Rejuvenating and Reshaping the Larz Anderson 'Chabo-hibas'

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The compact hinoki cypresses (*Chamaecyparis obtusa* 'Chabo-hiba') in the Larz Anderson Collection are the elder statesmen of bonsai, the high priests whose secrets we had to learn before approaching them with tools in our hands. In their early youth, two or three centuries ago, their supple trunks had been wrapped around canes; their young branches pruned and tied into fanciful shapes, their foliage trained to form cloud-like layers. As the trees matured, the trunks and branches strengthened until their twisted shapes evoked coiled snakes trying to break free from the calm order and visual stability of the canopy or, perhaps, the violent energy of Mount Fuji's volcano held in check by the stable mass of the mountain.

By the time we began our restoration work in 1999, some of the trees' original branch structure had been destroyed—partly by nature, partly by man—but the essential design and conceptual intent were still evident. For a Western bonsai artist of the twenty-first century, the notion of restoring a collection of eighteenth-century bonsai was a humbling prospect. Rather than impose on these venerable masterpieces a twenty-first-century bonsai aesthetic, we hoped to restore their visual power by recreating the original design. It was not only the great age of the trees that gave them that power but also the masterly training and care they had received for so long.

Rejuvenation Regime

When working with ancient plants like these, the restorer must spend a few years observing and learning from them before attempting major reshaping. In 1999 these trees were stable and healthy but not vigorous, so the first task was to rejuvenate them. We began by addressing the question of fertilization: changing the regimen from a dose of dilute chemical fertilizer every two weeks to an application of dry organic fertilizer pellets to the surface of the pots every three months. We got noticeable results within the first year—foliage color improved and growth became more robust. This regimen is now the standard practice for all the trees in the collection.

The second problem concerned the amount of light the trees received. When the lath house was built in 1962 it provided the ideal balance between sun and shade; over time, however, the surrounding white pines had become large trees, creating far too much shade. Almost all the trees in the lath house showed the effects of insufficient light in weak or lost lower branches, strongly vertical growth of new shoots, pale foliage, and the absence of inner adventitious growth. By happy coincidence, the offending trees were removed to make way for the Leventritt Garden of Shrubs and Vines. Here again, after only a year the improvement in growing conditions was visible in better foliage color and stronger adventitious growth.

Repotting the 'Chabo-hibas'

The third and most important part of the rejuvenation process—and the most difficult—was improving the condition of the roots. The central core in each pot was, and still is, a compacted block of centuries-old loam. (Much of it will remain there forever since it would be impossible to replace it without severely damaging essential roots.) The only area available for roots for annual growth was in the fresh soil that each tree received every three to five years during repotting, and it was here that changes were needed.

The volume of soil replaced at each repotting had been minimal: an outer shell no more than two inches thick. For large trees in such large

The rootball of 'Chabo-hiba' 878-37 is showing signs of needing to be repotted. The parallel lines of root growth are due to the presence of grooves in the pot which directed the roots downward towards the bottom rather than around in a circle as is the case with more typical containers.

containers, this was barely enough to maintain a minimal level of health and totally inadequate for regaining and maintaining vigor. Each year the roots had pushed upwards toward the surface in an attempt to escape the inhospitable conditions below. Once on the surface, they accumulated dust and detritus, in effect creating another layer of soil. Gradually the soil level had risen until the lower inch or two of the trunks was engulfed. By first lowering the surface of the soil to its original level (or even lower) we were able to use slightly shallower containers and still gain valuable space for fresh soil below the roots.

To increase the volume of new soil introduced when repotting, we had to remove more of the original soil. But rather than arbitrarily cut away "pie slices" of the root ball, we adopted a far more cautious approach. We carefully remove the soil introduced during the previous repotting and comb out the roots to avoid excessive damage. Then we use a hose to wash away loose portions of the original core and reveal the more accessible areas around the exposed root ball. These areas are then carefully excavated in an operation that more closely resembles an archaeological dig than a horticultural exercise. In addition to copious amounts of lifeless clay, we have unearthed rocks, brick fragments, and pottery shards. With each repotting the volume of additional new soil increases. When we have finally removed around fifty percent of the original soil, the excavations will cease.

