Effect of Cold on Flower Buds of Trees and Shrubs. As a rule our native plants are so accustomed to the rigors and vagaries of our New England winters that few of them show serious injuries from the varying degrees of cold or heat affecting them during the months when they are dormant. It is true that the exposed catkins of Alders and Hazels may be wholly or partially destroyed and the scales covering the flower buds of our Flowering Dogwood (Cornus florida) may become so dried and stunted that they lose their accrescent power or vitality, and do not develop into the beautiful snowy flowerlike organs calling attention to the small inconspicuous blossoms produced by this tree, which reaches its natural northern limit of growth in eastern Massachusetts. Such winter injuries are not uniform and may be dependent upon the conditions of growth and maturing of tissues during the previous season or upon local environment. In shelter of woods the Flowering Dogwood may develop beautiful large white showy bud scales when those on exposed trees are stunted and make little growth. Of course many of our really hardy native plants may be heavily damaged by unusual freezing temperatures late in the season, so that a crop of flowers or fruits may be lost for that year and even young growing shoots may be lost and the tree be forced to develop a new growth from latent or suppressed buds.

As gardeners and horticulturists we have come to judge the severity of our winters largely by the behavior or condition of plants which have been brought to us from the Old World or, more rarely, those which have been introduced from other parts of our own country, chiefly from regions enjoying a milder climatae than the average winter temperature of central and southern New England. Aside from the records left by thermometers, and judging merely by the general condition in the Arboretum, the past winter was, on the whole, fairly mild and so favorable as to warrant our expecting a good season for flowers and fruits. This is true of many species which are in situations less favorable than others of the same kinds. For example, we do not expect exotic
vines, shrubs or small trees to show the same degree of winter cold endurance in the low ground, near the Forest Hill gate, where the general shrub collection is located, as we would expect to find in the same species at the top or near the top of the adjacent Bussey Hill. While better soil drainage conditions may be found on the hill, a factor conducive to better ripening of wood in the autumn, the chief factor is the better air drainage or air flow which prevails on the higher land. The low ground in which the shrub collection is located is nearly surrounded by low hills or ridges forming a sort of lake into which the cold air settles and is pocketed, forming a basic stratum which may be several degrees colder than the zone of air a few feet higher.

In seasons when the winter temperature does not go much below zero (Fahrenheit) the effect of the difference in zones on certain plants may not be very apparent but if the recorded temperature falls to 12 or 15 below zero (Fahrenheit) serious damage to plant flowering may result, although leaves, twigs and branches may appear uninjured. This is well illustrated in the varieties of Peach, a native of China. In common with all early flowering trees and shrubs the flower buds are developed during the preceding summer. While some varieties of Peach have been developed in which the flower buds are considered more hardy than others a fall of temperature to 12 or 15 below zero is considered fatal to most of them, and 20 below zero is certainly so in virtually all cases. That the embryo flowers are dead may readily be ascertained by splitting open some of the blossom buds a day or two after the freeze. The hearts of the buds, representing the blossom portion, will be found dead and brown instead of being bright clear green as they should be if free from injury. Practical orchardists in the northern limits of peach growing recognize the advantage of planting Peaches where there is good air drainage as well as planting, if possible, on northerly slopes where spring growth would naturally be retarded and where there would be less danger of late frosts hurting the open flowers.

Peaches and allied species of trees promise a good full bloom this spring, and this applies to Japanese Cherries in general, as well as to the garden varieties of our common Sweet Cherry (*Prunus avium*) from Europe and Western Asia. The flower buds of *P. avium* appear nearly as tender as those of the Peach, this being one reason why this plant is rarely cultivated and seldom produces fruit in northern parts of New England and other cold sections of our country where varieties of the Sour Cherry (*Prunus Cerasus*) thrive.

The early spring months show a good deal of variation in the time of flowering of many of the precocious or very early flowering species, dependent on the number of warm days and degrees of temperature which prevail in any particular season. It may be interesting to note some of the species which have already blossomed or which are now in blossom in the Arboretum.

As usual, the White or Silver Maple is the first of the large trees to flower. This spring it blossomed during the last two weeks of
Viburnum fragrans
Photographed in the Arnold Arboretum, April 15, 1931, by Professor Oakes Ames
March and early days of April and it is usually at about that season we should expect the flowers to appear. But we have records of well developed flowers appearing on January 24th, 1913, on February 23rd, 1915, and February 1st, 1916, these records usually being taken from the same tree. At the present time the Red Maple (Acer rubrum) is in blossom, displaying shades of color from honey yellow to deep red in different individuals. Our American Elm, too, is in flower and the flowers of some of our Poplars are passing or gone. The spring flowering Witchhazels are now past their blossoming stage, the earliest being the southern Hamamelis vernalis, some of the flowers of which may open during warm days in January. It is not so beautiful and interesting in blossom as the Chinese Hamamelis mollis which is so precocious that the flowers are occasionally severely damaged or are destroyed by hard frosts. An interesting shrub, though not especially beautiful, is the Leatherwood (Dreya palustris) native in northeastern America. Given proper chance for development it may form a short trunk branching to the ground or near it and producing pretty little bell-like yellow flowers scattered over the slender, tough barked, leafless twigs. It requires no special care in cultivation except freedom from too close crowding by other shrubs or vegetation or too much shading by trees.

Among the most interesting of the newer shrubs in full flower (April 15th) in the Arboretum collection, is Viburnum fragrans. This specimen is now 6 or 7 feet high, the leafless branches well covered with the small panicles of fragrant, salver-shaped flowers which are pink in bud but white or light pinkish white when open. Although first described by the botanist Bunge nearly 100 years ago (1835) this species appears not to have been introduced into cultivation in Europe or America until about twenty years ago when seeds were collected in northern China by the late William Purdom for this Arboretum and for the nursery firm of Veitch, in England. The late Reginald Farrer collected seeds in 1914 which were also sent to England, producing plants which were soon distributed in English gardens. It is said to be a shrub attaining 8 or 9 feet in height and is described by Farrer as bearing "profuse trusses of pearl-pink flowers in spring like lilac deliciously smelling of heliotrope". He also described it as "rare as a wild plant but generally cultivated in Kansu (China) for its loveliness and fragrance". This species is apparently going to rank with our earliest flowering shrubs. In England it has been called the Winter-flowering Viburnum and in the southern part of the British Isles it is stated that the bushes flower more or less throughout the winter, some blossoms attempting to open before the leaves fall from the branches. Farrer described the fruits as shining scarlet and of good flavor.

J. G. J.

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