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ARNOLDIA

A continuation of the
BULLETIN OF POPULAR INFORMATION
of the Arnold Arboretum, Harvard University

VOLUME 22 MAY 25, 1962 NUMBER 7

HERBACEOUS ALIENS IN THE ARBORETUM

MANY native New England plants are to be found growing wild in the Arboretum; trees and shrubs, of course, in the various areas of woodland, but also numerous herbaceous plants. In fact, over 300 native herbs were recorded in the lists of the spontaneous flora compiled by the late E. J. Palmer and published in the Journal of the Arnold Arboretum during 1930, 1936 and 1947. In addition, however, there are a surprising number of alien plants, many of which have entered into the natural vegetational communities and now survive and reproduce themselves alongside the native species. The aliens include numerous weeds, plants of disturbed soil and other man-made habitats, but it is not the intention in this particular article to discuss the weeds, but rather to comment upon some of the more attractive or noteworthy herbaceous plants that have come to New England and the Arboretum from abroad.

Perhaps the two most spectacular such herbs are to be seen in the Meadow, the low-lying marshy area near the Administration Building, where one may see the Yellow Iris (*Iris pseudacorus*) and the Purple Loosestrife or Spiked Salicaria (*Lythrum salicaria*, Plate XIX). The former comes into flower first, in June and July, and carries its handsome yellow flowers three or four feet above the wet marshy ground; the latter starts later, in July, but blooms throughout the height of summer, marking the Meadow with wonderful splashes of purple and looking so much at home. It is so familiar in many similar marshy spots in New England that there is every excuse for the common mistake of thinking it a North American native. When it first came from Europe is not known, but it must have been here for many generations for it was mentioned as an established alien in Floras over a century ago. Somewhat aggressive perhaps, like many colonists towards the endemic native population, it has settled in, made a home for itself and become quite naturalized. Close examination of the flowers reveals a point of interest: there are three different types, depending upon the lengths of the stamens and style, and any one plant displays only one kind. In each flower the stamens

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are arranged in two groups of five which may be long, medium or short, as may also be the length of style. On any one plant there may be flowers with a long style, five stamens of medium and five of short length, flowers with a medium length style and long and short stamens, or flowers with a short style and stamens which are medium and long. The great Charles Darwin in particular investigated these flowers, making numerous, patient experiments which showed that the three types are bound up with their mechanism for pollination. Along with each type of style and stamen arrangement goes a different size of pollen grain and the papillate cells on the surface of the stigmata are also of different sizes according to the length of the style. The pollen grains from the longest stamens and the papillae of the longest styles are the largest whilst those from the shortest are the smallest. Seed is set only if pollen is received on the stigmatic surface from stamens of the same corresponding length as the style. In other words, cross pollination must take place and these three flower-types constitute, as the geneticists say, an out-breeding mechanism. One final curious point which does not appear to be concerned with the actual mechanism of pollination, but is nevertheless of interest, is the fact that the pollen borne by the long stamens is green in color whilst that from the medium and short is yellow. The only likely explanation for this that I have come across is that it is a protective device against pollen-eating insects.

Returning to the Yellow Iris which grows in the Meadow and about the margins of the ponds, along with the native wild Blue Flag, *Iris versicolor.* It is interesting to note that it is thought to be the original Fleur-de-lis, the emblem down the centuries of the French Royal family and still used, for example, in the flag of Quebec Province. It is not suggested that readers are in the habit of having their faces bruised but they may be glad to know of an ancient recipe for a cure given by John Gerard in his famous Herbal published in 1597: "The root of the common Floure-de-luce cleane washed, and stamped with a few drops of Rose-water, and laid plaisterwise upon the face of man or woman, doth in two daies at the most take away the blacknesse or blewnesse of any stroke or bruse." One never knows when such information might come in useful.

