NOTES ON THE EARLY USES OF LAND NOW IN THE ARNOLD ARBORETUM

INTRODUCTION. Among the biotic factors affecting the growth and development of plants in settled regions the most important is that of the human modification of primeval conditions. This is especially true in areas such as the Boston District which is among the oldest settlements in eastern America. But with the longer period of human intervention goes increasing difficulty not only in evaluating the factor as a whole, but also in describing its varying nature, since the uses to which parcels of land have been put become increasingly obscure with age. It is the purpose of the present paper to draw up in broad outlines the effects of man’s influence upon the vegetation, soil, and topography of the Arnold Arboretum. The periods of time, especially in their relation to the present, during which certain areas have been in natural woodland, in pasture, or under cultivation, together with local modifications of drainage, will be the rough units with which such an investigation must deal. It is recognized at the beginning that many important details are as yet unavailable, but it is hoped that the general results will make possible a clearer understanding of the potentialities for growing both native and exotic plants in the Arboretum’s array of local habitats.

The most fruitful sources of information are in the registered deeds of conveyance, and in the probated records of wills, inventories and divisions of estates touching upon the lands involved. For the Arboretum these must be sought in two places, since the government of West Roxbury has been moved repeatedly. For the years between 1639 and 1793, as well as for those between 1874 and the present, the records are in the Suffolk County Court House in Boston, while those for the intervening period, 1793 to 1874, are in the Norfolk
County Court House in the town of Dedham. By means of these records and occasional old maps it has been possible to establish most of the ancient property lines and to trace the titles for most of the Arboretum land back to about 1700, and some of them to the original grants made prior to 1654.

Next in importance, as suggested above, are old maps which are to be found in the various libraries in the vicinity. Two of these are by far the most significant for the present study. One was published in 1843 from surveys made by Charles Whitney, and gives the approximate boundaries of timber lands in Roxbury at that time. The other is a topographic map surveyed under the direction of Frederick L. Olmsted about 1878. It is of particular interest because it contains lines, evidently indicating fence-rows, which divided the old Bussey estate into parcels of varying size and shape. These lines and the areas they define have proved to be of considerable historic significance since they may be traced intact through several generations of proprietors. The natural woodlands in the Arboretum have yielded much information also, in the way of tree rings and the growth forms of the trees themselves. Likewise the rather extensive notes on the distribution and habits of the spontaneous herbaceous flora made in recent years by Mr. E. J. Palmer contain suggestions of past changes in vegetation or drainage. General histories of the vicinity, chiefly devoted to the political and social doings of the inhabitants have proved of some value, as have also geneological papers dealing with the families which have owned Arboretum property in times past. From the establishment of the Arboretum in 1872 to the present the annual reports of the Director, Professor C. S. Sargent, and later those of the Supervisor, Professor Oakes Ames, give a fairly detailed account of major changes in local conditions. Also Professor Sargent's excellent description of the Arboretum's accomplishments during its first fifty years, published in 1922, has been of considerable value.

The writer is much indebted to various persons in the libraries of the Massachusetts Historical Society and the New England Historic Geneological Society, and to others in the offices of the Clerk and of the Chief Engineer of the City of Boston for searching out old maps and other historic documents. Professor Kirk Bryan of the Department of Geology and Geography at Harvard has made several valued suggestions regarding the interpretation of the data. The author is especially grateful to those older men among his associates at the Arboretum who have had to endure his endless questioning and who have supplied a wealth of inspiration and knowledge out of their practical experience with our growing plants.

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Historical Sketch. The Arnold Arboretum is situated on a tract of about 260 acres in the western part of the old town of Roxbury. It is now in the park system of the City of Boston, and is in the municipal divisions of Jamaica Plain and West Roxbury. The greater part of the Arboretum land, about 210 acres, came from the estate of Benjamin Bussey who willed it, subject to certain restrictions, to Harvard College at his death in 1842. The remaining acreage has been added in various purchases, either by the City or by the College.

The Arboretum was started in 1872 on that part of the Bussey estate which lay north of Bussey and South Streets, excluding the area already occupied by the Bussey Institution. In 1883 this land was taken into the Boston Park System and leased back to Harvard College, tax-free, for one thousand years. At the same time the City added to it several pieces of land and undertook to build and maintain its fences and roadways. The additions at this time included about 10 acres in what is now the collection of larger conifers, near the corner of Walter and Bussey Streets; about 11 acres on the north slopes of Bussey Hill and reaching northward through the linden and horse-chestnut collections; and about 17 acres covering most of the present area of the North Meadow and the hillside at the base of which the Administration Building now stands. Further additions were made between 1890 and 1895 when the Peter’s Hill section was taken over from the Bussey estate; another five acres were acquired along Centre and Walter Streets at the corner of Bussey; and two areas formerly reserved by the City, one on Bussey Hill and the other in the North Meadow, were finally leased for Arboretum purposes. About 15 acres bounded by Walter, Weld, and Centre Streets were acquired by purchase in 1922, and the property between South Street and the railroad was taken from the Bussey estate at about the same time. The latest acquisition consists of about eight acres along Centre Street purchased from the Adams Nervine Asylum in 1926. Benjamin Bussey acquired his part of the future Arboretum by purchase between the years 1806 and 1837. He bought it in six parcels, two of which cover most of the area and came from the estates of the Weld and Davis families.

A glance at the titles to these several pieces of property shows that their boundaries persisted through many generations of ownership and conveyance, many of the lines having set off parts of the original colonial grants. It is quite evident further that although they conform in many cases to topographic and soil boundaries, they have but little in common with the modern arrangement of roads and plant-
ings. Therefore it is deemed advisable in the following discussion to use these modern divisions as unit-areas, with constant reference to the old property lines which affect them. Plate I is a recent map of the Arboretum upon which the unit-areas are numbered and separated by dotted lines.

1. The earliest mention of the hillside which lies back of the Administration Building, extending westward to include the collection of tulip-trees, is in the will of Jabez Totman, probated in 1705. Judging by the inventory of his estate the land was part of a farm upon which there was considerable grazing stock, and which was in pasture, orchard, and possibly in part planted to hay. It seems clear that its original timber was removed before 1700. It continued to be farmed by various owners until its incorporation in the Arboretum in 1883, but specific references to its uses are rare. The western half was described in the inventory of the estate of John Morey in 1771 as pasture. The Meadow Road was finished in the early 1890's, and the Administration Building in 1892. The magnolias were planted in the following year, the tulip-trees about the same time, and the pines which now cover the hill-top, sometime in the late 80's. In very recent years an attempt was made to grow small conifers on the southward-facing slope, but this was abandoned and the area is now largely in grass, made beautiful in spring by an abundance of daffodils.

2. Along the west side of the Meadow Road there is a stretch of nearly level ground perhaps 10-12 acres in extent and reaching westward and southward to the bases of the gravelly knolls which are now covered with natural woods. This area is very low and was once part of the North Meadow, but it is now drained and contains the planted groups of Cercidiphyllum, Tilia, Phellodendron, and Aesculus. East of the Meadow Road the shadbushes, buckthorns, and sumacs grow on similar ground, with some of the maples.

