Growing Lime-Loving Ferns in Tufa in Vermont

by Don Avery

The initial reason for building the tufa garden was for growing lime-loving alpine plants, especially those in the genera *Saxifraga*, *Androsdace, Salix and Daphne*. After initial success with some of these plants, it became apparent that the same cool north-facing rocks and crevices would be ideal for some of the calciphilic fern species from which I had been collecting spore on yearly forays into Canada. I had been tremendously inspired when I had seen ferns growing in profusion on limestone cliff faces and in limestone screes in the Gaspe Peninsula. *Asplenium veride* and *Dryopteris fragrans* are rather ubiquitous rock dwellers on the northwest coast of the Gaspe but are quite rare in Vermont. *Polystichum lonchitus*, unknown in Vermont, is found in profusion in isolated wooded limestone scree locations in the Gaspe. Another rare calciphile that intrigued me was *Asplenium scolopendrium* var. *americanum*, very rare in the US but common in the rich woods of the Niagara Escarpment on the Bruce Peninsula in Ontario. A few other lime-loving Vermont natives seemed worth trying in the tufa also. I had in mind *Pellea atropurpurea*, *Cryptogramma stellerri* and *Woodsia glabella*, all of which are difficult to grow in cultivation and not commonly found in fern collections in the Northeast.

Tufa has long been known to rock gardeners as the ultimate substrate for coaxing along reluctant, hard-to-grow alpines. Lacking access to tufa, most experienced alpine gardeners grow their plants in crevices between closely spaced rocks in some kind of well-drained substrate, containing little or no garden soil. In a true tufa garden however, the plants are grown within the rock itself. Small holes are drilled into the soft rock and the roots of seedlings or rooted cuttings are teased down into the holes. It is this method that I applied to the calciphilic ferns.

Tufa is found worldwide in regions of limestone karst topography. Over the course of millions of years ago, calcium accumulated on the ocean floor from the deposition of fish bones and coral and, with the passing of geological time, these deposits eventually emerged out of the ocean and hardened into what we call limestone. Compared to other rock types, limestone is generally soft and water soluble. In certain instances where large quantities of water move through limestone deposits, calcium is dissolved in the water and carried away. If the water becomes stagnant, over time it evaporates and the calcium, which has been held in solution, precipitates out. As time passes, the deposit hardens into tufa which is nearly pure calcium carbonate with traces of other minerals (especially iron) along with the fossilized remains of plants and invertebrates. Tufa is very porous and much lighter than limestone and is easily colonized by plant roots. When it is first dug out of the earth, it is nearly bone white, but with exposure to sunlight and air, it takes on a beautiful grey patina.

The only tufa garden with which I am intimately familiar is my own, and I will explain here how it was constructed and how the plants were established. From the beginning I was convinced that a north-facing wall, open to the sky, offered the most possibilities. This inspiration came from a wall garden which I had built out of local stone in 1986, and which has proven to be a natural haven for fern sporelings, including unexpected volunteers of *Polystichum brainii*, *Adiantum pedatum*, *Dryopteris cristata,* and *Asplenium tricomanes*.

Since my goal was to create the effect of a natural outcropping, the tufa wall was constructed differently from a traditional wall garden. I selected the largest pieces of tufa available to me to at the time, 10-18in diameter, and I stepped them back toward the bank at an angle of about 30 degrees, placing the stones as close together as possible

and avoiding straight lines. The base of the wall was set in a 6 inch deep bed of fine mortar sand and the upper stones were backfilled with a 6in thick layer of the same material.

My idea was to keep the sand wet and to allow the tufa to wick up moisture. To accomplish this, I laid out a length of soaker hose along the upper rim of the wall on top of the sand layer. After the first year, it became apparent that this method was not keeping the tufa evenly moist. In some places the tufa was dry while nearby, the soaker was tending to wash the sand out the bottom of the wall. To remedy this, I installed a series of commercial, 1/2 gal per hour, drip irrigation, emitters. These were connected to a garden hose which is left on from May to Oct. With this arrangement, he tufa never dries out and the lower stones are always cool and moist to the touch. I believe that this ever present moisture is the key to the success of the tufa garden.

The tufa wall was built in the fall of 2003 and planting began in the spring of 2004 when, along with the first alpines, I planted *Aspleniun veride* and *Pellea atropurpurea.* In 2005 and 2006 I continued to add ferns to the collection.

Whenever possible, I have planted sporelings in holes 7/8 in. diameter by 2½ in. deep, taking care not to drill all the way through the tufa. No special tools are needed to drill the soft rock as it is easily bored into with a cheap wood bit run by a battery operated hand drill.

