The Journal of the American Boxwood Society – Devoted to Our Oldest Garden Ornamental

THE BOXWOOD BULLETIN

Understanding the Current & Emerging Threats to Boxwood

Addenda to Registered Cultivar Names, Boxwood Art, ABS Tribute to Mrs. Robert L. Frackelton

Spring 2019. Volume 58. No 3.

The American Boxwood Society is a not-for-profit organization founded in 1961 and devoted to the appreciation, scientific understanding and propagation of *Buxus*. For additional information on the Society, visit our website at: **boxwoodsociety.org**

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In This Issue

From the Board

The American Boxwood Society's Board of Directors met on October 23, 2018 at the Blandy Research Farm in Boyce, Virginia. The Board discussed numerous topics including the June 2019 Symposium to be held in Indiana, the Box Moth and Box Blight Summit planned for February 2020, as well as a 10-day tour to Italy in May 2020.

Photo, clockwise from left: Cheryl Crowell, Bennett Saunders, Laurie McMinn, John Makar, Chris von Kohn, and Justin Stelter. Andrea Filippone and Bernie Cross joined via conference call.

Register Now for Our Indianapolis Symposium. June 7-9, 2019

Visit boxwoodsociety.org or see the insert in this issue for a full itinerary and to register for the event

Saving American Gardens from Boxwood Blight

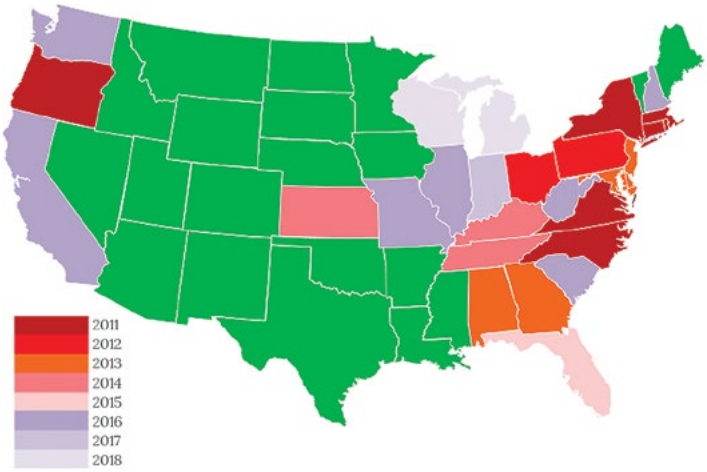


Figure 1 Boxwood blight tracker by year of the first interception or detection from 2011 to 2018

Boxwood was first planted in North America by Nathaniel Sylvester in 1653 on a Shelter Island plantation in New York, and it has since become a landmark species in American landscape. This prominence is attributed to its utility, resiliency, and low maintenance. Boxwood is prized for use as individual specimen plants, hedges, parterres, and landscape groupings. Other important applications include: decorative boxwood greeneries for holidays, and boxwood sculptures for learning, ritual purposes, and whimsy. Boxwood plants also are frequently grown as topiary or bonsai due to their high tolerance to heavy pruning.

Once-regarded as a low maintenance plant, boxwood is now threatened by boxwood blight, an emerging fungal disease caused by *Calonectria pseudonaviculata* in the United States, and also by *Calonectria henricotiae* in Europe. This disease was first reported in the United Kingdom and New Zealand in the 1990s, and now it is widespread in Europe. In the U.S., North Carolina and Connecticut were among the first states severely affected by boxwood blight in 2011. Since then this disease has spread to other states via nursery trade. As of December 31, 2018, twenty-eight states and the District of Columbia have reported interceptions of diseased plant materials or boxwood blight rampages (Figure 1), impacting historic and established boxwood plantings as well as landscaping businesses. Boxwood blight ruined the Woodrow Wilson Presidential Library garden in 2016 (https://www.newsleader.com/story/news/local/2016/09/21/boxwood-blight-leaves-presidential-library-garden-bare/90799326/). More recently, this disease invaded the Tudor Place in Washington D.C., and devastated most of its boxwood plantings (https://www.tudorplace.org/who-we-are/garden/preserve-the-garden/). Even some landscape companies have been sued by homeowners for spreading the disease to established gardens that their families have treasured for generations.

While boxwood blight continued to spread over the past 7 years, its negative impacts on American gardens would have been much greater without timely interventions by the federal and state regulatory agencies, horticulture industry, research and extension communities. Three most notable interventions at the national level were (1) development of boxwood blight Best Management Practices (BMPs), (2) institution of the Boxwood Blight Cleanliness Program, and (3) educational programming. The boxwood blight BMPs were developed by Horticultural Research Institute - the research arm of AmericanHort, and the National Plant Board (NPB) in consultation with the research community. The Cleanliness Program was developed by NPB and implemented by state Department of Agriculture to prevent the spread of boxwood blight via the nursery trade. Both the American Boxwood Society and AmericanHort have hosted a number of educational events. At the state level, a full quarantine protocol against boxwood blight was enacted in both Pennsylvania (2016) and Tennessee (2017); this disease was declared a nuisance in Illinois (2017). At the local level, many nurseries instituted their own sanitation programs. These interventions have had immediate benefits, curbing the spread of boxwood blight and reducing disease impacts. In the meantime, researchers have developed some new tools for controlling this destructive disease through the funding from Farm Bill, Section 10007 via USDA Animal and Plant Inspection Service, the Floriculture and Nursery Research Initiative via USDA Agricultural Research Service, and the horticultural industries.

Fighting boxwood blight has been and will continue to be a tough battle in the foreseeable future. Below I will share some the latest exciting research to help garden enthusiasts and boxwood professionals better understand 'the enemy' – the boxwood blight pathogen, to substantially reduce its accidental introduction, and to more effectively manage the disease at sites of contamination.

Figure 2 Three diagnostic symptoms of boxwood blight

Know the enemy

As indicated by the disease name, boxwood is the prime host of this pathogen. Initial symptoms appear as dark or light brown spots on leaves (Figure 2 left). This may be quickly followed by leaf blighting and leaf drop (Figure 2 middle), as well as black streaks on young branches and stems (Figure 2 right). These symptoms are typical of boxwood blight and they can be used to separate this disease from other common foliage diseases such as *Volutella* blight and *Macrophoma* leaf spot.

Are all boxwood species, varieties, and cultivars susceptible to this disease? The short answer is 'Yes.' However, their susceptibility levels differ greatly with some species and cultivars being much more susceptible than others. According to Dr. Kelly Ivors of North Carolina State University who evaluated over 70 cultivars commonly-used in the U.S., the ten least susceptible cultivars are Green Beauty, Northern Emerald, Wedding Ring, Wintergreen, Golden Dream, Winter Gem, Nana, Franklin's Gem, Wee Willie, and Richard. Nine of these are Asiatic cultivars belonging to *B. microphylla* or *B. sinica*, while Richard is a *B. harlandii*. None of the English and American boxwood made this short list.

The same pathogen can also attack pachysandra and sweet box plants. Specifically, it caused leaf spots on Japanese spurge (*Pachysandra terminalis*) (Figure 3 top) and Himalayan sweet box (*Sarcococca hookeriana* var. *humilis*) (Figure 3 bottom) near infected English boxwood in a Virginia garden. Similarly, it can cause leaf spots on Allegheny spurge (*Pachysandra procumbens*) and Windcliff Fragrant pachysandra (*Pachysandra axillaris*) under controlled conditions per Dr. James LaMondia of Connecticut Agricultural Experiment Station. Likewise, *Sarcococca confusa*, *S. orientalis*, *S. vegans*, *S. ruscifolia*, *S. saligna*, and *S. wallichii* are also susceptible, as demonstrated in a recent study at the University of Georgia. These species all belong to the family of Buxaceae.