All of this lowland was known in early times as 'Gore's Meadow,' and we find it mentioned as the property of John Gore in the oldest record of Roxbury land holdings, the "Ancient Transcript" (1634). Like others of its kind it was of particular value because it supplied a ready source of hay to settlers in a wooded wilderness largely devoid of natural grassland. Furthermore, it was the higher part of the whole meadow area which lies in this section of the Arboretum, and could be successfully drained to increase it productiveness. It was variously divided at different times into halves and thirds during the long and complex history of its ownership, but continued to be used for its original purpose, as hay meadow, until after it became a part of the Arboretum by purchase from the Adams Nervine in 1883. Par-
Map of the Arnold Arboretum and the Bussey Institution showing the numbered areas described in this bulletin.
tial control of Goldsmith Brook which flowed through it was attained in 1892, about the time the Meadow Road was finished, and the resulting drainage made possible the planting, about 1894, of the lindens and horse-chestnuts as well as the other neighboring groups. The control of the brook did not prove entirely successful however. In 1905 a culvert was put under the Meadow Road and the whole brook led underground from Centre Street to the place where it discharges under the Arborway. In 1902 the ground under all of these plantings was laid down permanently to grass which yields a good crop of hay each year, just as its predecessors did in generations past.

3. Lying between the Arborway and the Meadow Road is a marshy tract of several acres, formerly much wetter than now, but still too swampy for extensive plantings. Along the embankment formed by the Meadow Road, and also along that by the Arborway, plantings have been made, and a part of the eastern side of the area has been utilized for willow and alder collections, but otherwise the ground is left to itself.

In earlier times the meadow was divided into two parts by a straight line beginning near what is now the shadbush collection and extending to the Arborway so that a projection of it would follow the westerly side of Park Road, recross the Arborway, and form part of the northeastern boundary of the Bussey Institution property between the street and the Bussey Dormitory. This is one of the oldest surveyed lines in West Roxbury, being known in the original apportionment of the town’s property as the “headline” of the “first division of outlands.” It was the northeastern boundary of the Bussey estate and so of the original Arboretum.

Throughout its long and somewhat complicated titular history this area has been described as “meadow.” It appears to have been drained with fair success in early times to produce natural hay. In winter and spring it was probably ponded, as it still is after especially heavy thaws or rains. Whitney’s map (1843) shows only meadow with no standing water, but a map made about 1879 shows a small pond. The completion of the Meadow Road made possible, in the early 1890’s, the border plantings along the western margin of the low ground, but even semi-adequate drainage was not available until better sewer arrangements were made eastward from the Arborway to Stony Brook. This was done about 1900. The Arborway was completed about 1895, and the border plantation of willows was put in at that time. After better drainage conditions came, a willow collection was started (about 1908) in the low ground across from the Administration Building, but for various reasons among which injurious in-
sects and the excessively peaty substratum are important the collection has not been enlarged. The main part of the meadow is regularly cut and burned off in the autumn and allowed to come up to weeds in the following summer. The asters and goldenrods which blossom abundantly in the late summer supply a mass of brilliant color at a time of year when greens predominate elsewhere in the Arboretum.

4. One of the Arboretum’s most recent accessions is a small parcel of land along Centre Street lying between the Adams Nervine property on the north and the plane-tree collection on the south. Eastward it is bounded by a timbered ridge on the north slope of Bussey Hill, by the collection of river birches, and by the lowland containing the linden group. In the northern part it is quite low and is traversed by Goldsmith Brook which is now entirely underground. Southwesterly it slopes upward and forms part of the base of the high hill lying just across Centre Street. At the southwestern corner is the old Lewis house, recently renovated, in which lives a member of the Arboretum staff.

The earliest mention of this land found thus far is in a description of the holdings of Samuel and John Gore in 1708, where their northwestern boundaries are noted as on property of Thomas Morey. It is assumed that the latter acquired it either by purchase or indirect inheritance sometime after 1654 since no one of the name of Morey was among the original settlers, nor among those who contributed notes to the “Ancient Transcript.” The original Morey parcel contained about 14 acres (see Plate II), and was described as planting land, meadow, and orchard when it was transferred to John Morey in 1714. It is presumed that the meadow was on the low ground along Goldsmith Brook, and that possibly the planting land was on the more level areas about the house site and southeastward, leaving the sharper slopes and the morainic ridge now in natural woods for orchard.

The land remained in the Morey family until 1783, and was the nucleus of that part of the large Morey farm which lay west of the road. The only descriptive matter available in subsequent years is that the land was a farm and that part of it was a “sheep pasture” in 1806. The whole 14-acre piece will be referred to again as different parts of it are discussed. The area southeast of Bussey Hill and that occupied by the plane-trees and river birches were bought by the city for the Arboretum in 1883, but the remainder was not purchased from the Nervine until 1926. For many years the Arboretum rented the old Lewis house as a residence for Jackson Dawson, its first superintendent; and some neighboring Arboretum land was utilized for nurseries at an early date. The nurseries are still in use, but are now
planted mainly to roses. The Valley Road from Centre to South Streets was finished about 1883, and the plane-trees were planted about the same time. Just north of the Lewis house is the foundation of a large building put up by the Nervine. The large terraces around it have involved a great deal of filling, and the excavations found on the hillside to the north probably date from its construction. The lower slopes of the hill as well as the meadow are now in grass, soon to be planted with birches and shrubs. The lowering of Goldsmith Brook in the early 90's and its final "submergence" about 1905 have rendered the bottom land progressively drier and more suitable for present purposes. In very recent years neat conical stacks of hay, cut and put up on this bit of open ground, have added a quaintly rural aspect to the local scene, and have brought up to date the nearly continuous use of the land for farming through nearly two and one quarter centuries.

5. On the lower north and northeast slopes of Bussey Hill are two areas which are bounded on the upper side by Bussey Hill Road, and separated from each other by a strip of natural woods. Northeastward they are bounded in part by the Meadow Road, by other natural woods, and by the lowland of the horse-chestnut collection. The westerly one is planted to viburnums, river birches, and hackberries, while the lower is devoted to a variety of trees and shrubs which are chiefly leguminous. Surrounding the pond at the eastern end are persimmons, tupelos, dogwoods, witch-hazels, etc.

The history of the western area has already been outlined in the account of the 14-acre parcel of Thomas Morey. The more easterly section had an entirely different history, and was part of the Weld land purchased by Bussey in 1806. The western part of it, now containing most of the leguminous trees, was probably in the possession of the Gore family in 1692, and was bought by Joseph Weld in 1718. The land now around the pond was probably part of the original Weld grant. This whole area will be treated in more detail below in connection with the northeastern side of Bussey Hill, but it should be noted that in 1708 and again in 1718 the Gore part was described as pasture, and that all of it probably came under that heading in 1760.

The building of the road, which was finished in 1892, greatly modified the land below it on account of the large amount of grading necessary. A terrace was constructed all along the hillside and a large amount of subsoil thrown over the lower ground. Also a new form of drainage was started with the guttered roadway to carry off surface water from the hill. A temporary spring among the river birches may have become localized in its outlet at this time. Its presence probably accounts in part for the great vigor of the birches. The Meadow Road

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separated off the small pond from its neighbors, and the main plantings were finished over the whole lower area in the early 90’s. The birches and hackberries had been put in during the late 80’s. The attractive color and scent among the locusts in early summer, the rich reds of the tupelo leaves in the autumn, and the delicate tracery of the birch twigs against the winter skies help to make these spots among the choicest in the Arboretum.

