentate-crenate. The capsules are ellipsoid or nearly so, three to four inches long or sometimes longer, often stout-beaked, with a slight ridge on each face and prominent parallel ridges on either side of the rounded angles, corky-walled. The mature pedicels are shorter than the capsules. The seeds, borne in one row in each carpel or cavity of the capsule, are very corky, circular or somewhat uneven from mutual pressure, brown, half an inch in diameter or less.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Inflorescence and foliage. Fig. 2.—Sepal. Fig. 3.—Petal. Fig. 4.—Capsule. Fig. 5.—Seed.



IRIS KIMBALLIAE

IRIS KIMBALLIAE

Miss Kimball's Blue-flag

Native of Florida

Family IRIDACEAE

IRIS Family

Iris Kimballiae Small, sp. nov.

Perhaps the *Iris* flora of the region north of the terminal moraine was extensive in pre-glacial times. Species, or their ancestors, that previously had been saved from extinction on the pleistocene highlands may have been completely wiped out by the ice. This seems reasonable, for south of the moraine irises are comparatively numerous. They, or their ancestors, have had uninterrupted existence since they descended to the lowlands. They seem to have taken most eagerly to the wash of the old Piedmont and the mountains after it is spread out where there has been and still is but little change to disturb their peaceful existence. Even the plant collector has not yet secured specimens sufficient for the student to form a reasonable idea of their geographic distribution, and the habitats are not to the liking of the vandal.

The river-swamps of the Gulf coast region of Florida are rich in *Iris*. In the swamps within the city limits of Apalachicola are two quite distinct species, both of them botanically undescribed. Plants of one of these sent to the New York Botanical Garden by Winifred Kimball in the fall of 1921 flowered the following year, and from them the accompanying illustration was made. This is, perhaps, one of the several plants heretofore included under the designation "*Iris hexagona*"; but it really belongs to a different group of the genus, for the pods are obtusely three-angled, instead of having six sharp angles. As in the case of *Iris savannarum*, which is isolated in the interior prairies of Florida, *Iris Kimballiae* has become isolated in some of the coast-region swamps of the State. It prefers a black silt loam, usually in swamps whose water covers the surface, at least part of the year, and often where conditions have permitted a turf of grasses and sedges to form.

The geographic range of *Iris Kimballiae* cannot yet be definitely defined. However, it has been found in the swamps along the lower Apalachicola River and in swamps in the vicinity of the lagoons in the coastal region of both sides of the upper part of the

peninsula. The type specimens of this species are in the herbarium of the New York Botanical Garden. Next spring plants of this species will be set out at several places in order to learn if they may be used as a garden plant at the North.

Miss Kimball's blue-flag has a very stout fleshy rootstock. The leaves are erect, five to eight together, stiff, with linear, or slightly broadest above the middle, attenuate blades two to three feet tall. The flower-stalk is erect, one and a half to three feet tall, usually about equaling the leaves, green, often glaucescent when young, simple or with a short peduncle-like branch. The flowers are usually two together, pedicelled, but only partly exerted from the involucre. The pedicels are one half to three quarters of an inch long. The hypanthium, surrounding the ovary, is longer than the pedicel, bluntly three-angled. The perianth-tube is funnellform, shorter than the hypanthium. The three sepals are spreading, remate, three and a half to four inches long; the blade is ovate or elliptic-ovate, longer than the claw, rich purple, notched at the apex, with a linear yellow fine-hairy crest running from the base of the claw up to the middle of the blade; the claw is one quarter to three eighths of an inch wide, greenish white, shading to yellow at the base of the blade, finely green-striate, white-margined, with a greenish yellow rib running up into the crest of the blade. The three petals are nearly erect, spatulate, about three inches long, green with white margins and purple near the base, violet above. The three stamens are nearly an inch and a quarter long, with the anthers nearly twice as long as the filaments. The three style-branches are broadly linear, or narrowly linear-cuneate, an inch and a half to one and three quarters inches long, less than half an inch wide, purplish within. The style-appendages are obliquely ovate, a half inch long or slightly longer, lacinate or sharply incised near the apex. The stigma is broadly two-lobed, the lobes irregularly erose. The capsules are ellipsoid or oval, about two inches long, bluntly three-angled, often slightly blunt-beaked, with an obscure ridge on each face and on each angle, rather thin-walled. The mature pedicels are mostly as long as the capsules or longer. The seeds, borne in two rows in each carpel or capsule-cavity, are slightly corky, semicircular, brown, thick-edged on the outer side, thin-edged on the inner, about one third of an inch in diameter.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Inflorescence and foliage. Fig. 2.—Sepal. Fig. 3.—Petal. Fig. 4.—Capsule. Fig. 5.—Seed.