Can this pathogen infect a non-Buxaceae plant? The answer is 'Maybe.' In a recent study we applied the boxwood blight pathogen onto 27 common groundcovers or companion plants from 21 families. Under controlled environments, this pathogen caused disease symptoms and reproduced itself in a dozen of plants. These plants included *Alchemilla mollis*, *Arctostaphylos uva-ursi*, *Brunnera macrophylla*, *Epimedium youngianum*, *Galium odoratum*, *Geranium sanguineum*, *Phlox subulata*, *Tiarella cordifolia*, *Callirhoe involucrata*, *Iberis sempervirens*, *Mazus reptans*, and *Vinca minor*. These plants are potential hosts of this pathogen. They could potentially carry and spread the pathogen from infected nurseries or sites to new locales. They, along with pachysandras and sweet boxes, should be added to the watchlist and taken into consideration when developing boxwood blight mitigation programs.

Boxwood blight spread in the U.S. since 2011 is an unfortunate fact, but its development status here is about 20 years behind Europe by two accounts. First, its distribution remains limited in most affected states. Second, most positive diagnoses to date are in gardens and public spaces rather than production

Figure 3 Leaf spots of Japanese spurge and Himalayan sweet box in a garden (Photo courtesy of Ping Kong/Virginia Tech (top), and T. Michael Likins/Chesterfield Cooperative Extension, Virginia (right)

nurseries. We are in a much better position than Europeans in dealing with this disease. We also have more tools today than 20 years ago. We may have a better chance to contain this disease in the U.S. Following I propose two different approaches to mitigating this disease in American gardens and public spaces for states, counties and areas with and without this disease.

Fend off the boxwood blight pathogen

Keeping the pathogen out remains the most effective method and should be the primary approach for states, counties, and areas where boxwood blight is not yet present. The boxwood blight pathogen produces sticky spores as its dispersal and disease-causing agent. Its chance for spreading via air movement is marginal. Long-distance spread of this pathogen is primarily via infected plant materials. That is great news for gardeners and boxwood professionals! However, also due to their sticky nature, pathogen spores can easily attach to landscaping tools that have come in contact with contaminated materials. They may also attach to shoes, clothes and other personal belongings during visits to sites of contamination. Following are some strategies to block these avenues of pathogen entry.

The **first strategy** is to purchase, retail, and/or utilize blight-free plant materials and prevent the spread of boxwood blight to new sites. Here plant materials include boxwood, pachysandra, sweet box, and other potential host crops. Specifically, they also include both stock plants and greeneries for boxwood.

This strategy begins with looking for reputable suppliers. The best place to start is your state Department of Agriculture - Boxwood Blight Cleanliness Program as exemplified by Virginia (http://www.vdacs.virginia.gov/plant-industry-services-boxwood-blight.shtml). On its official website you can check for a list of participating Virginia nurseries and learn about the BMPs protocol that they have agreed to implement to produce blight-free crops. Once you locate participating nurseries near you, it is time to visit each and see first hand the actual steps taken to protect its crops (Figure 4). Surely you want to see the health of boxwood and related crops, and ask whether they have been recently treated with any fungicide, and if so, when and what? A recent fungicide treatment could mask potential crop health issues including boxwood blight.

All parties in the horticultural chain from growers to consumers have a role to play in implementing this

Figure 4 Boxwood Blight Cleanliness Program at work in Virginia nurseries – restricted access, footbath, and hand spray

strategy for its full benefits. Retailers, commercial landscapers, and ground maintenance personnel are on the front line with an area-wide impact. Nurseries that purchase boxwood and other host plant materials from other production facilities share the same responsibility. It is always advisable for growers to place incoming plant materials, including boxwood and other host plants in this case, in isolated areas for a few weeks without any fungicide program to determine whether they are truly as healthy as they appeared during receipt. Likewise, retailers are advised not to co-mingle incoming plant materials from different suppliers. These simple steps will save you potential plant losses on-site and hassles with your suppliers while protecting your client base. Consumers must do their share of diligence and this is particularly important for those with a well-established boxwood garden. Infected plant materials have been shipped and sold through big box stores nationally. Before you buy new boxwood or any other host plants, ask the garden centers of your interest: where are their plants sourced and are their producers participating in the Cleanliness Program? Buying new plant materials from a wrong retail center could ruin a garden within a few weeks.

The **second strategy** is to prevent cross contamination between job sites. The following steps, practices, and considerations are crucial to achieving this goal.

Sanitizing all the landscaping tools is fundamental. The landscaping tools here include pruners, saws, rakes, hoses, equipment, tarps, shoes, gloves, vehicles, and everything else that is used in establishing new gardens, maintaining existing plantings, and cleaning up infected plant materials. Pruners, saws, rakes, and other landscaping tools must be

Figure 5 Wearing shoe covers at a research site when downloading weather data and having vehicle washed before heading back to office

cleaned and sanitized between job sites. This is best done at the site of first job which reduces the chance of contaminating the working vehicles, spreading the pathogen along the way, and carrying it to next job site or back to the company ground. Likewise, vehicles should be cleaned and sanitized as completely as possible. At a minimum, they should be free of soil and plant debris before leaving a job site. Recommended sanitizers and instructions for their use are available on the Virginia Boxwood Blight Task Force web site (https://ext.vt.edu/agriculture/commercial-horticulture/boxwood-blight.html).

Scheduling and timing boxwood-related jobs could also mitigate cross contamination. Generally, boxwood pruning should be done when foliage is dry, normally late in the morning or afternoon of a sunny day. Maintenance of known infected sites should be placed as the last job of the day, allowing for more effective sanitation. After arriving at a new job site, it is always a good practice to walk through the entire property and scout for signs of boxwood blight infection before doing anything else. If blighted boxwood are seen, prune the healthy-looking ones first and the most severely affected ones at the last.

One consideration of importance is never to assume any job site is free of the blight disease. Whether latent infection (infected but not showing any symptoms) occurs in boxwood blight is yet to be determined. But we do know that infected plants may not show any symptoms for some time depending upon the boxwood cultivar and weather conditions. There is no guarantee that a healthy-looking boxwood garden today will remain healthy a few weeks later unless the owner and maintenance contractor work together to effectively to fend off the pathogen.

It is equally important for homeowners and professionals alike to practice good techniques where the landscape has boxwood blight or not. Specifically, it is recommended that field crew wear freshly laundered clothing each day when working in gardens and public spaces that are not known to have the disease. On the other hand, when pruning, scouting, or removing infected plants, field crews should wear disposable gloves, clothing (e.g. Tyvek®), and shoe covers. If disposable clothing and shoe covers are not available, clothing and shoes should be changed before leaving a site.

As positive diagnoses continue to emerge, landscape companies, if not yet practicing them, are urged to develop and adhere to clearly outlined sanitary protocols aimed at reducing the risk of spreading boxwood blight. They are also advised to share with their clients these protocols and documentation on how all the tools have been sanitized including products and recommended concentrations as well as exposure times, etc. right before leaving the last job site, and to get the clients consent prior to starting a job. By taking these steps, landscape companies will better retain and grow their client base. They may also help avoid potential lawsuits that may be filed against them for spreading the boxwood blight pathogen. In addition, they make a significant contribution to the disease mitigation effort at the regional level.

The **third strategy** is to avoid bringing the pathogen home after visiting contaminated sites including public and private gardens and friends' properties. The health of your garden will be as good as the care you take. In addition to buying blight-free stock plants and hiring reputable landscape companies, do your own share of diligence to fend off the boxwood blight pathogen. The following are some steps my team takes every time we visit a contaminated site (Figure 5). First, upon arrival at the site, we wear gloves, disposable shoe covers or clothing (Tyvek®) depending upon how close we will be to the infected plants. Second, we bag disposable gloves, covers and clothing, then spray shoes and hands with 70% ethanol before getting into the vehicle and heading back. Third, we have our vehicles washed in a car wash before returning to office. Fourth, we take a shower then change our clothes immediately after arriving home. In addition, I have a pair of shoes for doing yard work to protect my nearly 60 year old boxwood plantings. These steps have served us well. Homeowners and boxwood enthusiasts are encouraged to develop protocols that work for them in protecting their gardens.