6. Along the Arborway is a strip of relatively level land bordered on the north by the meadow. Its south and southwest boundaries are the Forest Hills and Meadow Roads and a stand of natural woods. It is occupied mainly by the maples and the shrub order, but along the roads are plantings of hawthorns, cherries, and plums. Like the land just west of it, this was all part of the Bussey property bought of the Welds in 1806. Likewise its northern part was in the Gore property in 1692 which was sold to the Welds in 1718. The latter was described as pasture in 1708 and 1718, and it is probable that the whole area was in pasture or hay land in 1760. Its more detailed history will be found in another place.

Almost immediately after the Arboretum was founded, the land now occupied by the Shrub Order was utilized as a nursery for starting the thousands of trees and shrubs needed for border and group plantings. There is fairly good soil and a sufficient slope to the westward to insure good drainage. After the bulk of the plantings had been made other nurseries were started, and during the 90’s this area was rearranged to serve as a systematic collection of shrubs. A further reorganization and enlargement of the beds to their present condition was finished in 1907. At this time some grading and draining were done, and the large modern trellis was put up. The plums and cherries were planted in 1894, soon after the roads were finished, but the maple group had been started in 1891. The hawthorns along the Arborway seem to have been planted in the early 90’s. The land under the maples was not laid down to grass until 1900.

7. The northerly and northeasterly slopes of Bussey Hill have a certain uniformity of aspect produced by the rather open plantings of large trees which cover them, and have been grouped together for purposes of description. The area in question is inclosed by the Bussey Hill Road as it “spirals” up to the Overlook, and bounded southeasterly by land of the Bussey Institution. It is occupied by the collections of birches, elms, mulberries, catalpas, ashes, oleasters, lilacs, forsythias, and privets.

The lower part of the birch collection, as already noted, was mainly in the Morey land which came from the Adams Nervine in 1883. All
Plate II. Map of lands in the Arnold Arboretum about the year 1710.
of the remainder of the hillside was in the Bussey estate purchased from the Welds in 1806. Although the old Weld estate is represented in several other areas described elsewhere, its history as a whole will be discussed here.

Among the Roxbury settlers were two Weld brothers, Thomas and Joseph. For various considerations, among which was his military service to the colony during its early dealings with the Indians, Joseph Weld acquired a large grant of land in West Roxbury about 1640. The location of all this land, upwards of 270 acres, is not clear, but it is known that a large part of it lay on both sides of South Street, then called the "Lower Road to Dedham" or the "Highway to Bare Marsh," in the neighborhood of what is now Forest Hills, and that it was farmed by John Weld, a son of Joseph. Early descriptions of this property are so confusing that it seems all but impossible to define their meaning at present. At any rate it is certain that a considerable portion of the Arboretum land was still in primeval forest in 1691 and later, and that John Weld’s son Joseph inherited from his father 60 acres, "partly plowland part meadow and pasture and woodland," which evidently lay west of the road and was the Arboretum property in question. For the boundaries of this land reference should be made to Plate II. The area was apparently underestimated at 60 acres, and continued to be underestimated until accurate surveys were made in 1861. It is presumed that the meadow mentioned in the above note was that now represented in the ponds near the Shrub Order. The relatively good soil on the "Plain-field" (Bussey Institution land along South Street) was undoubtedly utilized as at least part of the plowland, leaving the pasture and woodland for Bussey and Hemlock Hills.

After the death of Joseph Weld in 1712 the 60 acres passed to his son Joseph, but with no additional evidence as to land uses at that time. This Joseph Weld greatly increased the property by purchases from the Gore family in 1718.

The inventory of the estate of Samuel Gore, probated in 1692, affords the first definite record of a large part of the Arboretum land. There is reference to "About 22 acres of Meadow and Upland lying before the house... About 40 acres of Land, extending from sd. Meadow to the Sawmill, & taking in somewhat in the Second division for the advantages of the sd. Mill, Together with the Mill being almost rotten & the Dam broken..." The first item refers to the low ground of the horse-chestnut and linden collections and to the lowland southeast of it. The second includes a strip of land about 550 feet wide northwest of the Weld property described above, and ex-
tending into what is now the collection of larger conifers. It then included all of the 15 acres now occupied by the latter (see Plate II). Mention of a sawmill and dam is of considerable significance since the mill and its equipment had, as early as 1692, seen a great deal of service and must have accounted for the reduction of a great deal of the primeval forest of the Arboretum prior to that date. It is also of interest because the earliest name of Bussey Brook was "Sawmill Brook," which clung to it until the time of the Bussey estate.

The disposition of the Gore property between 1692 and 1718 contains so much descriptive matter that it will be noted in some detail. After the death of Samuel Gore his estate was not finally divided until 1708. In this division the oldest son, Samuel, received most of the meadow land (northern part). His mother, Elizabeth Tucker, had a piece which included land now in the collections of lilacs, tree legumes, part of the maples, natural woods, and a part of the Shrub Order. Her land was designated as upland and meadow. Another son, John Gore, received about eight acres in a roughly rectangular piece just southwest of the last. It now contains the elms, mulberries, and parts of the catalpas, lilacs, and birches, and was described in 1708 as upland and orchard. A third son, Obadiah Gore, had about 15 acres bounded southwesterly and southerly by Bussey, Walter, and Centre Streets, and now containing the larches, firs, spruces, and pines. He also had about 10 acres lying between this and John Gore’s eight acres. The whole of Obadiah Gore’s 25 acres was described as meadow, orchard, and upland. It is of interest that none of the Gore property was noted as woodland or plowland at this time.

Subsequently Samuel Gore acquired all of his mother’s and John Gore’s shares, and sold all but a part of the meadow to Joseph Weld in 1718. In the latter transaction the whole area was mentioned as meadow, orchard, and pasture, with still no mention of timber or cultivation, and confirming the definition of “upland” as pasture. Obadiah Gore’s share had an entirely different history. The Joseph Weld property, as now constituted, was substantially the same as that later bought by Benjamin Bussey.

The last Joseph Weld died in 1760, leaving the future Arboretum land to his son Eleazer. A rather detailed inventory of his estate is given, the significant items being as follows: “about 6 Acres of Orchard adjoining the house... 9 Acres of the Plane Eastward of the

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1 The term “upland” evidently referred to upland pasture rather than to woodland. It is often given in a list of properties, others of which are definitely designated as woods.
barn... about 10 of fresh Mowing, & 3 of Woodland... about 8 Acres of Meadow Called Gores Meadow... About 44 Acres of Pasture & Woodland."