We also made changes in the growing medium. The commercial bonsai soil we used for the first few repotting cycles was made of calcined clay, sand, and decomposed organic matter. None of the ingredients had been sifted

On old, pot-bound 'Chabo-hibas' the roots often grow upwards around the trunk. It is important to remove these girdling roots when repotting the plant. In this picture, taken in 1996, the removal of upward-growing roots exposed a full two inches of truck that have previously been buried.

and the organic matter in particular was little more than dust that tended to clog the air spaces among the larger particles. This soil—designed primarily for high-volume nursery production of tropical and subtropical plants—was unsuitable for long-term cultivation of hardy bonsai. The 'Chabo-hibas', in common with all the trees in the collection, require a growing medium with a coarser, more free-draining structure. The current recipe seems to be working well: 50 percent akadama; 20 percent calcined clay; 20 percent grit; 10 percent organic matter.

Akadama is an untreated, surface-mined, clay-like mineral with a granular consistency that it retains for many years, even when constantly wet. When *akadama* finally does break down into finer particles after some years, it does not become compacted, as do clay, loam, and even peat moss. In addition to structural stability *akadama* offers the advantage of allowing the roots to grow into and through the particles, not only around them, thus maximizing the volume and nutrients available for root growth.

Calcined clay, in this instance Turface®, is a clay that has been heated enough to drive structural moisture out of the grains so that they will not soften or break down when wet—but not so much as to reduce their porosity. These grains absorb a large volume of water and release it gradually and evenly to the roots. Grit is used to maintain good drainage and to prevent compaction. Although the pots are large, the grit used is an eighth-inch aggregate of well sand #3. Larger particles would obstruct root growth while doing little to help drainage.

The ten percent of organic matter is supplied in the form of decomposed pine bark that binds with the minerals in the fertilizer to create a medium that not only supplies nutrients to the plants but also encourages the growth of beneficial microorganisms, which also helps to break down the outer edges of the remaining original soil. At each repotting, organic matter from the old root ball is salvaged and reintroduced with the new ingredients.

Restructuring the 'Chabo-hibas'

As the trees' twisted branches had increased in girth over time, they had also straightened somewhat, a perfectly normal phenomenon in all conifers. In addition, they had grown outward and lost many of their inner branches. Consequently, each branch ended in a tuft of foliage far from the trunk, with no spatial relationship or harmony among the tufts. These remote tufts of foliage needed to be brought closer to the trunk and once again consolidated into clearly defined layers, and the trees' silhouettes needed to be restored to the denser and more stable pyramidal form of the original design, instead of the open, irregular shapes they had taken on.

Colin Lewis is seen here using water pressure from a hose to wash away the old soil from 'Chabo-hiba' 877-37, exposing the plant's dense, fibrous root system.

The branches of old specimens of 'Chabo-hiba' are often extremely contorted as a result of their slow growth and the annual pinching they receive

In spite of their great age, the trees had responded to the new soil and fertilizing practices within a year of repotting. However, it was three years before the new growth on the larger specimens was extensive and supple enough for training work to begin. Meanwhile, I was able to work on the three smaller trees and learn a great deal about the way 'Chabo-hiba' responds to various training techniques. One of the most surprising discoveries was that once the tension provided by multiple layers of dead bark has been removed, even hundred-year-old branches well over an inch thick are astonishingly pliable—a crucial factor in enabling us to restore the original design.

We quickly learned that normal wiring techniques, using annealed copper wire, are very effective on branches up to three-quarters of an inch thick. We knew from the texture of the bark that the branches varied in age, but age seemed to make little if any difference in their response to being bent with wire. For example, a six-inch length of a branch a half-inch thick would accept an initial bend in the region of forty-five degrees and a quarter-inch thick branch would bend beyond ninety degrees, both seemingly regardless of age.

On larger branches, the very heavy wire and significant pressure needed to effect a bend might have resulted in scarring. We therefore pulled these branches into position with fine tension wires attached to other parts of the tree. Normally this method introduces gentle curves over the entire branch, with the branch requiring a long time to adopt its new position. Sharper curves adopt new positions much faster and, in this case, sharp curves were our aesthetic goal.

Where possible, then, we worked to sharpen the existing curves, focusing the entire bend more efficiently in a limited area and thus reducing the setting time. Manipulating the branch at the point of the bend before applying the tension wire and again when tightening it helps significantly to concentrate the bend at one point. The wire usually remains on the tree for about four months, the time necessary for the branch to produce a new layer of wood. Beyond four months the damage to the bark may become too severe. If the tree is not particularly vigorous, the wire may stay on the branch for up to a year.