Better manage and contain the disease

Containing accidental disease introduction is as important as fending off the pathogen. This effort consists of scouting, eradication, and remediation. Our goal is to prevent the disease from outwardly radiating to adjacent gardens and production nurseries.

Scouting is the critical first step. The earlier the disease is detected, the easier and more likely it may be contained or even eradicated. Where and when to look will have tremendous impacts on the scouting outcomes.

Where new infection of boxwood blight will most likely show up is directly tied to the pathogen movement. The vast majority of positive diagnoses to date are due to the purchase of infected plant materials and use of contaminated landscaping tools. A limited number of cases are due to the movement of contaminated animals and infected plant debris blown or transported from a neighboring property. Therefore, scouting should focus on gardens where (1) new boxwood and other host plant materials have been added or utilized, (2) landscape maintenance was recently performed, and (3) disease has been seen in the neighborhood.

The best times to scout for new infections are the spring and fall seasons for most parts of the United States. This pathogen does not like hot and dry conditions. The optimum temperature for its spore germination and infection is about 75°F with the maximum at 82°F. Thus, summer might be too hot for boxwood blight infection, especially in the southern states. This disease generally is most active in the spring and fall seasons. Like other fungi, the boxwood blight pathogen spores require free water for germination and infection; and it takes a few days for infected leaves and stems to develop symptoms under ideal conditions. Thus, scouting after rain events will further increase the chance of finding the disease.

Eradication is to remove infected materials to prevent the disease from spreading to healthy-looking plants in the same garden and to adjacent plantings and production nurseries. Plant disease is a result of interactions between host and pathogen under the influences of environment; this is commonly termed "Disease Triangle". A disease becomes rampant when a virulent pathogen meets with a susceptible host under favorable conditions. In the case of boxwood blight, most existing plantings are English boxwood which is highly susceptible. Also, we have little control over temperature and rain events, the two most important environmental factors for this disease. Pathogen is the most manageable angle of the three; and that is where we can make a difference. The success of this effort relies largely on how much of affected boxwood shrubs are removed and how this removal process is handled.

As for how much of an affected shrub is removed, there are three major options: (1) uproot entire shrub, (2) cut to leave a stump, and (3) trim only symptomatic branches and stems while leaving the shrub intact. Each option has its advantages and drawbacks. The trimming option focuses on saving the established boxwood shrubs while attempting to remove affected materials. This potential saving does not come without a cost. An immediate monetary cost is to have an intensive fungicide program in place to protect the saved shrubs with infected but asymptomatic branches. Boxwood blight likely will continue to progress and spread at a level depending upon the conduciveness of weather conditions and the effectiveness of fungicide programs. This disease rampaged through quite a number of gardens in 2018 due to excessive wet weather conditions. The hidden cost is that the disease spreads to other shrubs in the same gardens and, even worse, to adjacent gardens or production nurseries. Both monetary and hidden costs have led managers/owners of many affected gardens (including Tudor Place) to switch to the option of uprooting or cutting affected boxwood shrubs and those in their immediate proximity leaving only stumps (Figure 6). These two options have the potential to eliminate the pathogen in all sources except soil. The soil inoculum may be contained by covering the base of the shrub with mulch including pine needles as done in the Woodrow Wilson Presidential Library gardens. Both options better prevent the pathogen from outwardly radiating to adjacent

Figure 6 Cutting affected boxwood shrubs to stump (Photo courtesy of Joshua Meyer/Tudor Place)

plants and gardens when compared to the trimming option. They may also require considerable investment to remove a large number of affected shrubs. The major difference between these two options is how to rebuild the garden. The uprooting option allows the owner to select and plant with a less susceptible cultivar while the other option rebuilds the garden through regrowth from the stumps. All removed plant materials should be incinerated on-site where practical or taken in double bags or tightly wrapped with plastic to a designated landfill.

When removing affected shrubs, exercising great care is equally important to containing the disease. Shrubs should be individually bagged or wrapped with plastic then dug from soil using an excavator as appropriate, and taken to incineration (Figure 7) or a landfill. Additional steps must be taken to prevent the spread of the pathogen to new locales as discussed above under the **second strategy** section.

Remediation is to rebuild boxwood gardens after infected plant materials are removed. This may be accomplished through two strategies. One is to heavily trim boxwood shrubs to remove all affected foliage and leave a stump for regrowth. The other is to completely remove boxwood shrubs including roots then replant with a new cultivar. Both strategies have pros and cons. The regrowth strategy may have the speed advantage, which is important for slow growing plants like boxwood. However, the new growth will continue to be highly susceptible to the blight disease. The replanting strategy may take a long time to rebuild a boxwood garden if starting with small stock plants; otherwise it will be costly if replanting with large stock plants. But it has the option to utilize a less susceptible cultivar which will be more sustainable in long run. Both strategies face

Figure 7 Eradicating diseased shrubs with great care – wrapping each shrub with plastic, then digging the stumps and roots with an excavator, and moving uprooted boxwood to a site for incineration (Photos courtesy of the Woodrow Wilson Presidential Library, Staunton, Virginia)

Figure 8 Detector boxwood placed on mulched and nonmulched stump areas (Photo courtesy of T. Michael Likins/Chesterfield Cooperative Extension, Virginia)

the same challenge of managing soil inoculum and preventing it from becoming a source of inoculum for regrowth or foliage of newly replanted boxwood; and that is where the mulching technique comes to play.

Mulching reduces boxwood blight up to 100%. In our 2016-2017 study under a landscape setting, stump areas with numerous infected fallen leaves and associated pathogen spores were covered with pine bark or not mulched (Figure 8). Disease control was measured by comparing the boxwood blight development on detector plant - containerized Justin Brouwers boxwood that were placed near the stump and rotated through the mulched and nonmulched areas at 2-week intervals. Mulching provided complete protection of the detector boxwood in all three positive rotations in 2017 and five of the eleven positive rotations in 2016. It also provided excellent protection in four rotations and fair protection in one rotation in 2016.

As mulches are used as physical barrier to block pathogen spores from soil splashing onto foliage, its performance directly relies on the coverage. Complete coverage is required for 100% blockage but additional mulch depth adds little to the control efficacy. Also, mulch type does not matter for this purpose. Mulching is a common practice in American landscaping for aesthetic appearance, water retention, soil temperature stabilization, and other purposes. These benefits should be taken into consideration when selecting mulches for boxwood blight control. Generally, it is advisable not to use synthetic or rock mulch. Synthetic mulch has no soil benefits and does not retain water or nutrients. Similarly, rock mulch does not hold water or nutrients. More importantly, its temperature may fluctuate greatly which is harmful for boxwood's temperamental roots.

The mulching technique performs best with 100% plant protection on two assumptions. First, all

sources of the boxwood blight pathogen other than soil have been eliminated in the garden and its proximity. Second, no other mean of pathogen dispersal than water splash is available. Neither was met at the site where our mulching study was conducted. There were over 400 established boxwood on this property and not all affected ones were removed during this study. There were two dogs and many wild animals - either resident (squirrels, rabbits) or daily visitor (deer, birds) on the property. Those animals could have moved the pathogen spores from the leftover or newly diseased plants to the detector plants. Both are realities in most, if not all, gardens. Thus, the mulching technique should not be used alone for boxwood blight mitigation. Instead, it should be used along with other tools for its maximal performance.