He had in addition considerable livestock including 21 sheep, 6 horses, 4 oxen, 13 cows, 4 "young Cattle," and 3 pigs. There is also mention of a "Mill house Including about Nine Thousand of Shingles." Providing the farm house was, like the barn, west of the road, the six acres of orchard and nine of the "Plane" would account for all or most of the present Bussey Institution land. The 10 acres of fresh mowing is presumed to have been in part fresh meadow, either in the lowland at the eastern end of the farm or somewhere on Bussey Hill. Gore's Meadow was evidently the roughly triangular piece at the northeastern corner of the farm. The 4.4 acres of woodland and pasture, therefore, were probably confined between the old lines of the Weld, John Gore, and Elizabeth Tucker lands on the northwest, and the boundaries of the Bussey Institute area on the southeast. There is every indication that Hemlock Hill was never entirely cleared and made into pasture, so that it may be regarded as at least part of the woodland. A large oak tree in the azalea collection on Bussey Hill, which was killed by lightning in 1931, proved to be solid to the center, and to be 264 years old. Its rings show that about 1768 the primeval forest in which it had spent the first part of its life was finally cleared, and that after that time it remained in the open, undoubtedly in pasture since the steep slope would preclude cultivation. The width of the rings prior to 1768 indicate that no appreciable clearing had been done around it in the preceding 96 years, and certainly none could have been expected before that time because all of the earliest rings are very narrow. Since all of the original Gore land had already been cleared, the conclusion seems justified that the woodland part of the 44 acres was confined to Hemlock Hill, a part of the southern slope of Bussey Hill, and possibly some of its southeastern slopes. It is probable, however, that all of the eastern and southeastern sides were open, and that the three acres of woods mentioned with the 10 of fresh mowing, were an isolated lot in this vicinity.

There is nothing in the records of Eleazer Weld's estate when he died in 1800, nor in the sale of it to Bussey in 1806, to indicate the trend of uses in this area. The next pertinent information is on the Whitney map of 1843, which shows most of the land except Hemlock Hill still open, but with clumps of natural woods here and there. The history of these wooded areas will be taken up in another place.

From the above notes it seems clear that most of the land in area no. 7 was clear and in pasture or orchard or both in 1708, and that the northwestern end may have been under cultivation; also that the
southern end, where the privets, ashes, and parts of the catalpas are, was probably clear and in pasture prior to 1760. Furthermore, there is no indication that any of this land was allowed to grow up to natural woods subsequently, nor is there much evidence of cultivation in these early times.

Bussey planted a double row of lilacs, among which were white pines, in a sort of rectangular arrangement around the top of the hill back of his mansion. A few of the pines are still standing near the azalea collection and long lines of lilac bushes remain on the east side of the Overlook. The fence row which separated the John Gore and Elizabeth Tucker properties was still in existence in the early 1890’s, as shown on an old photograph in the Arboretum Library, and the ones between the John and Obadiah Gore lands, as well as that between the former and the Brewer and Morey properties in part, were perpetuated in Bussey’s lilac plantings which followed the old lines. The ashes, elms, catalpas, and birches were started in 1886, and the ground beneath them was laid down in grass about 1900. The lilac and forsythia groups appear to have been started early in the 1900’s, very near the road, while the bank above the lilacs was still planted in privets. The lilacs were not expanded up the bank until somewhat later.

8. There are several stands of natural hardwood timber in the Arboretum which have had a somewhat varied history. It seems clear that during most of the 1700’s the Arboretum was for the most part devoid of deciduous woods, but the ancient oaks on the southwest slopes of Bussey Hill indicate that there were occasional trees which had their origin in the primeval forest, and at least one patch of woods which persisted until the 1760’s. Since the present woodlots are mostly of even-aged trees it is possible to "date" within a very few years the several stands.

At the northeastern base of Bussey Hill are several gravelly knolls upon which most of the oldest trees are 100-110 years of age. There are two parts of the woods, separated by a clearing below the huckleberries. The oldest trees in the westerly portion are mostly of sprout origin, while in the easterly tract there is a much greater number of trees which started as seedlings. The trees east of the Meadow Road, as well as a few around the base of the knolls just west of it, are older (130-140 years). Also, they are nearly all of seedling origin. All of these trees had a very rapid growth at the start, and show nothing but a gradual diminution in the rate subsequently.

The woods on the rocky hill along Centre Street north of the conifers is somewhat less even-aged than the others, the oldest trees rang-
ing from 120 to 140 years. All of those counted except one had a rapid growth at the start with gradual slowing, and were seeded in. The exception was a 140-year-old oak which grew rather slowly during its first 10 years.

The open woods on the knolls southeast of South Street appear to be about 120 years old, and to have started mostly as seedlings. They grew rapidly at the beginning and slowly later. At the southeastern end of the tract there are a few large white and red oaks which probably antedate the others.

Southwest of Bussey Street, on the rocky upland adjoining Hemlock Hill, is a piece of woods which evidently started by seeding about 130-150 years ago. Many of the older trees have been cut for some time so that it is difficult to count their rings. A sufficient number of sound stumps of recent cutting are available, however, to set the above ages. Like most of the other stands this also shows nothing but a steady diminution in the rate of growth.

The small piece of woods on the easterly side of Peter’s Hill appears to be about 100 years old, and to be of seedling origin, with a gradually slowing growth rate.

As shown above there is no indication of woods in the descriptions of the lands at the northeastern base of Bussey Hill in the early 1700’s. The westernmost of the knolls was Morey land, and was probably in orchard or pasture in 1714. The remainder was Gore property, in orchard or pasture in 1708 and again in 1718. Subsequent history of the westerly piece is obscure, but the large percentage of sprout origin is evidence that the present woods were preceded by another. However, the position of the sprouts does not indicate a previous forest of very large trees. It is presumed therefore that the land was abandoned and seeded sometime in the late 1700’s. As will be noted elsewhere, the breaking up of the Morey estate occurred in 1783, and this may have been the period of abandonment.

The more common seedling origin among the trees on the knolls farther east indicates that this land was maintained in orchard or pasture for a longer time. If this is not the case then it is necessary to assume that approximately between 1718 and 1830 a woodlot was started, allowed to grow, and then was so completely eradicated as to preclude sprout origin for a large percentage of the later trees. It is more reasonable to assume that the woods started in long-open ground, some of the young plants being grubbed out in the early stages, giving rise to a certain amount of sprout growth. Further, there is little in the 1760 inventory of the Weld estate to indicate woods in this area. The timber east of the Meadow Road evidently had about the same
Plate III. Map of lands in the Arnold Arboretum about the year 1770.
origin, but started earlier, about 1800. Here again the abandonment of the land might be correlated with a major property transfer, since 1800 was the year of Eleazer Weld’s death, and his heirs sold his ancestral estate to Benjamin Bussey in 1806.

The upland rocky woods along Centre Street was partly in the estate of the Brewer Family for several generations prior to 1764 when it was sold to John Morey. In 1733, and again in 1747 the probate records show that it was part of a 17-acre parcel along the road, bounded by John Morey on the northeast, by Joseph Weld on the southeast, and by the land formerly of Obadiah Gore on the southwest (see Plate II). In both years it was described as pasture. The woods farther to the southeast, between the pines and the former chestnut group, is on the Gore property described as orchard and pasture in 1708, and as pasture in 1771. It seems clear therefore that this land remained open and mainly in pasture until the present woods seeded in, which evidently occurred after about 1790. This might also be correlated with the final dissolution of the Morey estate in the 80’s.

The northwestern part of the woods just south of Bussey Street is on land which was also part of the Morey farm and was sold to John Davis in 1777. It was described as pasture in 1730 in an inventory of the estate of John May, in 1771 in an inventory of the estate of John Morey, and again in 1802 in the division of the property of John Davis. This brings it to about the time when the present woods seeded in. The southeastern end of the tract was mostly in the farm of Ezra Davis which was purchased by Bussey in 1832. Earlier history of this is very obscure in the records, there being almost nothing descriptive of the Ezra Davis land except that it was a farm. It is probable, however, that the present woods seeded into old pasture or possibly old orchard in the late 1700’s and early 1800’s.