IRIS LACUSTRIS

IRIS LACUSTRIS

Lake Dwarf-iris

Native of the region of the Great Lakes

Family IRIDACEÆ

IRIS Family

Iris lacustris Nutt. Gen. 1: 23. 1818.*Iris cristata lacustris* Dykes, Genus Iris 106. 1913.

The English name, lake-iris or lake dwarf-iris, happens to be a true appellative and a description in itself, for the circumscribed geographic area occupied by this good species is restricted to the immediate vicinity of several of the Great Lakes, or in other words its plant province is strictly the Lake Region. The botanical name is correct only in a broad sense, for the plant often grows at considerable distances from the lakes themselves.

Certain more or less conventional or stereotyped statements, casting doubt on the validity of this species, are on record. But, if differential morphological characters and an isolated geographic range mean anything in the segregation and interpretation of this species, the specific standing of *Iris lacustris* should not be doubted.

The flower with its accessory parts is quite distinctive. For example, the perianth-tube is narrowly funnellform—dilated from the top of the ovary to the free parts—and it is shorter than the sepals; whereas in *Iris cristata* the perianth-tube is slender and filiform except where dilated close to the base of the sepals and the petals, and it is much longer than the sepals. The other parts of the flower—sepals, petals, stamens, and style-branches—are also distinctive. Although May and June are the typical flowering season for this plant, in cultivation, at least, specimens flower sporadically from spring to fall.

We can, of course, easily imagine that *Iris lacustris* and the related species *Iris cristata* had a common ancestor at no remote period, geologically speaking. But they have had different histories and experiences. Where the plants of this species or its immediate progenitors existed during the glacial period or how far southward they were driven at that time we do not know. All vestiges of it have disappeared from the country south of the terminal moraine, and it has succeeded in populating or, at least, maintaining only a limited representation of its kind within an area north of the moraine in modern geologic times. It adapts itself to cultivation in various habitats far south of its natural range.

The type specimens of *Iris lacustris* came from the gravelly shores of the calcareous islands of Lake Huron, near Michilimakinak [Michilimackinac] now the city of Mackinaw. The original collector is not recorded. The specimens from which the accompanying illustration was made were sent to the New York Botanical Garden by Clarence Lown, who secured them from Mackinaw Island, Michigan. *Iris lacustris* is now known to grow naturally on the open sandy or gravelly shores of the three larger Great Lakes, in thickets bordering the shores, or in woods more or less remote from the lake-shore.

The lake dwarf-iris has rather slender-wiry rootstocks with tuber-like thickenings. The branches are dimorphous; the foliage ones are usually somewhat elongate, clothed with four to eight straight or nearly straight leaves with linear, often narrowly linear, nearly or quite straight blades, the lower ones scale-like, the upper two to five inches long; the flower-branches are very short with several imbricate leaves which are smaller than those of the foliage branches. The flowers are solitary, violet-scented, partly exceeding the involucre formed by the upper leaves of the flower-stalk. The pedicel is as long as the ovary in anthesis, or shorter. The hypanthium, surrounding the ovary, is sharply three-angled, with a slight ridge on each face and a rib along each angle. The perianth-tube is one half to three quarters of an inch long, shorter than the sepals, slender-funnelform. The three sepals are cuneate, three quarters of an inch to an inch long, scarcely distinguishable into claw and blade, with a prominent crest two thirds or three fourths their length; the sharp median ridge of the crest is yellow flecked with brown, and with white and violet near the tip, the lateral ridges are white flecked with brown and violet; the tip of the sepal is deep violet, notched, and with a dark violet band in front of the crest. The three petals are cuneate, slightly shorter than the sepals, violet, or whitish at the base, rounded or slightly notched at the apex. The three stamens are about two fifths of an inch long, with lilac filaments, deeper in shade near the tip, and white anthers mostly shorter than the filaments. The style is nearly as long as the perianth-tube. The three style-branches are broadly linear above the short-cuneate claw, about a half inch long and pale violet. The three style-appendages are semi-ovate, about one sixth of an inch long, blunt, undulate. The stigma is semicircular, not lobed, undulate. The capsules are ellipsoid, oval, or ovoid, one half to two thirds of an inch long, slightly beaked, three-angled, the lobes with a slight median ridge, each face with a shallow groove and a median line. The mature pedicels are shorter than the capsules. The seeds are obovoid, slightly inequilateral, about one twelfth of an inch long, brown, with the aril-tip curled over the top of the seed-body.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Flowering plant. Fig. 2.—Sepal. Fig. 3.—Petal. Fig. 4.—Capsule. Fig. 5.—Seed, $\times 3$.