One of these tools is fungicide. A general list of fungicides that may be used for boxwood blight is available on the Virginia Boxwood Blight Task Force web site (https://ext.vt.edu/agriculture/commercial-horticulture/boxwood-blight.html). Actual availability varies with user (grower, retailer, landscaper and home owner) and state. As always, the label must be read carefully and followed strictly every time fungicide is used. This is especially important for gardens and other private and public spaces as fungicide may drift and pose hazards to human and environmental health. They should be used as the very last resort.

To help garden enthusiasts and boxwood professionals time fungicide applications, Dr. Leonard Coop of Oregon State University has developed an infection risk forecasting model for boxwood blight. This model is based upon the disease epidemiology research conducted in Belgium and at Virginia Tech. Specifically, it predicts boxwood blight infection risk using air temperature when the leaf surface is wet. It is web-based at (http://uspest.org/risk/models) and also available for mobile devices. You can download it into Android by searching "boxwood blight" in Play Store" or iPhone likewise. The mobile versions are easy to use. Its interface has an Input tab where you enter your "location name" to search the national weather networks and select a station near you then enter "start date" and set "time span" for prediction. The forecasting results will be instantly displayed in Graph and Table formats. These forecasts should be used as a reference until this model is fully calibrated and validated. We hope the final product will reduce your fungicide applications to the minimum while providing the best boxwood protection.

Look into the future

Boxwood blight will continue to be a huge challenge for years to come. The proposed differential approaches above have the potential to most cost effectively slow boxwood blight spread and minimize its negative impacts in states, counties and areas with and without this disease. This potential may be realized and enhanced by better educating garden enthusiasts and boxwood professionals on diagnostic disease symptoms, pathogen-spread biology, mitigation strategies and tools, by ensuring that everyone in the horticultural chain and every property owner in the neighborhood does his/her share of diligence in fending off the pathogen or effectively containing the disease should an accidental introduction occur, and by developing a network of horticulturists and consumers for early detection, fast reporting and communication of new infections.

This disease has already had significant impact on the American garden and it will likely get worse before getting better. Both developing a better understanding of the pathogen biology and continually innovating control technology are crucial to winning the battle against this disease in the American garden. Among the most urgently needed tools are (1) highly resistant, if not immune, cultivars, (2) effective biological control and other reduced risk products, (3) easy-to-use diagnostic tools like immunostrips, (4) reliable disease-forecasting model, and (5) integration of existing tools such as cultivar, mulching and fungicide protection to increase their synergy. There are also a number of questions of practical importance. For instance, does latent infection occur in boxwood blight? Answering this question could help cut the spread of the disease via nursery trade. What is the stump height required to ensure 100% regrowth and how may this height be related to the age and size of boxwood shrub and also to soil conditions? A related question is how low on stems the boxwood blight pathogen may go from infected foliage. Answers to these questions will help realize the full benefits of the mulching technique. How long can the boxwood blight pathogen survive in the U.S. soil? Whether and how may its survival be related to local climatic environment and soil microbiome? Our preliminary study at multiple locations points to this pathogen not surviving as long as it has been perceived. This initial result is exciting – the pathogen may disappear after a period of boxwood absence, and then this landmark plant may be safely replanted at once-contaminated sites.

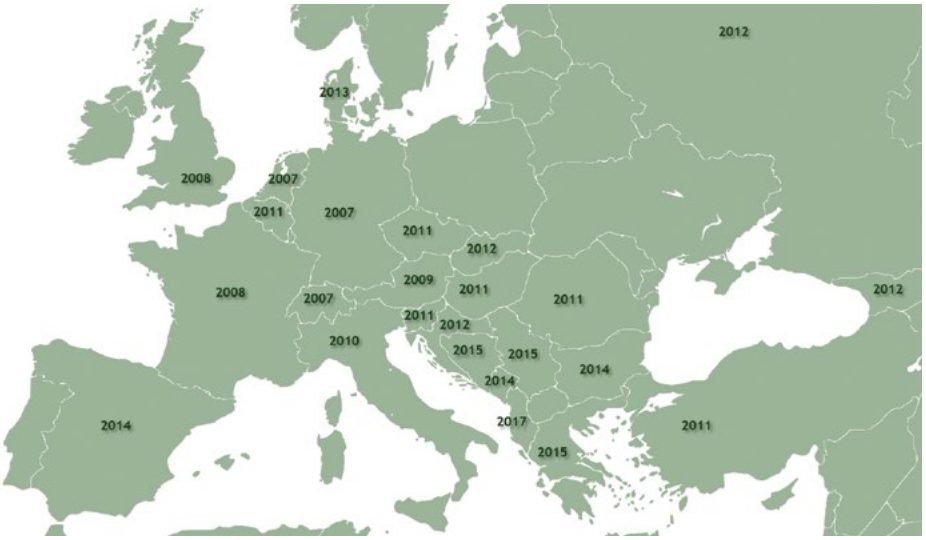
Article by Chuan Hong, Professor and Extension Specialist of Plant Pathology, Hampton Roads Agricultural Research and Extension Center, Virginia Tech.

Box Moth, *Cydalima perspectalis*

In our commitment to the health of boxwood in the U.S. and the world, the American Boxwood Society felt it pertinent to include the following article originally published in "Topiarius", the journal of the European Boxwood & Topiary Society, to help educate our members regarding an emerging threat to boxwood.

Update from ABS: *In late August of 2018, the Boxwood Moth arrived in Ontario, Canada, which means that sooner or later it will arrive in the United States. What we have seen and learned in Europe is that education and spreading the word is the key. If we can tell everyone that this moth is easy to stop before it starts to multiply by simply applying Bacillus thuringiensis (Bt), then we will be ahead of the problem. In order to start applying, one must know what to look for and then dig into the center of the plants to see if the problem is there. This takes vigilance on the part of the homeowner and the landscaper to be on the lookout for the worm before it becomes the moth. The larval stage is what devours the leaves. From the research in France, it is apparent there are optimal dates to apply spray. If we are all diligent, we can knock out the problem before it starts to spread, and that is the key to success.* – *Andrea Filippone*

Wild boxwood, devastated by the caterpillar.
Photo courtesy of Mark Chaplin, Tarn Valley, France.



Map data from *'Cydalima perspectalis (Walker, 1859) (Leipidoptera, cranambidae) and the threats for the nature 2000 habitat 5110 in Liguria (NW Italy)'*

The box moth, *Cydalima perspectalis*, is the latest threat to *Buxus*, defoliating Europe's great historic gardens, the wild boxwood forests and our domestic gardens.

Chris Poole, Chairman of EBTS UK, takes stock of the situation and looks at the latest advances in prevention and cure.

Since 2007 box moth caterpillars have been devastating parterres and other topiary in domestic, commercial and historic gardens across Europe. The impact, however, is not just in gardens. The caterpillar is decimating large areas of Europe's natural box woodlands. The Northern Caucasus as well as Bulgaria, NW Italy, Romania and southern France have all been badly affected. In the UK, wild box is now under threat with small infestations reported at Box Hill in Surrey, though currently there are no reports at other large areas of natural box such as the Chilterns.

The severity of the infestations is demonstrated dramatically in Germany's Grenzarch-Whylen Nature Reserve which contains that country's largest box tree forest. Between 2009 and 2010, the caterpillars attacked all the box trees, causing more than 90% defoliation; 27% lost all their leaves. Although the population of moths then decreased, having eaten most of its food source, by 2012 the trees that had been fully defoliated died as their bark had also been eaten, thus exposing the trees to fungal infection. Observations show the ecosystem in the forest is beginning to change with new ground cover taking the place of the *B. sempervirens* which will likely now only remain in smaller clumps.[1]

The origin of the moth is recorded as North China, but it has spread a long way since 1859 when it was

first identified. It now covers large areas of the continent of Europe.

