People are often surprised to learn that a few conifers, rather than being evergreen, lose their foliage in the winter. In fact, I am told that when the larch trees (Larix sp.) on the Harvard campus begin their autumn leaf drop there is a flurry of concerned telephone calls inquiring after the health of the trees and what can be done to stop the defoliation.

While the deciduous species of Larix, Metasequoia and Taxodium are known to many, few people know or grow the rare Chinese tree known as golden larch (Pseudolarix amabilis). This common name describes the fall foliage color of bright golden-yellow which begins with the first crisp frost and ends when the last needle is carried away by the autumn winds. It is difficult to describe the autumn color adequately for while the golden shade is rich in itself the color saturation is intensified on clear days when the sun, as a result of its low arc in the autumn sky, produces mellow light conditions. It is because of its suffused autumn colors that the Chinese call it either Kin-ye-sung “golden-leaved pine” or chin-lo-sung, “golden deciduous pine.”

Our grove of six golden larch trees growing along either side of Bussey Brook near the Walter Street gate is worthy of attention, not only in fall. In spring, the warm days stimulate new growth. Emerging leaves are a soft yellowish-green and the small, yellow, male cones are produced in dense clusters at the ends of short, spurlike branches. During the summer, leaf color is a pale emerald green which gradually gives way to golden autumn hues. Color change in the needles...
A superb group of one young and five mature specimens of Pseudolarix grows along either side of Bussey Brook near the Walter Street gate to the Arboretum. Having trees of different genotype and provenance allows adequate pollination by wind and results in an abundant seed crop every other year. Photograph by G. Koller.
begins at the outer tip and progresses inward briefly giving the effect of a green eye surrounded by gold.

During alternate years its large crop of female cones is extremely ornamental as the individual cones have thick cone scales which are arranged in such a manner as to resemble artichokes. In the immature state they are a pale green and as they ripen, in mid-October, they become a light tan. As the cones dry the scales loosen from the central axis so that the whole structure falls apart. Two seeds adhere to each cone scale and as the cones shatter the seeds are dispersed by the wind.

In the winter the tree presents an elegant silhouette for the trunk is straight and tapers gradually to the tip. The branches are widely spaced, thin in diameter and basically spread from the tree in a horizontal or slightly upthrust angle. Mature lower branches are clear of growth near the trunk with smaller branches and foliage presenting themselves on the outer one-third to one-half of the branch. The outermost branch tips are horizontal or slightly upturned. The upper crown is densely branched, with more upright branches, so that old trees have a flattened top which gently blends with a graceful curve into the more sparsely spaced side branches.

During the summer the foliage density is thin and as a result directly beneath the tree one can find spots of sun shining on the lawn. Grass grows directly up to the trunk and there is no evidence in any of our plants of surface or shallow rooting. Spacing to create landscape effect is often critical to the visual and spatial quality of a mature grove. Our grove of trees is planted on 30-35 foot centers which allows the plants adequate space to develop a full canopy without crowding, while enabling the outer branches of individual trees to touch, providing, in effect, a continuous ceiling. Beneath mature trees with their open canopy one could establish perennial plantings of ground covers, herbaceous plants or taller woody species such as azaleas, Leucothoe, Skimmia or low growing hollies. Landscape architects who seek plants with an open airy crown at maturity should consider using the golden larch.

Bark on the trunk and major stems of mature specimens is distinctive as it is broken into a series of irregular plates separated by deep ridges with color varying from gray brown to reddish brown. Young stems and branches are smooth and gray brown.

I have observed a great variation in growth rates for this plant. While some twenty year old plants are little more than 6-8 feet tall and have a sickly yellow green summer color, others grow robustly, and at the same age are 18-25 feet tall with emerald green foliage. Of those plants which were languishing most were growing on soil with a high lime content or on limestone seams of rock. Notes in the English literature appear to confirm that they are lime intolerant. However, this needs to be more substantially documented by controlled growth experiments.
Right: The leaves are arranged in a whorled pattern at the end of a short spurlike branch. Below: Cones are abundant every other year and are generally grouped or clustered along the upper surface of the branch. Cones ripen in the autumn of their first year. Photographs by G. Koller.
Cones which resemble artichokes in appearance change from light green to tan as they ripen in mid-October. At full maturity the cone becomes deciduous and the whole structure shatters, scattering cone scales, with two adherent seeds, in the wind. Photographs by G. Koller.