IRIS CRISTATA

IRIS CRISTATA

Crested Dwarf-iris

Native of the southeastern United States

Family IRIDACEAE

IRIS Family

Iris cristata Ait. Hort. Kew. 1: 70. 1789.*Iris odorata* Pers. Syn. Pl. 1: 53. 1805.*Neubeckia cristata* Alefeld, Bot. Zeit. 21: 297. 1863.

Our so-called dwarf-irises represent a group quite different from the larger blue-flags. The groups differ from each other not only in the structure of the flowers and the fruits, but also in the habitats. The natural habitat of the blue-flags is wet; that of the dwarf-irises is dry. Consequently there is a difference in the anchorage and stem-systems. The larger blue-flags have cord-like fleshy roots and stout fleshy rootstocks, while the dwarf-irises have fibrous roots and coarse-wiry rootstocks.

This dwarf-iris flourishes in the plantations of the New York Botanical Garden, as well as in other places farther northward than its natural range. This fact leads one to suspect that the plant never regained all the ground it may have lost during the ice age. Within its range it is most abundant along the main drainers of the highlands. Along these highways, as it were, in post-pleistocene times, it reached the Atlantic seaboard on the east and the Trans-Mississippi country on the west. As there are no great erosion highways running northward from the old Appalachian plant reservoirs, the plant's progress in that direction was, evidently, checked or blocked.

The crested dwarf-iris, however, is one of the few flags that has left a tangible trail behind it in its escape from the old Appalachian Highlands. It spread radially from the high altitudes into the Piedmont and Coastal Plain, and it still maintains a foothold from the higher mountains to near sea-level.

Iris cristata is of wide geographic distribution, in the southeastern United States south of Pennsylvania and Missouri, and consequently of varying habitats. Cliffs, bluffs, rocky hillsides, ravines, and woods are among its native haunts. Plants with albino flowers have been found.

The origin of the type specimens of the crested dwarf-iris is not known. Aiton, who first describes it botanically, records that it was introduced from North America into England by Peter Col-

linson in 1756. It was probably secured in the southern Atlantic States by Collinson's chief explorer, John Bartram, or by one of the half-dozen plant collectors who were then active in that region.

The method of seed-dispersal in the dwarf-irises is quite different from that of the large blue-flags. The corky-coated seeds of the blue-flags merely float away or about on the water of the plant's habitat. Each seed of the dwarf-irises, inhabitants of dry places, has a viscid appendage—*aril*—by which it may adhere to the feathers of birds or fur of animals, and thus be disseminated.

The crested dwarf-iris has coarse-wiry branching rootstocks with tuberlike thickenings. The branches are dimorphous; the foliage ones very short, with three to six leaves which are closely imbricate at the base and with sabre-like blades one to twelve inches long, the inner much the longer; the flower-branches are mostly one to three inches long, with the small dirk-like leaves more or less enfolded, but not imbricate at the base. The flowers are solitary or two together, faintly scented, exceeding the involucre formed by the upper leaves of the flower-stalk. The pedicel is about as long as the ovary in anthesis, or longer. The hypanthium, surrounding the ovary, is sharply three-angled and with a slight ridge on each face. The perianth-tube is mostly one and three quarters to two and three quarters inches long, very slender, broadly funnelliform at the top. The three sepals are cuneate-spatulate to narrowly obovate, one and a quarter to one and a half inches long; the blade mainly lavender, dark or pale, with a white blotch bordered with violet; the claw is shorter than the blade, with a crest of three beaded ridges, the median one yellow and running to the base of the claw, the lateral ridges yellow with white edges, all extending up into the blotch in the blade. The three petals are spatulate, somewhat shorter than the sepals, lavender, except the deeply channeled purple claw. The three stamens are one half to three quarters of an inch long, with the subulate filament tinted with lavender and the yellow anther longer than the filament. The style is filiform, about as long as the perianth-tube. The three style-branches are narrowly cuneate above the slender claw, about one inch long, lavender, more deeply shaded along the midrib. The style-appendages are semi-ovate, about a quarter of an inch long, blunt, undulate. The stigma is semicircular, not lobed, minutely erose. The capsules are ellipsoid or oval, varying to ovoid or obovoid, one half to three quarters of an inch long, often minutely beaked with the persistent style-base, three-lobed, the lobes with a slight median groove, each sinus with a minute groove. The mature pedicels are about as long as the capsules or longer. The seeds are nearly or quite one sixth of an inch long, oval or obovoid, but slightly inequilateral, brown, with the aril-tip curled over the top of the seed-body.

JOHN K. SMALL.

EXPLANATION OF PLATE. Fig. 1.—Flowering plant. Fig. 2.—Sepal. Fig. 3.—Petal. Fig. 4.—Capsule. Fig. 5.—Seed, $\times 3$.

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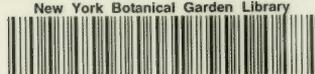
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