The consensus is that the widescale spread is not caused by the flight of the moths, but by commercial movement of infected plants where leaves are carrying undetected eggs. An example of this was at the 2012 Sochi Winter Olympic Games. During the build-up, Italian box was imported for planting in the Olympic village where Russian experts then found *Cydalima perspectalis* in the site. Control measures using Aktelik, a non-systemic organophosphorus insectoacaricide product with enteric-contact action, failed, resulting in a rapid spread into the natural boxwood in the territory of yew-box grove in the Caucasian Biosphere Reserve. It has since spread further across Georgia and where all the *Buxus* plants have suffered from the caterpillar. Damage has also been observed on *Rubus* spp., *Ruscus colchicus*, *Ruscus fruticosus* and *Smilax excelsa*.[2]

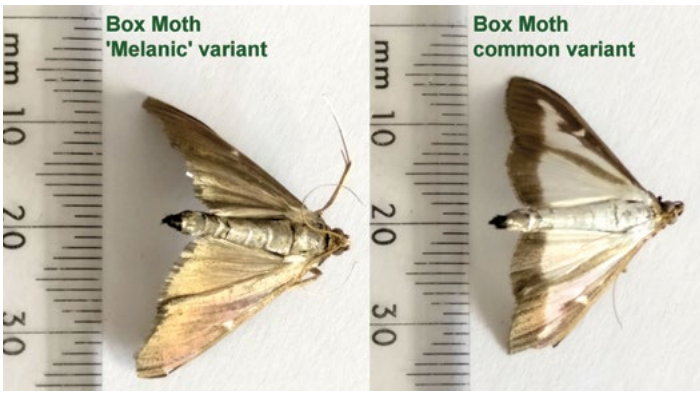
Box Moth were first described by Francis Walker (1809-1874) in 1859 when he was working for the British Museum collating their specimens. They were recorded in the *List of the specimens of lepidopterous insects in the collection of the British Museum*. Since its initial description and classification, it has been placed in a number of genera, including *Glyphodes perspectalis* (Walker, 1859), *Neoglyphodes perspectalis* (Walker, 1859), *Palpita perspectalis* (Walker, 1859) and, most commonly in the UK, *Diaphania perspectalis* (Walker, 1859). However, in 2010, it was reclassified as being part of the *Cydalima* genus, so it is now known as *Cydalima perspectalis* (Walker, 1859) – the bracketed 'Walker, 1859' indicates that Walker described perspectalis, but that is has since been reclassified to a different genus.

The insect has four stages during its life:

Eggs – 0.8-1.0mm diameter are laid on the underside of leaves in a flat sheet and colored greenish yellow at first with black dots appearing as the larval head capsule is formed.
Temperature threshold for egg development >10.9C

Caterpillars/Larvae – When they hatch are greenish yellow in color, developing black heads and light and dark strips with spots along their length as they grow. Fully grown they are about 4cm long, and live for about 2 weeks.
Temperature threshold for this state is >8.4C

Pupae/Chrysalis – The pupae are cocooned in white webbing spun around leaves and are between 1.5-2.0cm long.
Temperature threshold for this state is >11.5C



Moths – Have a wing span of about 4cm and either have a thick dark brown border around a white colored wing with distinctive dots halfway down the leading edge of the wings (common variant) or, less commonly, the wings are almost entirely brown with white dots (Melanic variant). The moths start laying eggs 2-3 days after they start flying.

Photos: Cosmin Mancini, Zerbor, and Vvoe/Shutterstock

In Central and Southern Europe, the life cycle of *C. perspectalis* is repeated three times and sometimes four depending on the combination of temperature and light as they need a specific number of 'degree days' for each stage of their cycle. When the day-length drops below about 13.5 hrs the larvae will 'diapause' (the dormant stage of a developing insect) so that it can overwinter in a web spun on *Buxus* leaves. In this state, it can survive temperatures down to -30C. In spring it will come out of diapause and continue its development, eating the new box leaves, before changing into the pupae stage.

Examples of different methods of suspension of the pheromone

Sticky gel in a syringe

New long life vial

Impregnated rubber bung

Pheromone traps have tended to be used in scientific research for recording numbers of specific insects. They work by using a lure impregnated with a synthetic pheromone of the female insect to entice the male into a trap so that numbers can be assessed. The RHS website, under 'Non-chemical control' measures, suggests traps only be used for monitoring adult activity. However, experiments in France as part of the SaveBuxus project (2014-18) have looked at their use as a control measure, on the basis that trapping the males reduces the number of fertilized eggs and thus disrupts the breeding cycle. So far, their research has established that the funnel-type trap is the most effective design for catching male box moths. Other types such as sticky traps, where the moths become stuck to a surface, need replacing to regularly to be effective in high pressure infestations. They also tested different lure types which come in a variety of forms from impregnated rubber tips, plastic vials to a thick sticky liquid – all work in the same way by slowly defusing the synthetic pheromone. Different lures last for differing times with the earlier forms lasting from five to six weeks while the latest designs can last up to eight months before the pheromone is depleted and needs to be replaced.

In a test over a 5km^2 area of the Val-de-Marne rose garden outside Paris, which has large amounts of box hedging round its rose beds, 50 BUXatrap® traps equipped with GinkoBuxus lures were arranged with a trap per 100 m^2. This showed there were only 23% of caterpillars present compared to the control area. Similar results were found in the other test sites at Castle Park of Champs-sur-Marne, Vieux Moulin, Gradignan and Château Haut-Brion in Pessac. However, just using the pheromone traps didn't protect the rose garden and in Autumn 2016 the boxwood was totally defoliated.

A new version of the GinkoBuxus lure produced by Sumi Agro was released in 2017. It uses the same pheromone used in earlier versions but has a slow release mechanism that makes it effective for eight months. This means you don't have to remember to change the lures during the season making it much easier for users as they then only have to empty the traps. The lures are widely available in France but are not currently easy to purchase elsewhere though it is now available in the UK following work by EBTS UK to connect the makers with retailers.

Pheromone traps are a useful tool in reducing the box moth problem and currently should be used in conjunction with spraying or biological controls.

Bacillus thuringiensis (Bt) which is used in Dipel and XenTari is generally considered harmless to humans, birds, and other beneficial wildlife including bees. The US Environment Protection Agency has not found any human health hazards and has no known effect on wildlife such as mammals, birds, and fish. In some countries, including Australia, Canada, and the USA[3] a number of products have organic certification. They contain protein endotoxin crystals and living spores and there are fifty subspecies; the most commonly used for caterpillars are subsp. *Kurstaki* (in Dipel) & *aizawai* (in XenTari). When the targeted insect eats a treated leaf, the toxins dissolve in the high pH of the pest's stomach, causing holes in the lining which allow the spores into the gut. These then germinate causing the death of the insect within a couple of days.

Most reports consider Bt to be the best option for killing box moth caterpillars, however it has to be ingested and it doesn't stay active on leaves for more than ten days as it breaks down under UV light.

Prospect for the Future?

Essential Oils and Plant Extracts

In her dissertation, Stefanie Gabriele Göttig, details tests that were carried out using six plant extracts, seven essential oils and one seed oil.[4] The tests looked at the repellent effect of different concentration of the extracts and oils when applied to *Buxus* leaves and therefore the number of egg laid by the female moths. A second observation was made on the toxicity of treatment on the caterpillars when they eat the leaves that had been treated. The plant that was most effective was Elder *Sambucus nigra* followed by *Thymus vulgaris* which reduced egg laying significantly. However, when also looking at the toxicity of the treatment, the S. *nigra* had no effect on the caterpillars whereas only 7% survived with the *T. vulgaris* at 5% concentration which was mixed with distilled water & Tween 20 (1%) as an emulsifier.