Passing from the marshy area known as the Meadow to the nearby grassy meadowland it is remarkable how alien is its composition. The principle constituents are the grasses: Sweet Vernal Grass (*Anthoxanthum odoratum*), Timothy (*Phleum pratense*), Meadow Foxtail (*Alopecurus pratensis*), Orchard or Cock's Foot Grass (*Dactylis glomerata*), Rye-Grass (*Lolium perenne*), Canada Blue Grass (*Poa compressa*), Kentucky Blue Grass (*Poa pratense*), and White Bent or Redtop (*Agrostis alba*), and the last two, whilst also natives of Europe, are the only species with any possible claim to nativity in New England. Nor is the similarity of the meadow to those of Britain and Western Europe confined to the pasture grasses, for along with them we find several clovers: Red, White and Alsike (*Trifolium pratense*, *T. repens* and *T. hybridum*) to mention the most important,

PLATE XIX

(Top) Purple Loosestrife, *Lythrum salicaria.* (Bottom) Lesser Celandine, *Ranunculus ficaria.* (Photographs by Heman Howard)

all components of the best pasture-land and now introduced from Europe the world over: to North and South America, Australia and New Zealand, the most famous areas for raising sheep and cattle. Without doubt these clovers were originally introduced by the early settlers and farmers in New England for exactly the same reasons as the grasses and, in the case of the Arboretum it is no coincidence either for much of it was established on the grounds of the old Bussey Farm.

The weeds of the typical English pasture are present too, the weedy Velvet Grass, or Yorkshire Fog as it is called in parts of Britain (*Holcus lanatus*), the Yarrow (*Achillea millefolium*), Stitchwort (*Stellaria graminea*) and Tufted Vetch (*Vicia cracca*), as well as the Buttercups (*Ranunculus acris* and *R. bulbosus*) and, where the soil is heavy or moist, the Creeping Buttercup (*Ranunculus repens*), an irrepressible weed when it gets into cultivated plots on heavy, damp soil. Along with buttercups one might expect daisies, and they are here, but not the common English daisy (*Bellis perennis*) which is not hardy enough to become naturalized in grassland and lawns in the Boston area. It occurs further south and is said to grow in a few milder spots in Rhode Island and Connecticut, or conversely it survives in Vermont where the snow covering is complete and deep enough to protect it throughout the winter from the severe sub-zero temperatures. The daisy found in the Arboretum meadows is the Ox-Eye or Wild Marguerite (*Chrysanthemum leucanthemum*), the wild European relative of the very different chrysanthemums of the horticulturalists. However, it does not flower in the spring with the first flush of buttercups as might the English daisy but appears as spring gives place to summer. Another summer flowering member of the daisy family which appears in the grassland of the Arboretum is Cat's Ear (*Hypochoeris radicata*) and, as the summer draws towards its end, the Fall Dandelion (*Leontodon autumnalis*). An unusual form of this latter can be found scattered throughout the grounds; it develops pale, greenish-yellow flower heads which are smaller than normal and do not bear proper, flat, ray florets. What exactly causes this form is not known as far as I am aware, but it has been named forma *ochroleuca*. However, one is left wondering whether it arises from insect attack or disease, or whether it is just an inherited teratology. A few careful observations might throw a lot of light on the phenomenon.

Possibly coming into the category of meadow weeds come the three alien sedges found in the Arboretum, *Carex caryophyllea*, *C. hirta* and *C. muricata*. It is difficult to visualize how these inconspicuous and often overlooked sedges could have been introduced into New England other than along with the other meadow plants. None of the three are weeds in the usual sense but to a greater or lesser extent each does occur in meadow land in Europe, where they are native.

Not so conspicuous as many other herbaceous plants is the Ground Ivy, Gill-over-the-Ground, or Run-away-Robin (*Glechoma hederacea*) which is to be found in one or two places covering quite large areas in amongst the grass and other plants. As its common name suggests, it creeps along the ground, but it bears