In one instance we successfully used a more drastic technique to lower a branch that was too thick and too short to respond to any other method. After cutting a fifteen-degree notch into the underside of the branch through about half its diameter, we pulled it down with tension wires until the cut surfaces of the notch were in close contact and under pressure. This was done in early June 2005; as of October 2005, no adverse effect on the health or vigor of the branch is evident and the two sides of the notch appear to have bonded perfectly. The tension

wire will remain undisturbed for another growing season.

The speed with which the branches adopt their new position, regardless of their age or position on the tree is another remarkable property of the 'Chabo-hiba' cultivar. After four months, most branches of a quarter-inch or thinner have set more or less permanently. Thicker branches with more severe bends can also set within four months although a second wiring is applied to consolidate the new position. This rate of setting contrasts with that of spruce, fir, and many species of juniper and pine, some of whose branches can take more than six years to become fixed in a new position.

Pruning the Branches

Occasionally it has been necessary to remove a part or all of a heavy branch. Here again we adopted a cautious approach out of respect for the age and value of these trees. Removing too much foliage from a branch at any one time can seriously weaken it or even cause death, especially in the case of older trees with complex compartmentalization of the vascular system. Therefore, we do the work in stages, cutting away the targeted areas bit by bit. It is important to leave enough healthy foliage to sustain the balance and vigor of the branch as a whole. As more growth develops on the desirable portions of the branch, more of the undesirable portions can be removed.

Removing entire large branches is also a gradual process. We first weaken the branch by cutting away up to seventy percent of its foliage; we then continue to cut back new growth to further reduce the vigor of the branch. After one year, the branch can safely be cut back to a short stub, which then remains untouched for yet another year. At that time it is cut as closely as possible to the trunk unless, as we have seen in some instances, the vascular system at the base of the stub—known as a collar—is too complex or too fragile. In these cases the stubs will remain in place for the foreseeable future.

From time to time some of the smaller branches succumb to competition from their stronger neighbors and begin to deteriorate. New growth is reduced to almost nothing and the foliage becomes pale and inactive. This is not a tragedy; rather, it is the tree deciding for itself which branches it wishes to rely on for the future and which it has no further use for. This helps us greatly by telling us which branches to discard and which to maintain. Furthermore, since the tree has spontaneously decided to bypass these branches, they can be removed instantly and without ceremony.

Refurbishing the Foliage

Once the branches have been repositioned, we can begin remodeling the dense foliage layers, often referred to as clouds. Almost without exception, this calls for reducing the canopy's height and increasing its width to achieve a more horizontal appearance. Height can easily be reduced by pruning out strong vertical smaller branches and repositioning the more flexible lower growth. Foliage on lateral branches is left to grow freely until the extension shoots are robust enough to wire into position. This process took three years for the first trees we worked on but currently, thanks to the trees' continually increasing vigor, shoots can reach this stage in two years.

We use fine pruning for a variety of purposes: to eliminate weak shoots and give the healthier shoots more room to flourish; to direct future growth to where it is needed; and to eliminate growth where it is not needed. This kind of pruning is also used for other bonsai, but the foliage of the 'Chabo-hibas' presents its own unique challenges and rewards. For example, unlike many species of *Chamaecyparis,* whose foliage fronds or fans are presented in different planes, 'Chabo-hibas' (at least when grown in containers and heavily pruned) tend to present their fronds on a horizontal plane in all parts of the tree. It is hardly ever necessary to reposition wayward fronds with wire—they are so few in number that they can usually be cut away; and once any zone of foliage has settled into "horizontal frond mode" very few, if any, vertical fronds are produced.

An important part of foliage manipulation begins in late summer. At this time, a typical new shoot comprises two or three small (less than half-inch) recurved fronds at the base, then two or three medium-sized fronds up to an inch across and, overlaying all these, a spread-

The mature shoots produce branchlets which overlay each other like tiles on a roof. The upper branchlets are larger and more vigorous than those below. By snipping off the larger upper branchlets and leaving the smaller and less vigorous lower ones, the foliage can be encouraged to become more dense and finely textured. At the same time, any branchlets that are not horizontal are removed.

ing terminal frond that expands to a diameter of two inches or more if left unchecked. To increase bulk and encourage fine branching, we remove the terminal fronds entirely, leaving the two medium-sized fronds intact. These will develop during the following year into duplicates of the parent shoot, with equal vigor and size. Although slow, this process builds a more sturdy and organized network of smaller outer branches than merely allowing the foliage mass to expand without control.