Göttig concludes that essential oils and plant extracts can act as a repellent causing a significant reduction in egg-laying by the female moths. This could be because the leaves of the treated plants have a slightly different optical property and texture due to the 'obvious fatty spray layer'. While this didn't affect the plant, it did deter the moths from laying eggs. When caterpillars ate the treated leaves, they died in around twenty-four hours.

Frass Vials

In June 2017, researchers in Hungary published a paper in the *Journal of Pest Science* (Vol.90 Issue 3 pp873-885) called 'Synthetic blend of larval frass volatiles repel oviposition in the invasive box tree moth, *Cydalima*' that looked at the 'frass', excrement produced by the caterpillars when eating box leaves. They noticed that while the caterpillars were feeding on leaves, the female moth didn't lay eggs in the vicinity. They wondered why this might be and looked at various possibilities, from visual cues to smells. Given the amount of excrement (frass) produced by the caterpillars, they decided to do a chemical analysis using coupled gas chromatographic–electroantennographic detection and found three chemicals that, when they did electrophysiological testing on the antenna of the male and female moths, caused responses. These three compounds, guaiacol, (±)-linalool and veratrole, were present for a couple of days after the caterpillar had produced the frass. The next step was to produce a synthetic version of this chemical mixture and put it in a bottle with a wick and place it near some potted box plants. The results were impressive, reducing the laying of eggs by around 75% compared to the control environment. They concluded that the chemical mixture may pave the way 'to the development of successful control methods for the preservation of boxwood populations in Europe.' Now we have to hope that their trials can be reproduced on a large scale and that a company invests in producing a commercial product as soon as possible.

Biological Pesticides

The most effective biological pesticide available is based on *Bacillus thuringiensis* (Bt) and it has been in use for over 50 years controlling caterpillars in crops. It is not readily available to domestic users in all countries though it can usually be bought online. It is generally available to professionals.

Nematodes

These small worms are supplied as a powder that is mix with water and apply with a watering can or hose attachment and repeated 2 more times at 7 day intervals. The nematodes need to be sprayed directly onto the caterpillars as they work by contact. They kill by entering through natural openings in the bodies of the larvae and producing bacteria that disrupts their digestive system. Having made contact, they then reproduce in the dead caterpillars and spread to others until they have nothing left to eat, at which point they die. To be effective, the surroundings need to be moist and the temperature must be >12C. As nematodes are a live product they can be

[1] John R, Schumacher J (2013) Der Buchsbaum-Zünsler (Cydalima perspectalis) im Grenzach-Wyhlener Buchswald – Invasionschronik und Monitoringergebnisse. Gesunde Pflanzen 65:1–6. | [2] Citation Assessment of Forest Pests and Diseases in Native Boxwood Forests of Georgia Final report by Dr. Iryna Matsiakh Forestry Department, Ukrainian National Forestry University. | [3] *Bacillus thuringiensis: A Cornerstone of Modern Agriculture*, by Matthew Metz CRC Press, 24 Nov 2003 | [4] Stefanie Gabriele Göttig, Dipl.-Biol., Technische Universität Darmstadt *Development of eco-friendly methods for monitoring and regulating the box tree pyralid, Cydalima perspectalis (Lepidoptera: Crambidae), on invasive pest in ornamentals.* 14.07.2017. | [5] Molnár, B.P., Tóth, Z. & Kárpáti, Z. J Pest Sci (2017) 90: 873.https://doi.org/10.1007/s10340-017-0837-0)

stored only for a maximum of 4 weeks and must be kept in a refrigerator during this time. They can be very effective if applied at the right time.

Trichogramma

These parasitoids are small wasps that lay their own eggs inside the egg sacks of the box moth eggs. When they hatch, they eat the box moth eggs. These can be very effective; however, as they are a live product they have to be purchased and applied in a timely manner, normally within 48 hrs. The distribution method is often a biodegradable cardboard carrier that is hooked onto a branch inside a box plant. Low emergence rates and a sex ratio unfavorable to females means they don't reliably sustain their population – generally, treatment lasts about two weeks before it should be repeated.

If the trichogramma are applied as soon as eggs have been laid and a minimum of two consecutive treatments are applied to the first set of eggs in the year, it is possible to achieve 90% efficiency.

A lot of work has been carried out in France on producing products to release these natural predators, which are native to the Drôme region. Bioline Agro-Sciences won first prize for innovation for its product Tricholine®Buxus. However, while effective, from an ease of use point of view, they require exact timing of orders, delivery and application as the trichogramma are a live product.

Conclusion

There is a lot of research going on into box moth and its caterpillars, but it has spread far and wide so it isn't going to be a simple matter to bring it under control. However, if a few of the items being researched make it to becoming a commercial product, it is possible to imagine a lure/vial combination that repels female moths from laying eggs while even more effectively attracting male moths into a trap and a simple organic spray that kills any caterpillars that do emerge.

Special thanks to Chris Poole and Topiarius*, the European flagship magazine of EBTS, for letting us republish this article.*

ABS Tribute to Mrs. Robert L. Frackelton

Mrs. Robert L. Frackelton joined the American Boxwood Society (ABS) in July 1967. While everyone always called her "Decca", her name, omnipresent in *The Boxwood Bulletin* for 37 years, was always written as she preferred, "Mrs. Robert L. Frackelton." I gladly yield to her wish here. Perhaps a touch antebellum, but an important acknowledgement of her always poised, graceful, elegant, intelligent and quietly productive personality.

Mrs. Frackelton was quiet during her first few years in the Society. Probably her first association with the board and general membership was her participation in the first annual ABS Workshop held in the Oatlands Plantation in Leesburg, VA on June 15, 1979. This was quickly followed by her attendance in the September, 29-30, 1979 Boxwood Garden Tour to the Washington, D.C. environs. Next, Mrs. Frackelton hosted the March 12, 1980 Spring Meeting of the Board of Directors. She reserved a private meeting room at the historic Kenmore Conference Center near her home in Fredericksburg. She graciously took the wives of three board members on a private tour of Fredericksburg – a town she supported and where she proudly resided. At this meeting, the board recessed for a "… convivial and delicious luncheon hosted by Mr. and Mrs. Frackelton in their beautiful home."

Board of Director

At the October 25, 1980 Board of Directors Meeting, Mrs. Robert L. Frackelton was unanimously elected to serve on the Board. In the announcement, it noted, "Mrs. Frackelton was born and raised in Charlottesville, VA. In 1941 she received an undergraduate degree in Chemistry from Sweet Briar College. With her husband she moved to Fredericksburg, Virginia in 1946 where they have since resided." The full page announcement in the January 1981 *Boxwood Bulletin* went on to explain, "…her interest in horticulture, boxwood in particular."

As Director, Mrs. Frackelton earnestly began her contributions to the society which would continue without interruption until her passing almost a quarter of a century later. She immediately joined the Tour Committee and set the itinerary, preformed site coordination, provided the promotion, planned the meals and took reservations for the April 25-26 ABS Garden Tour. The two-day tour included her garden, the Rising Sun Tavern, the Mary Washington House, Chatham, Kenmore, Wakefield and Stratford Hall. The tour included her garden, which can only be described as a botanical boxwood paradise.

First-Vice President

At the 21st ABS Annual Meeting on May 13, 1981, Richard Mahone was elected to serve as the fifth President. Vacating the 1st Vice President position which Mahone held for three years, Mrs. Robert L. Frackelton was unanimously elected to serve in his vacated position. Elected to the Board of Directors only six months earlier, her meteoric rise to 1st Vice President was not happenstance; rather it aptly demonstrated her proven ability to easily organize and support the ABS in an important variety of critical roles.

