In the early numbers of the present volume of the Bulletin the effects of the severe winter on many plants in the Arboretum was discussed. Several plants which were then believed to be dead produced leaves in June and some are now apparently in good health; others which were only killed to the ground have grown again from the stumps and the damage by the winter has been less severe than it was believed to be in May.

Oaks. In the third week of May the Willow Oak (Quercus Phellos), the southern Overcup Oak (Q. lyrata), the Spanish or Red Oak of the south (Q. rubra or falcata), the so-called Turkey Oak of eastern Europe (Q. Cerris), the hybrid Q. heterophylla from the middle states, and a little Oak from Stone Mountain, Georgia (Q. georgiana), appeared to be dead. Six weeks later they were covered with healthy leaves, with the exception of the last which after a hard struggle for life finally died. Fortunately this species is represented in the Arboretum by a healthy young specimen which was not injured by the winter. A fine specimen of the weeping form of one of the European Oaks (Q. Robur var. pendula), which appeared in the spring to have been ruined, escaped with the loss of a single branch. A vigorous species of the native Black Oak (Q. velutina), one of the common trees in Massachusetts, growing with others in the Oak collection, was killed, showing that exceptional cold like that of the past winter may kill even the hardiest native trees. This is shown, too, in the fact that two trees of the Sour Gum (Nyssa sylvatica) were killed in the group by the little pond near the junction of the Meadow and the Bussey Hill Roads.
Ashes. The three trees of *Fraxinus syriaca*, often cultivated as *F. sogdiana*, which have been uninjured in the Arboretum for thirty-eight years and have frequently flowered and ripened their fruit here, were killed to the ground but have now sent up a few feebleroots. The flowering Ash so called, (*Fraxinus Ornus*) of southeastern Europe, which has suffered before in the Arboretum but flowered here in the spring of 1917, is now represented by a few weak stump shoots which did not appear until September. *Fraxinus Paxiana*, one of the new introductions from western China, was killed in the Ash collection, but was not injured in the Peter's Hill Nursery.

The Liquidambar and other trees. The North American Liquidambar opened its leaf-buds so late that by the middle of May the trees looked as if they were hopelessly injured. Later they entirely recovered, and in October the leaves of this beautiful tree have not before been more brilliantly colored here. A single plant of the Chinese *Liquidambar formosana* is still living in the Peter's Hill Nursery; it is, however, only a bush for it is more or less injured every winter, and it is probable that this tree will never flourish in the United States except in some of the Gulf and Pacific coast states. *Catalpa Bungei* has not suffered before in the Arboretum but many branches on all the trees were killed by the winter, and one of the two specimens in the Catalpa collection on the hill above the Lilacs was killed to the ground but has now sent up a number of shoots from the roots. The condition of the three Persimmon trees (*Diospyros virginiana*) in the group on the right-hand side near the lower end of the Bussey Hill Road illustrates the fact that some individuals of a species can resist cold better than other individuals of the same species. These three trees were of the same origin and the same age; two are uninjured and the third is now represented by a few weak suckers from the roots.

Various shrubs injured by the winter. Although it was believed in May that the Arboretum had lost a number of species by the excessive cold of the winter, the actual loss has not been as serious as it then appeared. All the plants, however, of the Japanese *Ilex crenata* were killed. These plants have been growing in the Arboretum for twenty-five years and had never suffered in earlier winters more than the loss of a few leaves. This Holly was believed therefore to be one of the few broad-leaved evergreens which could be safely used in northern gardens. Plants of the Inkberry (*Ilex glabra*), a common Atlantic and Gulf coast shrub from New Hampshire to Texas and one of the handsomest and hardiest of the broad-leaved evergreen shrubs which can be grown here, lost for the first time in the Arboretum a large part of their leaves and a few branches during the winter. The plants soon recovered, however, and are now as thickly clothed with leaves as they were a year ago. The largest plants of *Ilex opaca*, another native of the Massachusetts coast region, were killed outright, but smaller plants, although they lost most of their leaves, are still alive. One of the new Chinese species of Magnolia (*M. Wilsonii*), *Daphne genkwa* and *Lonicer a Delavayi* appear to be the only species of recent introduction which have been actually killed. All the plants of *Sophora viticifolia* appeared to be dead until June when the leaves began to unfold. None
of the plants flowered but they are all in good condition. All the plants of the new Chinese genus of the Witch Hazel Family (*Sinowilsonii*) appeared to be uninjured in May but many of the branches died after the leaves were fully grown, and although these plants may recover their present condition is not satisfactory.

**Evergreen Barberries.** It is a satisfaction to be able to report that the four species of evergreen Barberries from western China in the collection, *Berberis Julianae*, *B. Sargentiana*, *B. Gagnepainii* and *B. verruculosa*, are now in good condition, although the leaves of all but the last species were killed and many of those of *B. verruculosa* were injured. It may be expected therefore that these beautiful plants may continue to live in eastern Massachusetts if suitable positions can be found for them.