no relationship to the Ivy, being a member of the Mint family, and like most members of this family (Thyme, Sage, Marjoram, Lavender and Rosemary, to mention a few) the leaves give off a characteristic odor when bruised; although in the case of Ground Ivy it is not a particularly attractive scent. In the majority of flowering plants both male and female organs, the stamens and pistils, are found together in the same flower, a condition known as hermaphrodite. In some plants, however, the sexes are separate, but occasionally the situation is slightly more complex and this is the condition in Ground Ivy. To use a technical term, it is gynodoecious; that is to say, some plants produce flowers which have both functional stamens and ovary (are hermaphodite) whilst other plants are male sterile and only enclose a functional ovary. Stamens are usually present but they are small and abortive and contain no viable pollen. Close examination soon shows that the male sterile flowers are slightly smaller than the hermaphrodite but it is possible, although much less common, to get somewhat intermediate conditions as well where one, two or even three of the normal complement of four stamens are functional, and in these cases the corolla size is also intermediate. Furthermore, these intermediate flowers can occur on plants along with others which are fully developed or which are completely male sterile. It is particularly interesting therefore that in the two latest standard works for the identification of plants of New England and other northeastern areas, the 8th edition of Gray's Manual of Botany, revised by the late Professor Fernald, and the new Britton and Brown Illustrated Flora of Northeastern United States and Adjacent Canada by H. A. Gleason, a variety is described based upon the small size of the flowers (var. *micrantha* Moricand in Gray's Manual and var. *parviflora* (Benth.) Druce in Britton and Brown). This variety needs investigation in the case of the North American plants, for as there is no mention in either work of gynodioecism, one suspects that it has no claim to recognition as such and that they are really just names that have been given for the male sterile condition. In Britain, where Ground Ivy is a native component of hedgerows, light woods, etc., one investigation of plants over an area near Warwick I made with others showed that the two extreme types were found in approximately equal numbers, but according to the books mentioned above the variety *micrantha* is usually more common in northeastern United States than the larger flowered form. This too is worthy of investigation, for certainly the male sterile plant is present in the Arboretum.

A bright spring flower to be seen here and there is the Lesser Celandine (*Ranunculus ficaria*, Plate XIX), a kind of Buttercup, which bears its shiny yellow flowers only three or four inches above the ground and set off by a background of dark glossy leaves. It should not be confused with the Greater Celandine, *Chelidonium majus*, a taller, almost weedy perennial, also found in the Arboretum, but related to the Poppy and producing four-petalled yellow flowers and a bright orange or yellow juice when the stem or leaf is broken. *Ranunculus ficaria* is of interest in the Arboretum, or in northeastern North America for that matter, in

that it appears that it is only the sexually sterile, tetraploid plant which has been introduced. In Britain, where it is native and has been investigated, there are two main types, a fertile variety which has 16 chromosomes and a sterile one with 32, and the most obvious difference between them is that the former sets plenty of good seed whereas the latter hardly, if ever, produces any seed at all. Instead it reproduces by the production of bulbils, or little tubers about the size of a grain of wheat, in the axils of the foliage leaves and has in consequence been given the name var. *bulbifera*. The whole plant dies down early in the summer so that the bulbils are scattered onto the surface of the soil around the parent plant, or are accidentally dispersed in some other way, and eventually give rise to new plants. If one wishes to see the bulbils, look at the base of the leafstalks as the plants finish flowering, for it is then as the leaves die down that they develop quite rapidly to their full size. One suspects that this plant was first introduced for its bright cheerful spring flowers; the larger flowered var. *grandiflorus* which is similarly and intentionally grown as a garden plant in Britain, being a native of the Mediterranean area, is probably too tender to survive the winter in the Boston area.