One of Mrs. Robert L. Frackelton's first major responsibilities as ABS 1st Vice President was organizing and promoting the educational program for the upcoming 1982 annual meeting. Concurrently, she aptly planned the fourth ABS boxwood tour. It was held in the Amherst and Lynchburg, VA area on September 18 and 19, 1982. She scheduled the Sunnyside Boxwood Farm, the private garden of Mr. and Mrs. Hall, Mt. San Angelo, Sweet Briar House and campus, Point of Honor, the private garden of Mr. and Mrs. Patteson, and the private garden of Mrs. Richards, Jr., all for the tour. This included a French Picnic at the boathouse at Sweet Briar College, dinner with cocktails at the Winton Country Club, an evening program entitled "Wildflowers" by Caroline Bates, and a lunch at the Boonesboro Country Club. Of course, she had the registration applications sent directly to her home to more efficiently take on this responsibility for the tour.

Any ABS Annual Meeting requires months of diligent preparation – a challenge Mrs. Frackelton took on with enthusiasm and skill. During these meetings, she provided wonderful refreshments without being reimbursed. She could recite from memory the appropriate passage in the ABS Constitution to

resolve any procedural impasse. At the end of each meeting, she would stand and recognize each individual who had contributed to its planning, always omitting her central role.

ABS President

On May 14, 1986, after five years serving as 1st Vice President, Mrs. Robert L. Frackelton was elected to serve as the sixth President of the American Boxwood Society at the 25th Annual Meeting. As membership chair she reported, "ABS membership stands at 703."

Photo: Robert L. Frackelton
President Mahone relinquishes the boxwood gavel to his successor, Mrs. Frackelton.

On October 15, 1986, Mrs. Frackelton, as newly elected ABS President, hosted the first of many board meeting at her Fredericksburg, VA home. Because they occurred thirty years ago, it is easy to plead a faint memory of the business agenda. However, the lunches she provided, with ample portions of healthy,

delicious, beautifully presented, gourmet home-prepared meals still hold a vivid and strong memory. Then, beautiful china plates, crystal glasses, elegantly designed silverware, with a freshly starched cotton table cloth and napkins completed the table. Incredulously, her amazing desserts easily surpassed her gourmet entrée. The perfect hostess, she was always considerate of others. She made it easy for us feel welcome and eager to participate on the ABS board.

The January 1990 *Boxwood Bulletin* on page 50, included a small easily-overlooked notice of the passing of Mr. Robert L. Frackelton. With the July 1991 issue, giving Mrs. Frackelton respite, Dale Taylor was elected seventh ABS President. Mrs. Frackelton immediately resumed her role as 1st Vice President which she aptly served until April 1995. Then at the Annual Meeting in Williamsburg, VA on May 20, 1995, she stepped down as 1st Vice President to resume her first ABS role as a board member. She would serve with distinction in this position until her passing, ten years later.

The Boxwood Bulletin

To properly describe Mrs. Frackelton, not to diminish any of her other substantial contributions and accomplishments, *The Boxwood Bulletin* must be mentioned. The ABS found itself with no editor for the July 1987 (Vol. 27, No. 1) issue. The inside front cover notes, "Edited by the ABS Bulletin Committee" and "Edited under the Direction of The American Boxwood Society." Well, the inside story is that Mrs. Frackelton was both of these groups. For 18 continuous years, ended only by her untimely passing, she diligently edited each issue while also providing many important photographs. In addition, she was the correspondence secretary, responding to all inquiries from members and the public. I'm confident she sent her elegant, hand-written letters to hundreds of inquiries each month. In each issue of *The Boxwood Bulletin*, she ensured that the Society received full attribution for what were her unsurpassed efforts.

So much more

To Mrs. Fackelton, no challenge within the ABS was too large or complex to find an equitable resolution, and no detail was too small to overlook. Through her nearly four decades long tenure, on multiple occasions, she reviewed and proposed Constitutional amendments which were always passed by the full board. Her first amendments, without attribution, were passed May 12, 1982 on pages 15 and 16 of the July 1982 (Vol. 22, No. 1) *Boxwood Bulletin*. She vetted the not-for-profit tax status of the ABS resulting in tax savings for the society. She reduced the ABS mailing costs by finding a more favorable bulk mailings status for *The Boxwood Bulletin* – an era when the mailings were more frequent and far larger than today. She edited *The Boxwood Bulletin* for decades. She edited the first edition of the *Boxwood Handbook: A Guide to Knowing and Growing Boxwood.*

In one random and ordinary example, the October 6, 1983 minutes of ABS Board meeting reported, "It was

decided to publish in The Bulletin only lists of new members, not the full membership. Mrs. Frackelton has volunteered to furnish addresses of specific individuals upon request by a member." Given her large multiple responsibilities she held within the society, she was always eager to do more. In the March 22, 1984 meeting, she reported, "...that she had contacted 181 members who were delinquent in their dues...".

For years and even decades, Mrs. Robert L. Frackelton chaired every committee within the ABS. In advance I offer my apology as this clinical enumeration fails to convey the magnitude of the responsibilities she performed. She chaired, serving with distinction, in these committees: Membership, Garden Tours, Nominating, Memorial Garden, Hospitality, ABS Constitution, Annual Meetings, Publicity, Finance, *The Boxwood Bulletin*, Publications. She also served in elected positions as Director, 1st Vice President, President and Editor.

A few personal observations

I was in a unique position within the society to closely understand her work. With all her great attributes, perhaps her most endearing quality was her quiet modesty. This caused many to overlook her major, significant and non-stop contributions to the ABS. She was so through in planning events and leading the organization, her work appeared effortless. If ever questioned, she deftly deflected the attention of her skilled accomplishments to others, or onto the results itself.

I was fond of her omnipresent handwritten notes in green ink. Always handwritten. Always green ink. Her copious handwritten cards, notes and letters were always thoughtful and gracious, and today they're legendary. She would write personalized letters to everyone associated with the ABS; a welcome note to new members, reminder notes to those who had let their membership lapse, informational letters to individual members of the board and so many more. It is impossible to calculate the hours and great energy she devoted to correspondence. My ABS and boxwood material fill over nine linear feet of shelf space. Yet, because I have retained so much useful material from Mrs. Frackelton, it took mere seconds to randomly locate one example. In May 1989, she attended a boxwood workshop. She attended every ABS event. I was absent. She thoughtfully photocopied the *Guide to the Natural Forms of Boxwood* bound it and mailed it to me. The omnipresent green ink handwritten "sticky" was still attached. Without my asking, she knew I would have a professional interest in this booklet. Thirty years later I still have it and I remain awed by this innocent example of her work. How can anyone be so thoughtful and astute?

In 2003, the manuscript for my tome, *Boxwood: An Illustrated Encyclopedia*, was virtually complete. Mrs. Frackelton was aware of it, but hadn't seen the manuscript. As a courtesy, I mailed her a copy and she loved it. In her typical manner, she called me and asked a few appropriate and astute questions. One question concerned the photographs, would they be black and white or in color? I explained it was necessary to use black and white as the ABS could not fund color photographs. After publication, in the quiet manner she preferred, I privately and gratefully acknowledged her unexpected and overwhelming financial support which resulted in more than 300 color photographs. Until now, I don't believe anyone else was aware of her quiet, substantial, financial contribution.

To the best of my knowledge, only Katherine Ward and I knew Mrs. Frackelton was solely responsible for sustaining the ABS in an era when its continuity was not assured. Indeed, she quietly worked to ensure her significant multi-year financial support to the ABS was not revealed. It can only be described as an absolute devotion to the ABS and its many varied programs.

December 18, 2004

When John McCarthy stepped down as editor, the ABS had no successor. Naturally, without hesitation, Mrs. Frackelton began to edit the January 2005 issue of *The Boxwood Bulletin*. Only her unexpected passing prevented her from completing this work. Lead by her daughter Rebecca, it then became an endearing family commitment to complete the issue for the passion held by Mrs. Robert L. Frackelton.