At the Arnold Arboretum we have access to plants of different ages from which to derive observations on growth rates. In mid-February 1980 seeds were germinated at the Dana Greenhouses. Individual seedlings were transplanted from a crowded seed pan into individual 3 inch pots and by 1 October averaged 4–7 inches tall. Eighteen-year-old plants, well established in our permanent plantings, exhibit 16–22 inches of new growth on terminal and lateral branches. An examination of several mature trees 90–120 years old produced evidence of 4–8 inches of new season growth. Growth observations of several seedling batches presently at the Arboretum is deceiving as one batch was partially eaten by rabbits and in another progressive transplanting and crowding resulted in an exaggerated lack of vigor.

In order to document sources, age, and growth rate I took the following measurements from plants existing in our permanent collections on 1 October, 1980:

1. Accession Number 3656: acquired as plants of an undetermined size from Veitch and Sons Nursery in Chelsea, England in May, 1891.
   Plant A — approximately 40 feet tall, 42 feet wide with a d.b.h. of 2 feet. New season growth was 4–8 inches long.
   Plant B — approximately 45 feet tall, 42 feet wide with a d.b.h. of 2 feet. New season growth was 4–6 inches long.
   Plant A — approximately 40 feet tall, 45 feet wide with a d.b.h. of 1 foot 9 inches. New season growth was 4-6 inches long.
   Plant B — approximately 42 feet tall by 55 feet wide with a d.b.h. of 2 feet 4 inches. New season growth was 4-6 inches long.

   Plant A — Has a notation that this plant was 30 feet tall in 1946. It is now 40 feet tall, 42 feet wide with a d.b.h. of 1 foot 6 inches. New season growth is 4-8 inches long.

   Plant A — approximately 20 feet tall, 18 feet wide with a d.b.h. of 5 inches. New season growth was 4-6 inches long.
   Plant B — 25 feet tall, 28 feet wide with a d.b.h. of 10½ inches. New season growth was 4-6 inches long.
   Plant C — Not measured since it is alive but displays little vigor, greatly reduced growth and sickly yellow-green summer foliage.

   Plant A — 18 feet tall, 16 feet wide with a d.b.h. of 2½ inches on the larger of two stems. Average new growth is 16 to 22 inches long.

These growth rates are compared to a venerable old specimen which presently grows on the lawn along the driveway across from the main house at the Hunnewell Estate in Wellesley, Massachusetts. This tree is undoubtedly the parent of our trees acquired from H. H. Hunnewell in 1896. On our behalf, Walter Hunnewell traced the origin of the plant and the records indicated that it was acquired as a seedling in a 4 inch pot from Veitch Nursery in 1866. In tracing the history of this tree we believe it was first mentioned in notes prepared by H. H. Hunnewell for the March 1867 issue of the American Journal of Horticulture when he says he has small plants. The next reference to this plant is recorded in Life, Letters and Diary of Horatio Hollis Hunnewell (1906. Vol. 3, pp. 127-8) with a 1905 notation as follows: *Pseudolarix kaempferi*, 35 feet tall with a trunk 4 feet in circumference and a spread of branches of 37 feet. This tree has produced seeds for many years and many seedlings have been raised from it.” The tree has been measured annually since 1921 and Mr. Walter Hunnewell reports that in 1921 it had a circumference of 5 feet 6 inches and in 1979 after 58 years this had increased to 7 feet 11 inches. In October, 1980, this tree estimated to be 115 years old is
At 115 years, this specimen of Pseudolarix, at the Hunnewell Estate in Wellesley, Massachusetts, is one of the original and oldest of its species in North America. As of October, 1980 it was approximately 55 feet tall with a spread of 50 feet. Its circumference as of 1979 was 7 feet, 11 in. Photograph by G. Koller.
approximately 55 feet tall with branches spreading 50 feet. The lowest branch which sweeps the ground is 3½ feet above the soil level and it spreads outward 36 feet from the trunk. This bottom branch has a diameter of 10 inches at the point where it is inserted into the trunk. Most of the branches on the driveway side of the tree were lost due to ice storm damage in 1921. As of October 1st the cones are beginning to ripen but the cone scales are still firmly attached. A quick visual examination indicates that despite a few damaged branches the tree remains sound and healthy.

In examining all of the trees reported on, I checked for signs of insects or disease. Leaves were, for the most part, intact with little to no bite or chew marks. However, the foliage of one specimen exhibited tiny, circular, randomly spaced, yellowish spots which were evident only on close examination. This may indicate a fungus infection or perhaps damage by an atmospheric pollutant.