Many of the more spectacular herbaceous aliens are escapes from cultivation. Not escapes from intentional cultivation by the Arboretum, but in at least one place there are remains of the foundations of a dwelling house. Snowdrops and Siberian Squill (*Scilla sibirica*) have obviously been garden flowers, the latter having spread from a garden on South Street so that behind the main planting of Forsythias there is now a large sward of it under the trees, vivid blue in April. Near-by, but flowering later in the year, there are a number of plants of Star-of-Bethlehem (*Ornithogalum officinale*), also an old fashioned garden plant and found in other parts of the Arboretum as well. Other escapes from cultivation found here and there are the Day-Lily (*Hemerocallis fulva*), whose exact country of origin is not really known but which almost certainly came from East Asia, the Sweet Violet (*Viola odorata*), the Lily-of-the-Valley (*Convallaria majalis*), the European Bellflower (*Campanula rapunculoides*), the related *C. persicifolia*, and Live-for-Ever (*Sedum purpureum*). Perhaps in this class belong the Hollyhock (*Althaea rosea*) and the Giant Mullein (*Verbascum thapsus*) which have almost become weeds and which soon seem to appear on almost any open area and waste ground. The latter especially is a striking plant at all stages of its growth, first with its large gray-green rosette of leaves, almost the texture of felt, and then in the second year it produces straight upright spikes 5 or 6 feet tall with scattered clear-yellow flowers. In this group comes the Deptford Pink (*Dianthus armeria*) which has found a home in open woods and dry banks and the extraordinary Birthwort or Dutchman's Pipe (*Aristolochia kaempferi*), native of Japan, growing near the Administration Building and possibly elsewhere.

Another group of plants escaped from cultivation were not originally grown in New England for their flowers but as food plants and one or two of these are to be found in the Arboretum. The carrot (*Daucus carota*) or Queen Anne's Lace,

as its flowers are called in New England, is almost certainly in this class, as is also the parsnip (*Pastinaca sativa*), although not as common in meadows and wasteland as the carrot. *Asparagus officinalis* grows near the remains of the foundations of the old Bussey House and elsewhere, and along with the Horseradish (*Amoracia rusticana*) probably comes into this category. Related to this last is the Watercress which has several times been recorded by streams and pond margins in the Arboretum but does not seem to be present today. Each one of the specimens of it that I have examined from the Arboretum has turned out to be the tetraploid species *Rorippa microphylla* and not the more widespread diploid *R. nasturtium-aquaticum*. Both were almost certainly introduced into the New World, but the former is almost confined to the northeast and is not the one usually grown in Europe as a commercial source of watercress for salads.

Earlier in this article it was said that there was no intention of discussing weeds, but where one draws the line in classifying a plant as a weed varies very much upon the circumstances and context. There are a few plants with weedy tendencies which are not always weeds in their immediate situation in the Arboretum. Mullein has been mentioned but another is the Bindweed (*Convolvulus* or *Calystegia sepium*). The situation here though is extremely complex. Alien stock from Europe has undoubtedly been introduced but there are native varieties which differ only slightly; in addition, more than one species has perhaps been introduced. Furthermore, it seems probable that the different stocks hybridize and taxonomically the whole problem of the Bindweeds is very confused. Even within the Arboretum they are variable, but an examination throughout the whole of New England, or better still northeastern United States and adjacent Canada, employing modern experimental techniques, is called for to elucidate the problems. From East Asia came the Japanese Hop (*Humulus japonicus*) a rank herbaceous vine, almost a shrub, growing vigorously in the South Street area. Another plant on the border line between a herb and a shrub is the Woody Nightshade or Bittersweet (*Solanum dulcamara*), which can become a near-weed but prefers, if possible, to have its roots in damp soil. The name Nightshade indicates its relationship to the Deadly Nightshade (*Atropa belladonna*) but although it is poisonous, this relative of the tomato and potato is not as poisonous as the Deadly Nightshade which fortunately has not been recorded as an alien from New England. The other common name, Bittersweet, points a very good lesson in the advantages of using Latin names and the pitfalls that lie in wait for those who shun and despise them in preference for the common or folk names. In one State, I understand, when legislature to protect and conserve the attractive Climbing Bittersweet (*Celastrus scandens*), a totally unrelated plant, was being prepared, someone looked up the name Bittersweet and found in the reference book they used that its Latin name was listed as *Solanum dulcamara;* the result in that State has been that this rather undesirable poisonous alien is now protected by law.

Whilst most of the introduced herbs of the Arboretum have been discussed,

there are still a number which have not been mentioned; sufficient has been said perhaps to draw attention to the fact that although only woody plants are intentionally cultivated there are still many that are herbaceous which are well worthy of attention.

PETER S. GREEN

Green, P. S. 1962. "Herbaceous Aliens in the Arnold Arboretum." *Arnoldia* 22(7), 49–56.

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