The knolls below South Street were in the Weld estate, but their early history is obscure on account of the small amount of data available on the boundaries or uses of the land in this section. The present woods evidently seeded into open ground in the early 1800’s, at about the time Bussey purchased the property.

The small patch of woods on Peter’s Hill is evidently but little over 100 years old. There is little information as to the earlier history of the land, as will be shown later, but the present timber seeded in about the time the land was purchased by Bussey in 1837 from the Davis family which had held it through several generations.

This brings the discussion to the Whitney map published in 1843, the year following the death of Benjamin Bussey. On this map there are no woods shown on the knolls at the northeastern base of Bussey
Hill except those between the Meadow Road and the maples. Likewise there is none on Peter's Hill. The other tracts are shown essentially as they are at present except that the one by the conifers had a large extension northward to cover the sites of most of the present walnut and hickory collections. There is evidence of this extension in the abundant undergrowth now existent especially under the walnuts.

It should be noted that the only woods omitted from the map are those approximately 100 years old. When the map was made they were but thickets of young saplings 10-15 years old, and were therefore not regarded as woodlots. The other tracts were young stands 25-50 years old.

As for the period between Bussey's death and the starting of the Arboretum there is little information of any kind. There was a note in one of the codicils of Bussey's will, however, that no timber was to be cut off the land until the University took it over. Consequently it is fairly certain that the areas of natural timber remained intact until the Arboretum era. Professor Sargent mentions repeatedly the thinning and pruning of the natural woods, especially in the early years, but nowhere is there mention of clearing operations. Whether the present hickory and walnut areas were thinned out by him or by someone cutting between 1861 and 1872 is uncertain, but it is probable that the present condition was made in the 80's when the groups were planted. Pruning and the elimination of old decrepit trees still goes on with good results in the growth of young stems which will insure the continuity of the timber as a whole. Undergrowth and ground cover are allowed to develop as they will except in a few cases where azaleas or other shrubs have been planted in the more open woods.

9. The entire history of Hemlock Hill prior to the Bussey purchase is to be looked for in the records of the Weld and Davis families, and in the trees themselves (see Plates II, III, and IV). Whether Bussey did any cutting of trees during his lifetime is unknown. It is presumed that since his death little has been done except for the removal of dead wood, but in the growth rings of trees cut recently from the steep eastern slope there is evidence of the release of formerly slow-growing trees. This indicates that some of the thinning operations started by Sargent were probably carried out in this area. Elsewhere on the hill the release is not shown. On the middle part of the eastern slope there are several recently cut stumps which show a release about 125 years ago of such a nature as to indicate considerable cutting about that time. The trees are 140-160 years old.

On the northern slope of the hill the older trees range from about 100 to about 140 years old. The younger of these (about 100-120
years) are near the brook at the base of the hill, while the older ones (135-140 years) are part way up the slope. All of these trees grew very rapidly at the start and show no evidence of release except in one case where there is a slight indication of it about 60-65 years ago. Otherwise they all show a rather steady diminution in rate of growth after very rapid starts. Young trees in the dense shade on the lower slopes are now growing very slowly, even from the seedling stage. There is every reason to believe, therefore, that this hillside was either clear-cut or heavily culled about 140 years ago. The younger trees near the brook could still have had a rapid start many years later both on account of the better light at the edge of the timber and because of nearness to water.

The southerly slope of the hill is also steep and rocky, but is notable for a large admixture of hardwoods. The older of these appear to range from 135 to 150 years of age, and to have grown continuously in the open when they were young.

From the above notes it is evident that Hemlock Hill has been the scene of a certain amount of lumbering. It is apparent that in the early 1800’s considerable was done on the Davis land at the eastern end, and in the 1790’s the north slope was rather heavily cut. The trees on the top of the hill are rather uneven-aged (80 to 160 years), but all show fairly rapid growth at the start which might indicate either continued culling of the stand or a relatively open timber growing there naturally. The writer is inclined to the latter opinion, especially since young trees now starting have the same sort of rapid growth. The forest has undoubtedly suffered considerably from the continued trampling of picnickers and hikers. Fences recently put up are intended to discourage climbing on the steep rocky cliffs on the north side where most of the damage is done. The partial drying up of Bussey Brook, and the change in its channel effected several years ago have also done some damage to the trees near it. On the other hand there is a wealth of young birches in the woods, and with them young hemlocks which bid fair to perpetuate the forest provided they and the pittance of soil they grow in can be preserved.

10. Most of the steep southwestern slopes of Bussey Hill are now devoted to collections of oaks and beeches. A ridge-like extension of the hill south of the Overlook carries on its top and upper slopes a miscellaneous collection of shrubs and small trees among which the azaleas are the most conspicuous. There are a few ancient oaks on the hillside which are remnants of an old forest, but most of the woods there now consist of planted trees. The old remnants appear to be the oldest trees in the Arboretum, at least some of them dating back
Plate IV. Map of lands in the Arnold Arboretum about the year 1810.
to the primeval forest.

The northern part of the area, containing most of the oaks, was the property of Samuel Gore in 1692 and, as stated above, was described in 1708 as orchard and pasture when it came by inheritance to Obadiah Gore. The latter sold it in 1710 to William Dudley, in which transaction it was part of a larger piece called "Orchard & meadow." This would suggest that the upland part now under consideration, since it could not have been meadow, may have been entirely in orchard. In 1771 when an inventory of the Morey estate was made, it was noted as pasture. After 1771 there is no descriptive matter referring to the use of this land, but it is presumed that the western part of it was abandoned as farm land about 1800 or earlier, since it was in woods on the Whitney map of 1843. The upper, eastern part appears to have been still open at that time except for a few clumps of old trees.

The slope of the hill farther southeast, where the beeches and azaleas are, was part of the Weld estate which, as noted elsewhere, is somewhat obscure in its land history. Evidence from the old stump in the azalea collection shows that the primeval forest in its vicinity was not cleared until about 1763, and that subsequently the land must have remained open, probably in pasture, to the beginning of the Arboretum. Whether this evidence applies to the whole hillside is unknown, but there are a few old oaks in other parts which may eventually throw light on the question. In 1843 the only woods shown on the Whitney map for the whole area are a few clumps, evidently of these old trees.

The first road built in the Arboretum was that between the Centre and South Street gates, finished about 1884. The beeches were planted in 1886 and the oaks in 1887. The boundary plantation of pines next to the Bussey Institution land was probably started in the late 70's. The top of Bussey Hill was held as a reservation by the City until 1895. The azalea collection was not started until 1907, and the influx of the late E. H. Wilson's plants inaugurated the so-called Chinese collection around the knoll south of the Overlook. The sanitary building was put up about 1903. Apparently no attempt was made to lay down a cover of grass under the oaks and beeches, and the open ground just above the road inside the South Street gate probably dates back to very old pasture or cultivated land, as does also that on the top of the knoll above the Chinese collection.