**Corylopsis.** The two species of western China which were covered with flowers in the spring of 1917, *C. Willmottiae* and *C. Veitchiana*, were killed to the ground by the cold of the winter and are now represented by feeble stump-shoots, and it is doubtful if these plants can be successfully and permanently grown in this climate. The Japanese *C. pauciflora* and *C. spicata*, which lost their flower-buds and some branches have not looked well through the summer but are recovering. Another Japanese species, *C. Gotoana*, which was uninjured in bud and leaf, seems destined to become a popular garden plant in the northern states.

Several other shrubs which were injured by the winter and in May and June gave little promise of recovery, are now alive and will probably entirely recover. Among them is a plant of the Japanese *Lindera obtusiloba* which, although it has been growing in the Arboretum for twenty-five years, is still one of the rarest plants in the collection as it has not borne seeds and has proved difficult to propagate. This plant is most beautiful in the autumn when the leaves during the first week in November are the color of gold. Another Japanese Benzoin, *B. sericea*, which was injured by the winter will probably recover, although this plant has suffered in less severe winters and will probably never be valuable in this climate. The two Dipeltas, a Chinese genus related to Weigela, which were killed to the ground have produced shoots from the roots. These plants, although they have flowered sparingly in the Arboretum, have suffered from cold before and it is doubtful if they can be successfully grown in Massachusetts. *Rhus Potaninii*, *Cornus paucinervis*, *Salix Bockii*, *Osmanthus cerasiformis* and *Ceanothus Wrightii* have recovered, as was predicted in the Bulletin issued on the 16th of May. The most important of these for the garden is *Cornus paucinervis* for it flowers here late in July when comparatively few shrubs are in bloom. It is a narrow shrub with numerous upright stems five or six feet high, small narrow pointed leaves with only two or three pairs of veins, small flat clusters of white flowers and small black shining fruits. If this plant proves as hardy in eastern Massachusetts as it has at Rochester, New York, it will be one of the most valuable of Wilson's introductions from western China. Coluteas bloom on the branches of the year and all the species, although they had been killed
to the ground were later as full of flowers and fruits as they were in ordinary seasons.

The following plants believed to be dead in the spring are still alive, although it is doubtful if they can be permanently successful in this climate: Stachyurus chinensis, Staphylea holocarpa, Poliothyrsis sinensis, and Fortunearia sinensis. The Staphylea, which Wilson believed to be one of the handsomest of the small trees which he saw in China, has never done well in the Arboretum, and although there is still life in some of the small plants it is doubtful if it ever flowers here. Viburnum ovatifolium, which was reported in May to have been killed, has grown again from the roots, and all the Chinese Viburnums with deciduous leaves are now in good condition. The two evergreen species which live here, V. rhytidophyllum and V. buddleifolium, lost their leaves from the cold but are now covered with a new growth and look as well as they usually look here at this season of the year. They are better suited, however, for a milder climate than that of New England. Lonicera Henryi, a Chinese species with twining stems and evergreen foliage, was killed to the ground but is growing again. This beautiful plant flowered for several years in the Arboretum and was believed to be perfectly hardy and an important addition to the small number of broad-leaved evergreens which can be successfully grown in the northern states.

Broad-leaved Evergreens. The colors which the leaves of a few of these assume in the autumn add greatly to the beauty of these plants in November. The most conspicuous change of leaf color on any of these plants is on the Rocky Mountain Mahonia (or Berberis) repens. From light bluish green the leaves turn to pale violet color in the autumn. This is one of the handsomest and hardiest evergreen plants which can be used here to cover the ground under larger plants; it grows only a few inches high, spreads rapidly by underground stems, and the bright yellow flowers are large and conspicuous. It is unfortunate that eastern nurserymen have not yet learned the value of this plant. The small dark green leaves of the Box Huckleberry (Gaylussacia brachycera) become in the autumn deeply tinged with red when the plant is fully exposed to the sun, and the leaves of Pachystima Canbyi are more or less tinged with violet. These are two of the rarest plants in the United States, being known now only in two localities, the first in Pennsylvania and the other in West Virginia where the Pachystima has not been seen, however, for nearly fifty years. The leaves of Leucothoe Catesbaei often turn deep bronze color in the autumn. This plant which has always been considered hardy in eastern Massachusetts, suffered seriously during the winter. Most of the plants lost the ends of their branches and their leaves, and many were killed outright in a particularly favorable position for this shrub where it had been established for nearly twenty years. The Rhododendrons are in good condition and generally well furnished with flower-buds, and the Laurels (Kalmia latifolia) have not before in the Arboretum given such promise of abundant bloom.