With trees of this size, every process from branch shaping to fine pruning can be carried out simultaneously on different parts of the tree. The final process, however—building density—can only begin once the branch terminals are sufficiently balanced over the entire tree. Foliage density is needed not only to create a neater and more defined bonsai image, but also to allow the large clouds of foliage to be divided into smaller interrelated sections, giving the tree a more massive and more vibrant appearance.

So when the branch terminals have been properly established, we return to the shoots in late summer, this time cutting away almost the entire shoot and leaving only two of the very small, recurved fronds at the base. These fronds seem to be of a different nature from the others, as if destined to remain small. Their growth is slow but robust. Extension is rare and is usually confined to one terminal, which is easily pinched off. Rather than try to extend these small fronds, the tree responds to the loss of a shoot by producing more small fronds from other internodes. Eventually the foliage becomes so dense that we must thin out some of the heavier branch terminals and allow younger inner growth to replace them.

This density-building technique has worked well, first on the small cascade (#101-69) and then on the two medium-sized trees (#880-37; 890-49). The larger specimens have not yet reached the stage of density building, although that time is near.

Ongoing Maintenance

The gradual process of old soil removal will continue, ideally for several decades, until it is complete. Even after that, however, the roots should receive ongoing care and structuring in much the same way as do the branches. As new roots develop closer to the trunk, some of the heavy pieces at the extremities of the root ball can be removed. The eventual goal is to have the majority of the root ball consist of healthy young roots.

Restructuring the branches on the large trees will take perhaps another three to five years after which the focus will be on building foliage density. From that point forward, the trees will be maintained by a sort of micromanagement

The foliage of 'Chabo-hiba' becomes tight and dense as a result of annual pinching.

Peter Del Tredici is seen here using a chop stick to tamp new soil around the older portion of the rootball of 'Chabo-hiba' 879-37, which he was repotting in March, 1996.

that includes cyclical thinning and replenishment of branch terminals as well as selective fine pruning to guide foliage growth in anticipation of future thinning.

Overwintering

In the milder parts of the United States, as in much of Japan, bonsai can be left out-of-doors all winter with only minimal protection from the elements. In New England, however, even though 'Chabo-hibas' are hardy in zone 5, the plants need to be protected from the cold. A plant that is perfectly hardy growing in the ground is not as hardy when grown in a container above ground and surrounded by air. This is because the soil, which has great insulating power, never gets as cold as the air, which has no insulating power.

The Arboretum bonsai are stored in a windowless concrete-block structure for the winter. The temperature in the building is maintained between 33 and 36 degrees Fahrenheit, and the plants are checked for water once a week. In general, they need watering about once a month. Extreme care is taken to keep the plants from drying out during storage; it can be difficult to rewet them come spring. On the other hand, if the plants are kept too wet during storage, they become susceptible to fungal infections.

As long as the temperatures remain below 36 degrees, the plants survive in total darkness (and, surprisingly, continue to need water). However, such dark storage will not work at higher temperatures. The key to successful winter storage is to make sure that the plants are fully dormant before they go in and that they come out before they show any sign of growth. Traditionally, the plants went into cold storage on Armistice Day (November 11) and came out on Patriots' Day (April 19), but in recent years these dates have shifted to a week later in the fall and a week earlier in the spring as a result of changes in the weather.

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Yokohama Nursery Company Instructions for Growing Dwarfed Trees

The Yokohama Nursery Company Catalogues issued between 1901 and 1922 all contain the identical instructions for how to take care of the dwarfed trees that the nursery sold. This information is historically significant for being among the earliest English descriptions of how the Japanese took care of the plants. The instructions are reprinted below in their entirety. According to Dr. John Creech, these instructions were most likely written by Mary Unger, the American wife of Alfred Unger, the German horticulturist who operated the Louis Boehmer Nursery Company in Yokohama from 1890 through 1908.