11. The walnuts, hickories, and a miscellaneous group of species in the vicinity of the pterocaryas are planted in an area of approximately 10 acres along Centre Street and bounded southeasterly by the old
chestnut collection, the oak collection, and part of the birches. There is a natural boundary line on the southwest made by the rocky woods, but the northeastern boundary has been set rather arbitrarily in the plane-tree group.

This land was part of the 17-acre Brewer parcel described in connection with the natural hardwoods. The first direct mention of it is in the inventory of the estate of Nathaniel Brewer probated in 1733, where it was described as pasture land. In 1747 another Nathaniel Brewer also noted it as pasture, but after that there is no definite record of its use for many years. At the time when an adjacent piece was purchased by Bussey, in 1813, it was noted as a "mowing lot," which indicates that it had not lost its character as open land at that time.

Whitney’s map of 1848 shows approximately the southeastern third of the area in woods, the age of which is uncertain. The 1813 conveyance suggests, however, that the timber did not start until after that date, but that it must have been soon after in order to make an impression upon the map maker as woodland. In the edge of the present woods on the southwestern side of the tract is the bed of an old stone wall.

The hickories were planted in 1886 soon after the finishing of the Valley Road, and the walnut group was started in 1886-87. The pterocaryas were planted in 1887. Like the ground under the oaks, no attempt appears to have been made to start grass in these groups. A part of the land lying on the gentle slopes east of the pterocaryas was used many years ago for nursery purposes, and now contains a miscellaneous collection of shrubs among which are Deutzia, Spiraea and others. Judging by Whitney’s map the woods which came up did not reach the site of these beds of shrubs, so that it probably remained open from the time of the Brewer pastures of the 1730’s or earlier.

12. A roughly rectangular piece of ground containing about 15 acres and bounded southerly and southwesterly by Centre, Walter, and Bussey Streets, is now devoted to the larger conifers such as the pines, spruces, firs, larches, and the handsome golden larch.

A narrow place in the channel of Bussey Brook which occurs near the eastern corner of the parcel was the probable site of the sawmill which was built on this land very early in the history of its occupation. As noted above the inventory of Samuel Gore’s estate in 1692 described the mill as being very old and the dam which produced its power broken down. The whole 15 acres, with 10 acres northeast of it, were described in 1708 as meadow, orchard, and pasture, and in 1710 as meadow and orchard, suggesting that the orcharding may have
been extensive at that time since the meadow was necessarily small. The Morey inventory of 1771 calls it the "Saw Mill pasture & Meadow."

After 1771 the records, which are exceedingly complicated as regards ownership, show no descriptive matter other than boundaries. The Whitney map, however, shows that the land was clear in 1843. The extent of the meadow could not have been very great, as shown by the contours of the ground; and the length of time it lasted, depending upon the activities at the site of the old sawmill, is quite unknown. The inventory of Joseph Weld’s estate in 1760 mentions a "Mill house Including Nine Thousand of Shingles," but fails to tell where the house was.

The history of a small triangular piece of land at the western corner of this area, containing less than half an acre, indicates a change in the course of Bussey Street. The position of the road was evidently moved northward at the entrance to Walter Street between 1812 and 1835, and the old house site now south of Bussey Street at this corner originally had the street south of it. It is presumed that other changes in the course of the street were made at the same time but what they were is yet uncertain.

Whitney’s map shows that in 1843 there was a house along the road on the rocky hill where the natural wood now stands. It may have been the home of negro squatters who are known to have lived in this neighborhood for many years previously. There were also houses at that time near the point where Walter Street turns off of Centre, and on the south side of Bussey Street where it joins with Walter. The foundations of the latter are still in evidence and very conspicuous, as noted above, but those of the former have been nearly obliterated. The former houses, or others on the same sites, belonged to the Kent and Skinner families and remained standing until sometime in the 1890’s.

The larger conifers were started in 1886, but the Hemlock Hill Road was not finished until about 1892, the same year in which the deepening of Bussey Brook modified to a certain extent the drainage of the area. There is a sizeable but intermittent spring on the hillside among the spruces. In 1900 the land under the permanent plantations was laid down to grass.

13. Between the Hemlock Hill and Valley Roads there is a roughly triangular piece of ground which now contains the collection of yews, arbor-vitaes, sciadopitys, junipers, bald cypresses, and hornbeams. It is bounded on the northwestern side by the pines and by some natural woods. A striking feature is the clump of old beeches along Bus-
sey Brook. On the northeast side of the area is a small intermittent stream which joins with Bussey Brook near the junction of the roads. It is fed by a spring which issues near the large rock outcrop along the Valley Road.

Nearly all of this land was part of the original Weld grant, and its early history is unknown. Whether the brook and its tributary flowed through open places or were overhung with woods in the natural forest is undetermined, nor do we know when the land was cleared. The interesting investigations by Mr. E. J. Palmer upon aboriginal relics in the Arboretum suggest that part of this area was the site of an Indian camp ground, and if this is the case partial or complete clearing for a very long time might be suspected. The Whitney map shows the woods on both sides of Bussey Brook reaching nearly to the water in this vicinity, while a map of the Arboretum prepared by H.S. Codman in 1887, before Hemlock Hill Road was built, shows natural woods covering about the southern half of the triangle, forming a continuous wooded area from Hemlock Hill to Centre Street. Pictures taken when the road was graded (about 1890) show that it went through a wooded strip, and Sargent, in his historical account published in 1922, says that there was an alder thicket along the brook, presumably in this vicinity. Not much is left of these woods except the old beeches above mentioned and some occasional large oaks. The hornbeams were planted in 1886, the groups of Taxodium, Taxus, and Sciadopitys in 1891, and the arbor-vitaes and junipers probably in the late 80's. The ground was laid down to grass about 1900. The conifers, viewed from several vantage points either in the valley of the brook or on the slopes of the nearby hills, constitute one of the most striking features of the Arboretum, and one of the first to be completed.

14. The wooded part of the South Street tract has already been discussed, and there remains the lower ground where the pond is now situated. The limited amount of planting which has been done there consists mainly of poplars and willows except for a small area near the railway which is being used as a nursery.

Bussey, or Sawmill Brook, as it traversed this lowland, appears to have been the ancient dividing line between the Weld and Davis holdings. Throughout their entire history these properties have been largely in meadow. The low knolls in the southwestern part were presumably in pasture or under cultivation, but there is no specific record of such. The part northeast of the brook came into Bussey's hands with the Weld purchase in 1806, while the remainder was bought from the estate of Ezra Davis in 1832. What is known of the latter will be found in the discussion of Peter's Hill. At the time the tract
was added to the Arboretum the northeastern part was only a wet meadow, but in 1922 work was started, and by 1925 the pond was formed by the excavation of masses of peat. Some of the surrounding land was raised by allowing it to be used as a dump, but beyond this and some border plantings the original project of roads, paths and plantings is still unfinished. With the growth of the trees which will eventually shield the tract from the adjoining railway, it can be made into a useful as well as beautiful addition.

15. Although Peter's Hill exhibits some striking variations among its natural habitats, the history of its human occupation is so uniform and so scanty in detail that for present purposes it is grouped under one heading except for the natural woodlands which have already been discussed.