The hardiness potential of *Pseudolarix* in both its northern and southern ranges seems to be inexactly defined. It is being grown at the Strybing Arboretum in San Francisco as listed in their 1979 guide to plants. Northern limits may not have been fully explored for it is fully hardy at the University of Illinois in Champaign-Urbana where winter temperatures drop to –20° F. Dr. Lyle Littlefield, at the University of Maine, at Orono, where average minimum winter temperatures average –20° to –25° F. reports that seedlings 6–8 inches tall survived only to the snow line. He felt that young seedlings lacked the ability to harden off properly and perhaps older and larger plants would have been more successful. At the Landscape Arboretum of the University of Minnesota, Dr. Harold Pellett has done laboratory controlled hardiness testing and has determined the lowest survival temperature of stem tissue to be –45° C. Perhaps this indicates that under cultivation, the tree has not yet found its way to the most northern limits of hardiness.

The fact that this tree still remains rare and little grown in North America may be due to the paucity of published information in horticultural books and periodicals. Perhaps a more important reason is that most trees reported in cultivation seem to have a low or erratic history of seed production. I believe that this is due to a lack of cross pollination, since many old specimens are grown as lone representatives of the genus in any geographical area. At the Arnold Arboretum the grove of *Pseudolarix* distinctly alternates in cone productivity year by year, but on good years we get an abundance of viable seeds. From our 1979 seed collection we distributed thousands of seeds and seedlings to nurserymen in addition to the autumn 1979 plant distribution to Friends of the Arnold Arboretum. Optimum germination of seeds takes place after 30–60 days of cold stratification at 40° F. Although we have attempted propagation by cuttings our experiments have never been successful. Should any readers have success with
cuttings we would appreciate information about the techniques used to produced positive results.

The literature indicates that there are several distinct selections being grown. However, a survey of the computer file of the Plant Science Data Center in Mt. Vernon, Virginia, failed to reveal any institution in North America which grows any cultivars or plants which vary from the type. In reviewing the literature, I wonder how many of those plants described separately actually exist today. In the Manual of Cultivated Conifers by den Ouden and Boom (1978, pp. 366-68) the cultivar 'Anseleyana' is described as dwarf and bushy, but in 1964 the type plant at Castlewellan in County Down, Ireland was described as over 100 years old and 30 meters tall. The cultivar 'Dawsonii' described as a dwarf conical shrub was raised from seed of a normal sized tree in the Hunnewell Pinetum by J. Dawson of the Arnold Arboretum in 1895. This tree no longer survives nor do we have any progeny. Perhaps it exists elsewhere. The cultivar 'Nana' is described as a artificial dwarf and from this I take it to mean that it's dwarfness was maintained by techniques similar to Bonsai. From indication of the early literature describing this tree it has long been popular as a dwarfed pot plant in China. We have plants in our collection raised from seeds collected from 'Nana' and today they are normal sized trees.

In terms of growing environment the tree grows best with an exposure of full sun but it seems to be tolerant of light shading. In the wild, seedlings normally develop in the shade of neighboring trees rather than with an exposure of full sun. As to soil conditions it seems to prefer a well drained, lime free soil.

Landscape use of this tree certainly could be more extensive. It not only makes a superb specimen tree but it is even more spectacular as a grove planting. Several people have expressed a dislike for this tree in the home landscape because it becomes too large, yet the same people plant maples, elms and lindens which grow as large or larger. It seems to me that those who would like a tree under which they can build a garden, should eagerly explore the use of this conifer. Golden larch should also be tested for its adaptability to urban growing conditions since its deciduous nature might reduce its susceptibility to salt and chemical pollutants. The fact that the needles are tiny and that the cones shatter into many segments would diminish their nuisance potential in regard to litter. And finally, the open airy canopy of a mature specimen would allow light to penetrate nearby windows while providing some shade for adjacent structures.

The correct scientific name of this plant has been a subject of dispute since it was first described. Most references list it as Pseudolarix kaempferi, while our taxonomists feel that it is more correctly called Pseudolarix amabilis, and so I have called it throughout this article. See references by Tjaden, Hara, & Brummitt, and Nicholson cited in the reference list.
A. A. 3656-B, acquired May, 1921 from Veitch & Sons Nursery in Chelsea, England. Current d.b.h. is 2 feet and height is 45 feet. Note the plated bark, widely spaced branching pattern, and the angle at which branches are inserted into the trunk. Photograph by C. Lobig.
If at this point I have aroused your interest in growing this golden larch you will need a source of plants or seeds. Landscaped sized plants are available from Weston Nurseries, Hopkinton, Massachusetts 01748; one year seedlings from Groundnut Hill Nursery, Inc., Logging Road, Cape Neddick, Maine, 03903; and seeds are available from F. W. Schumacher Co., South Sandwich, Massachusetts 02563.

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Reference List