Dwarfed Trees Growing in Jardinières and Their Cultural Directions

Treatment of *Thuja obtusa*. During spring and summer, by preference keep this plant in a sunny airy situation where the wind will pas freely through the branches; water once a day giving just enough to make the soil moist; in dry hot weather it may be necessary to give water twice a day. Care however should be taken not to have the soil wet and never water unless the plant needs it. Watering overhead in dry weather is bad but rain is always beneficial. During winter keep the tree in a cold greenhouse partially shaded, or in an unheated orangery, giving water about once in 10 days; the soil however much never be allowed to get dry. (The science of successful culture of all plants in pots consists in judicious watering, giving too much or too little is equally bad.)

Treated as above this plant is very ornamental on balconies, terraces, etc. If this plant is kept indoors, it should always be placed out-of-doors at night and as often as it is not wanted for decoration. Indoors it should never be exposed to the dry heat from a stove or open fireplace, otherwise the leaves will drop off and the plant perish.

Pinus pentaphylla and pine trees in general growing in jardinières require the same attention in watering and general treatment as *Thuja obtusa* but are not so much influenced by atmospheric conditions; nevertheless sun and air are necessary to maintain health, therefore keep the plants out-of-doors as much as possible.

Maples and other deciduous trees take the same treatment as *Thuja obtusa* as regards watering, but are much more accommodating than evergreens; in fairly mild climates the maples may remain out-of-doors all winter, but where the frost is very severe they should be kept in a cool cellar after the leaves have fallen in autumn; the soil must always be kept moist but not *wet*; early in spring put the plants out-of-doors and fully exposed to all weathers and when in full leaf use for decoration indoors as needed.

MANURING: When the trees commence growing in spring, we give manure twice a month, say March, April, May and June, again September and October. In the hot days of July and August, we give no manure and the same in winter and early spring, the plants then being at rest; the best manure is finely powdered oil cake or bone meal. To a jardinière one foot in diameter we give 3 or 4 large teaspoonfuls *not heaped* of this dry manure spread evenly around the edge of the jardinière; a

larger or smaller jardinière will require more or less. For a small jardinière, say three inches by six inches, half a teaspoonful will be ample each time.

REPOTTING: This is done by us once in two or three years as follows: lift the plant out of the jardinière and with a sharp pointed stick remove about one-third of the old soil around the *edges and bottom,* cutting away a portion of the *old fine* roots but none of the strong roots, then replace the plant in the same jardinière first looking to the drainage; for a small shallow jardinière we use a flat piece of tin or a flat crock over each hole; over this spread some rich fresh soil; neatly balance the plant and fill up with the same rich fresh soil to within one-half an inch of the rim; this holds the water and prevents the manure being washed over the sides of the jardinière; also the soil should be made sufficiently tight round the edges of the jardinière to prevent the escape of water, it being of the first importance that the entire ball of soil around the plant be moistened at each watering. Should the watering of the plant at any time be neglected and the soul has become quite dry, put the jardinière in a tub of water for 10 or 15 minutes, *not longer,* and if the injury is not too serious, the plant will recover. In the case of large plants, we use hollow crocks for drainage, the same as is used by growers of specimen plants. After several repottings, the plant having increased in size, shift into a larger pot, but as dwarfness is the thing aimed at, the smaller the shift the better. Repotting should be done in February or March just before spring growth commences.

We advise when it is possible to get the above work done by a good gardener who has been accustomed to the handling of heaths, New Holland plants, etc. In the care of *very* shallow jardinières we find it desirable annually to replace a portion of the old soil to maintain a healthy growth.

PRUNING: To maintain dwarfness in the trees, pinch back the young growth; this we usually do from April to the middle of June and always with the finger and thumb, a practice followed by the late Mr. Thomas Rivers of Sawbridgeworth, England, when preparing his dwarfed fruit trees fruiting in pots. In *Thuja obtusa* we pinch out the points of the young growth all over the plant to maintain the form; this practice we also apply to *Cryptomeria* and all other conifers except Pinus. *Pinus:* we pinch out the points of the irregular growth simply to maintain the shape of the plant. Pomegranate, *Lagerstroemia indica,* flowering peach, flowering cherry, etc.: we pinch back the *nonflowering* shoots either before or after blooming. Wisteria: in July and August we pinch back all the young growth leaving only four or five leaves on each shoot. Maple and other deciduous trees are pinched back at the same time as *Thuja obtusa* leaving two to four leaves as may be necessary to maintain the desired shape of the plants. Should a second growth be made, the same rule is followed of pinching out the points.