All of the Peter's Hill land now in the Arboretum with the exception of the small parcel in the old cemetery belonged to two branches of the Davis family when it was acquired by Bussey. An irregular line drawn from a point near the crossing of the Arboretum road on Bussey Street to one near the place where South Street turns under the railway divides the two. This line would probably pass along the northeast side of the apple collection, and was approximately on the "headline" of the ancient "second division" of colonial lands. Two sons of William Davis, one of the earliest settlers in Roxbury, occupied the land sometime in the late 1600's or early 1700's, but how they got it, whether by purchase, inheritance, or grant, is unknown. Ichabod Davis owned the triangular piece along Bussey Street, about seven acres on the eastern end of Hemlock Hill, and a piece of the South Street tract. John Davis originally had upwards of 40 acres of the southeastern part of the remainder.

There is practically no information as to land uses in any of the Ichabod Davis records. The property was carried as a farm through several generations, and was finally sold to Bussey in 1832 by Benjamin Weld, the administrator of Ezra Davis' estate. The Whitney map shows it as open ground except for a small extension of timber across Bussey Street from Hemlock Hill.

The first descriptive matter on the John Davis land is in a will probated in 1705, where the following note is found, "... homestead of Upland & Meadow lying on both sides of the Country Road leading to Dedham—Including in it that pt. of Pasture Land and Woodland Adjoining unto John May & Joshua Seivers." It is assumed therefore that the southeastern 40-odd acres of the hill were in pasture and woodland at this time, but the proportions and arrangements of each are unknown. From 1705 to 1843 there is no indication as to
the relative openness of the land nor to its uses except that it continued to be farmed by succeeding generations of Davises until sold to Bussey in 1837.

The northwestern part of Peter's Hill is more obscure as to the history of its ownership, but there is a fairly good record of land uses during the past 200 years or more. Some mention of it has already been made in the description of the natural woods. At the time of the Davis will noted above there were about 14 acres of land in the northwestern corner of the hill area which belonged to John May, but how he came by them is as yet unknown. An inventory of the May estate filed in 1730 describes the 14 acres as pasture. The Morey inventory of 1771 described it as pasture, and it was the same in 1777 when John Davis bought it from the Morey estate. The inventory of John Davis' property in 1802 still noted it as pasture, and it was mostly open land on the Whitney map in 1848. Some rocky land near Bussey Street was abandoned to timber in the very early 1800's, as noted in the discussion of natural woods.

The Davis will of 1705 mentions a piece of Seaver land adjoining the May property, and in a deed given to John Morey in 1740 the Seaver land is also used as a boundary on the southwest. Apparently there was a small piece, perhaps between the burying ground and John May, which was later acquired by John Morey. When the latter bought the larger tract it was noted as 14 acres, and when it was sold it was 17 acres, but no intervening transaction has been found. The cemetery land appears to have come from Seaver property and to have been set off about this time. The first meeting held at the old Walter Street Meeting House was in 1712.

The property of John Davis on Peter's Hill was divided into two parts in 1802. The southern part, about 32 acres, was inherited by his brother Nathaniel, and the northern, about 28 acres, went to a sister, Charity Murdock. Bussey purchased the former directly from the heirs of Nathaniel Davis in 1837. The 28 acres, on the other hand, were sold and resold repeatedly, passing through the hands of six owners before 1833. Bussey purchased it from the last of these in that year. The division made in 1802 has left no evidence on the ground, but over the top of the hill is a low ridge which may have been the base of a stone wall. It is in about the right location for the boundary of the old May pasture.

The whole area south of Bussey Street was brought into the Arbo- retum in 1895. In the same year Bussey Street was straightened and the grades improved. The roadways were finished in 1900, and the boundary plantations in the following year. Also in 1901 groups of
willows and poplars were put in on the southeast slopes, the spruces and firs were planted along Walter Street, and the crab-apple collection was started at the northeastern base of the hill. The great *Cra- taeagus* plantations which cover much of the northeast and southeast slopes were mostly planted in 1906-7. In the late 90's a nursery was started near the top of the hill on the southwest side. Later it was abandoned but a great many plants were left so that there is now a miscellaneous collection of exotic trees which seem to be thriving.

When the Arboretum took over the land there were a few large trees scattered over the northwest slopes. These are now nearly all gone, but their stumps, although large, indicate that they grew very rapidly throughout their lives, evidently in open land, and that they were scarcely if any older than 100 years. Drainage conditions were modified considerably throughout by the building of the roads which now carry a great amount of surface run-off. Major changes were also made at the eastern base of the hill. The road leading out to South Street passes over a large fill which crosses the ravine in which the American apples are planted. A part of the southeastern slope is springy and harbors a native flora peculiar in many respects to wet meadows. A large tract along the railway near the southern corner is devoted to a collection of oaks, and on the hillside above it is a group of young larches.

16. A comparatively recent addition to the Arboretum is a parcel of land between 14 and 15 acres in extent on the north side of Weld Street between Walter and Centre Streets. At present it is free of roads and largely unused, having only some small plantations of conifers put out in 1923.

The earliest clear reference to this property is in a deed from Joseph Dudley to Henry Hatch in 1815, when it was a part of a large farm. The Arboretum purchased it from the heirs of Thomas B. Williams in 1922. Throughout the known history of the tract there are no specific data as to its uses. It continued as farmland, and was without timber when the Whitney map was drawn in 1843.
Plate V. Map of lands in the Arnold Arboretum about the year 1840.
Summary. There is every indication that the larger part of the primeval forest was cleared from the uplands of the Arboretum by 1700. The floristic character of the original woods can only be conjectured since no adequate description of them has yet come to light. Furthermore, all the primeval forest has been so long removed from most of southern and central New England that its reconstruction from remnant examples is out of question in most regions. The nearest approach to such an example in the Arboretum is on Hemlock Hill, but this has been so severely cut over and culled that it cannot be regarded as showing primeval conditions. However, it has probably never been made into pasture nor entirely cleared. Consequently, since the hemlock woods are mostly on the cold northerly slope of the hill where such woods would have been expected in the primitive forest, it is presumed that the original facies has not changed a great deal. A certain mixture of white pine, beech, sugar maple, chestnut, linden, and a few other deciduous trees may have been in the original, but if so it has long disappeared.

The old white oak on the south slope of Bussey Hill gives definite evidence of a more deciduous type of forest, rather xerophytic in character, on this area. Also there is evidence that some of this wood was not cut until the middle 1700's. The presence of several of these old white oaks on the hillside shows that they were more than merely occasional.

From this very scanty evidence we may infer that the original timber was a mixture of the deciduous and coniferous trees of the region in which the latter were most abundant upon cold northern slopes, possibly limited to the steep north face of Hemlock Hill. The deciduous woods were probably disposed in such a way that the more xerophytic trees like the white oaks were commonest either on warm southern slopes or on dry rocky or gravelly knolls.

It is probable that the lowlands were in marsh or wet meadow vegetation rather than bog types when the settlers came because of their relatively good drainage. The fact that they were called "meadows" and utilized as such prior to 1654 is indicative of this. Shrubby or timbered bogs were also cleared and used for hay in this region, as the histories show, and it is not impossible that some parts of the Arboretum meadows had such an origin.