I think it is very important to get rid of all remnants of organic potting mix before setting the plants in the holes and I am especially wary of compost and bark-based mixes. I bare root the plants and wash them off in a bucket of water before inserting them into the tufa. After teasing the roots of the ferns into the holes, I carefully backfill the holes with a mixture of crumbled tufa chips and a minute amount of fine, peat-based potting mix. I suspect that fine sand would work just as well to fill some of the air spaces. I try to avoid incorporating too much of the fine tufa powder that came from the drilling of the holes. As much as these plants love limestone, I suspect that few would appreciate being planted directly in powdered calcium carbonate. I find that I can use a small funnel and the eraser end of a pencil to tease the mix into the holes and around the small roots. I water the plants in afterward using a plastic spray bottle. I have occasionally given the transplants a small dose of diluted liquid fertilizer to help them make the transition from potting soil to tufa.

In some instances, the ferns have been too large to plant in drilled holes and so I planted them in between the tufa stones, backfilling with crumbled tufa and fine sand. It seemed that this would allow the roots to penetrate into the wet sand and into the natural soil behind, and/or to grow into the calcareous rock.

The three or four years these ferns have been planted out is not a very long time by gardening standards and I am not inclined to start crowing with pride just yet. Any old garden hands know that it is only with humility that we are allowed to claim any success in the tricky business of horticulture. I can report, however, that I am thrilled to see how happy most of these ferns are in the tufa habitat.

The *Asplenium veride* are doing especially well as are the *Dryopteris fragrans.* The *A. veride* is the quintessential tidy alpine specimen, standing brave and upright on a near vertical face. My plants of *Cryptogramma stelleri* were too big for planting in drilled holes and I have been amazed at how fast they have colonized the crevices between the stones. *Asplenium scolopendrium,* also planted in a crevice, has flourished beyond anything I could have hoped for. My single specimen gets far more direct sun light in the afternoon than I would prefer, however the fronds are 12 inches long, perfectly green and have been loaded with spores the last two years.

I have *Asplenium rhizophyllum* in two locations, one in a drilled hole and another nestled between the stones. They are all growing slowly and are beginning to show signs of "walking" but the fronds have never had good green color. I am sure that many of these ferns would benefit from more sun protection as well as an occasional drop of dilute liquid fertilizer.

Pellea atropurpurea has behaved much as it has in my limy rock garden, by fading away and leaving behind several healthy and promising sporelings. *Polystichum lonchitis* is alive and healthy but very slow growing. I have three *Woodsia glabella* planted in holes on a wet mossy face toward the bottom of the tufa wall. They were planted in 2007 and did remarkably well until August 2008, when they suddenly went dormant, I hope not forever.

My initial plantings also included two plants of the sun loving serpentinophile *Polystichum scopulinum,* but these dwindled away off the first year. Although my original batch of sporelings was very promising, I have had no luck growing this fern anywhere in the garden.

My tufa garden is 18 to 36 inches high and 14 feet long and consumed about a ton of rock. Those gardeners who don't have access to large quantities of tufa should not be discouraged because it is possible to make a perfectly enjoyable tufa garden with as little as one large stone. In any case I would suggest that you use the largest chunks that you can get and the heaviest pieces that you are able to handle. For growing ferns, face the garden away from the sun and always remember that the tufa must be able to wick up moisture, especially during the summer months. I have a friend who has managed beautifully with an 18 inch boulder set in shallow water at the edge of a pond.

The primary obstacle to making a tufa garden is locating a source of the material. At the present time, as far as I know, tufa is only available from two quarries, both in British Colombia. They will ship it to you by the ton. Tufa rock is not especially expensive, but it can be very expensive to ship it great distances. If you and your gardening friends can not use a full ton, I suggest that you contact one of the retail sources that purchase their tufa in bulk from the quarries. I have listed below the names of the quarries and the outlets that I know of in the US, as well as one in Ontario. To find out about numerous other sources in Canada, contact Rocky Mt Tufa directly. Good luck!

Rocky Mountain Tufa Ltd. (Quarry)

P.O. Box 66 V0A 1B0, BC.Canada

Phone: 250-341-6865
http://www.tufa.bc.ca/index.php

Golden Rock Products (Quarry)
Kimberley, BC.
Phone: 250-344-8999
http://www.goldenrockproducts.com/company.html

Wrightman Alpines
RR#3 1503 Napperton Drive Kerwood

Ontario Canada N0M 2BO
Phone: 519-247-3751
wrightmanalpines.com

Tower Perennial Gardens
4010 E. Jameson Rd.
Spokane, WA 99223
Ph: 509-448-6778

The Flower Factory
4062 Hwy A
Stoughton, WI 53589
Ph: 608-873-8329

Herbie Rocks Tufa
John Altman
300 North Market St.
New Wilmington, PA 16142
Ph: 724-971-2509

Marcellus Nursery Inc.
5062 Onondaga Rd.
Syracuse, NY 13215
Ph: 315-488-2632

Bristle's Garden Centre
7454 State Route 96
Victor, NY 14564
Ph: 585-924-2274

Sara Garden Centre
5900 Youngers Rd.
Bliss, NY 14024
Ph: 585-637-4745

Jon Marett
445 Glencastle Dr.
Atlanta, GA 30327
Ph: 404-925-5501