One of the outstanding suggestions derived from the historical study is that the actual plowing and cultivation of the land have not been extensive and have been limited to a few localities. Tracts which have been designated at various times as plowland or hay fields are as follows: parts of the old Thomas Morey land along Centre Street, parts
of the lower northeastern slopes of Bussey Hill, the "plain field" east of the Bussey Institution, and possibly also parts of the land now under the larger conifers, some of the ground on the lower slopes of Peter's Hill, and the area now in the hickory, pterocarya, and neighboring groups. Data on the upper slopes of the southeastern part of Peter's Hill are exceedingly few but is is to be inferred from notes on nearby lands of similar nature that it remained in pasture for very long periods. Other parts of the upland may have been plowed and planted for short times but there is no evidence of a long period of cropping which would deprive the soils of their native raw food materials. The records of land holdings and uses, therefore, suggest that the major soil changes due to human occupation during the 230-odd years before the founding of the Arboretum were caused by the clearing of the original forest and the maintenance of open pastures or orchards for long periods. The past 150 years have seen further important modifications on the areas which have been allowed to revert to timber, while during the past 60 years the development of the Arboretum itself has effected changes in many more of the upland soils.

The oft-repeated expression that the Arboretum has been grown upon "worn-out" farm land is true then, judging by the historical findings, only in the sense that the soils of the area have lost some of the qualities originally given to them by the long-standing primeval forest; and that they have been compacted and the distribution of the elements in their layers modified. But they do not seem to have been unduly subjected to surface washing nor to a depletion in mineral salts. In other words the edaphic conditions on the uplands may not be so far removed from those which occurred in the original forest as is generally supposed; and any attempt to build up these soils by feeding or aerating them must take into account their original close mineral relationship to the relatively poor surrounding soils of the region rather than to a former, supposedly better, condition within historic times. Further light is thrown on this matter by the fact that the Arboretum's most successful plantings, among which are the groups of leguminous trees, river birches, lilacs, hickories, pterocaryas, the larger conifers, and possibly also the crab-apples are mainly on lands which seem to have been most cultivated during earlier periods rather than on soils not so utilized.

The chief effect upon the upland soils caused by the development of the Arboretum, other than that immediately upon the spots dug up for planting, has been to change an artificial grassland type of vegetation into one of semi-open woodland, or savannah, in which much of the grassland type is maintained. In some cases, as in the oak col-
lection, one wood has been replaced by another of similar nature. Other important, though local, changes have been along roadways where soil has been removed or added in the building of embankments. The lowland soils have been greatly modified of course by the repeated lowering of the water table. The linden and horse-chestnut collections are possible on their sites largely because Goldsmith Brook has been so controlled, and its bed lowered to such an extent, that the semi-peaty soils have become available.

There has been no uniformity in the manner of the Arboretum’s plantings. Some of the earliest ones were made with a great deal of care, using large holes in which rocks, gravel, and sand were replaced with loam and peat. The loam so used was brought from outside the Arboretum and the peat was cut from the low ground where the ponds now are, or from the north meadow. Most of the plantings made before 1887 appear to have been of this nature, but later ones did not involve so much modification of the existing soils. In recent years the condition of some plantings has been improved by the application of manure.

Between 1879 and 1886 nearly 2300 squares of peat were cut for use in improving the soils of the planted areas, and 2000 more were excavated in 1891-2. There is no further record of the cutting of peat until 1921-2 when that which came from the pond in the South Street tract was utilized. There is no evidence in the old deeds or probate records that peat was cut for this purpose in earlier times, although there is a deed from Eleazer Weld to a man named McCarthy in 1784 giving to the latter the right to take peat out of the north meadow for fuel purposes.

The small proportion of tillage land indicated by this study of the old farms is substantiated by historical investigations of all southern New England agriculture as it had developed before 1800. P. W. Bidwell, in his Rural Economy in New England at the Beginning of the Nineteenth Century,¹ has an excellent summary of the early growth of agriculture in this region. The individual farms, particularly those of inland towns, were nearly self sufficient economic units, and the farmers persisted throughout most of the first 180 years of the colony in the use of the most antiquated methods, being far behind the mother country in that respect. The chief reason for their failure to evolve better practice appears to have been the lack of markets, and consequently the lack of an incentive to improve production. The only areas in which such an incentive was present to any marked degree

were around the more important coast towns. West Roxbury might be classed as on the less favorable border line of the latter group, not so much due to its position as to its hilly, rocky surface and the small amount of its good soils. Bidwell (p. 320) quotes a letter written by a General Warren of Massachusetts in 1784 comparing English and American farms. "A man in America that farms 150 acres, would think a stock of £150 sufficient. One miserable team; a paltry plow, and everything in the same proportion; three acres of Indian corn, which require all the manure he has; as many acres of half-starved English grain from a half-cultivated soil, with a spot of potatoes, and a small yard of turneps, complete the round of his tillage... All the rest of the farm is allotted for feeding a small stock. A large space must be mowed for a little hay for winter; and a large range for a little feed in summer. Pastures are never manured, and mowing lands seldom;..." A typical inland farm, according to Bidwell's studies (pp. 321-2) consisted of 100-200 acres, "...divided into three roughly equal tracts, one-third being woodland, including wasteland, one-third pasturage, and the remainder divided between mowing lands and cultivated fields in varying proportions. The land under tillage, however, hardly ever exceeded ten or a dozen acres, except in the neighborhood of such commercial towns as would furnish a market."

An instance of the latter is cited in Brookline where, on a farm of 100 acres, "...12 were in woodland, 20 in pasture, and 68 in mowing, tillage, and orchards." The condition of the Arboretum farms evidently stood somewhere between the two extremes.

The large number of orchards mentioned in the old deeds is also worthy of comment. Further quoting Bidwell (p. 334), "...every farm had an orchard of several acres, containing a hundred or more trees. The abundant yield of these trees seems to have been used principally for making cider... The orchards suffered much from lack of care. After the original planting, practically nothing was done to preserve the trees or increase their yield except to allow cattle to pasture among them and, very rarely to plow between the trees."

The latter part of the 18th and the early part of the 19th centuries witnessed large improvements in New England agriculture brought on mainly by the development of the industrial towns and the resulting growth of a market for produce. Most of the Arboretum farm land was prevented from immediately profiting by these advantages for at least two reasons. First, in the period between 1783 and 1806 the three large properties of which it was then mainly composed (Davis, Weld, and Morey) were either sold in large or small units, or divided up among a larger number of legatees. The relation of this period to
the abandonment of the areas now in natural hardwood stands has already been mentioned. Second, Benjamin Bussey appeared on the scene in 1806 to begin the series of purchases which finally united most of the land. Bussey was a wealthy merchant and manufacturer who appears to have bought the ground as a site for a home in which he could retire during the later years of his life. The interest in agriculture and horticulture for their own sakes which led to his unique gift to Harvard College seems to have crystallized late in his life and was probably actuated by the increasing current interest in these fields throughout New England as a whole. At any rate, there is little evidence that either during his own life or during the period in which the land was owned by his heirs (1842-61) there was any major change in agricultural practice on the land. The impetus given to farming in the region as a whole by the growth of the industrial towns was destined to be short-lived in any event due to the opening of western lands and to improvement in the transportation of more cheaply produced foodstuffs.

It may be said, therefore, that the data thus far accumulated on the early uses of land in the Arboretum may be closely correlated with the major developments in the rural economic history of this part of New England.

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