*Article by Lynn R. Batdorf**

I joined the ABS in 1977 and have served as International Cultivar Registration Authority for Buxus *since 1985. Writing this tribute has given me the great pleasure to honor and recognize a very graceful and intelligent woman who put service and dedication above all else. I still miss her.*

Photos sourced from past issues of The Boxwood Bulletin

Small Wonders: Gothic Boxwood Miniatures Exhibit

Public entrance to The Metropolitan Museum of Art (The Cloisters)

The exhibition area of Small Wonders: Gothic Boxwood Miniatures, NYC

A consortium of three world-class museums combined their rare and extensive collections of ancient and intricately carved boxwood. They created a travelling exhibit of boxwood carvings, the largest the world has ever seen. Travelling to each museum, it was first shown at the Art Gallery of Ontario, Toronto from October 29, 2016 to January 22, 2017. Then, The Metropolitan Museum of Art (The Cloisters), New York City from February 22 to May 21, 2017. Finally, Rijksmuseum, Amsterdam from June 15 to September 17, 2017.

Lynn Batdorf provides us with a detailed look back at the Small Wonders exhibit that took place at The Cloisters.

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1. Part of the Thomson Collection at the Art Gallery of Ontario, Toronto this is a commemoration of Woodcarver Ottaviano Jannella. He was renowned for his masterful and ingenious manipulation of boxwood. While later in date than the Netherlandish works featured here, the assemblage of carvings, tools, and materials bear witness to the extraordinary technical accomplishment of sculptors who created intricate worlds from modest blocks of boxwood. This was assembled by Ascoli Piceno, an Italian, who lived from 1635 to 1661. The sculpture, tools and eyeglasses are from 1654-60.

2. Miniature Altarpiece with the Virgin in Glory, and Saints James and Dominic. Made of boxwood in Netherlandish in the early 16th century. This is from a private collection in the United Kingdom.

The wings of the miniature altarpiece provide clues about its original owner, the figure kneeling at the left. His name almost certainly was James, as he kneels alongside Saint James the Great as his patron. In addition, he was affiliated with the Dominican order, which promoted the praying of the Rosary. Saint Dominic appears at the right, a little dog at his feet.

3. Prayer Bead with the Crucifixion and the Sorrows of the Virgin. Made of boxwood in Netherlandish in the early 16th century. From The Wernher Foundation, English Heritage, Ranger's House, London.

The bead emphasizes the sorrowful events of the life of Jesus' mother Mary, which are commonly linked to the cycle of prayers known as the Rosary. Together, there are seven. They read clockwise beginning at five o'clock on the lower bead (with a jump to the upper bead for the Crucifixion) as follows: the Prophecy at the Presentation, the Flight into Egypt, Jesus lost for three days, Jesus Carrying the Cross, the Crucifixion, the Lamentation (set deep at center), and the Entombment. The inscription includes a prayer said upon the completion of the Rosary. The artist placed a shield in a prominent position on the lower half of this bead, expecting that it would be customized at the time of sale with the coat of arms of the purchaser. For reasons unknown, it remained blank.

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4. Letter M with the Life of Saint Margaret. Made of boxwood in Netherlandish prior to 1524. Owned by Musée national de la Renaissance, Châeau d'Ecouen.

The list of Margaret of Austria's possessions in 1524 includes this remarkable letter M, carved on both sides with the tortured story of Saint Margaret. The narrative begins with the saint tending sheep in the countryside; a local governor, Olybius, has seen her there and dispatched his servant to ask her name. In the adjacent roundel, she appears before him. On the reverse, the consequences of her rejection of him play out. Margaret, naked to the waist, is tied to a column and flogged as Olybius covers his eyes. In the final roundel, he has ordered her beheading. At the bottom of the letter, Margaret subdues the Devil and vanquishes a dragon.

5. A Knife. Made of boxwood, steel and silver in Netherlandish in the early 16th century. Owned by Musée du Louvre, Département des Objets d'art, Paris.

Running along the edge of the handle is Jesus' family tree, known as the Tree of Jesse, which links him to King David, to the town of Bethlehem, and to Isaiah's prophecies about the coming of the Messiah. The other images connect events from Jesus' life to Hebrew Scripture, above all the Last Supper, in which Jesus gave bread and wine to his followers, with the priest Melchizedek serving bread and wine to Abraham (Genesis 14:18).

6a, 6b, 6c. Miniature Altarpiece with Jesus Carrying the Cross, the Crucifixion, the Decent from the Cross, and the Resurrection. Made from boxwood in Netherlandish 1503-33. Owned by Musée du Louvre, Département des Objets d'art, Paris.

The complexity of this piece and the delicacy of its carving need three photos to begin to appreciate the work. The altarpiece bears images of the Tree of Jesse, or the genealogy of Jesus – a visual proclamation of his familial descent from the biblical King David.

Along the edge of the case is the motto of the couple that commissioned the altarpiece: *riens sans peine*, the medieval French equivalent of "no pain, no gain." They kneel at the front of the Crucifixion scene, their coats of arms carved in the frame. Wealthy and ambitious, he was Augustijn Florisz van Teylingen, a church warden and town official in Alkmaar, a city in the north of Holland known since the Middle Ages for its cheese market. In 1503 he married Judoca Jansde van Egmond van de Nijenurg, a member of a more prominent local family, and they had thirteen children together.

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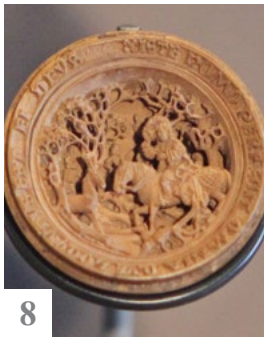

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7. Prayer Bead with the Legend of Saint James the Greater. Made of boxwood from the Netherlandish, early 16th century. Owned by the Cleveland Museum of Art, a purchase from the J.H. Wade Fund.

This bead is unusual in both form and subject matter. The original owner was likely named James. The inside of the bead shows the trial and execution of one of the two apostles of Jesus called James. The outer scenes illustrate lesser-known, earlier episodes, including when a magician whom James has converted to Christianity dispenses of his books on magic by hurling them into the sea.

8. Half of a Prayer Bead with the Vision of Saint Hubert. Made of boxwood from the Netherlandish, early 16th century. Owned by the Thomson Collection at the Art Gallery of Ontario, Toronto.

While hunting in the Ardennes forest one Good Friday, a young nobleman called Hubert had a curious vision of Jesus on the Cross set between the antlers of a great stag. The stag implored him to honor animals and, when hunting, to be mindful not to kill a doe with young. Hubert was inspired by the episode to become a priest and, eventually (in 708), bishop of Liège, in Belgium. His burial site was frequented by pilgrims, and his feast day remains popular in the Netherlands today.

9. Prayer Bead with the Queen of Sheba Visiting King Solomon and the Adoration of the Magi. Made of boxwood from the Netherlandish, early 16th century. Owned by the Thomson Collection at the Art Gallery of Ontario, Toronto.

Both the stories paired here concern rulers coming from exotic and faraway places to honor a greater king. To emphasize the

similarity of the narratives, the carver had deliberately drawn visual parallels between them. Though the inscription ringing the outside of the carving mentions the train of camels that the Queen of Sheba brought, they are nowhere in sight when the bead is opened. Rather the action is indoors, with the queen and two other women offering gifts, just like the three Wise Men in the scene below. The small dog under the table in the lower bead is typical of the small details that the artist inserts to enrich the scene.

10

10. Rosary of Floris van Egmond and Margaretha van Glymes. Made from boxwood in Netherlandish 1500-39. Owned by Musée du Louvre, Département des Objets d'art, Paris.

This sophisticated rosary, with individual beads, link New Testament stories, images of the apostles, and lines from the Apostles' Creed with stories, prophets, and texts from Hebrew Scripture. Each bead is marked on the bottom with a letter of the alphabet, which ensures their proper sequence. The inscriptions are cared with particular skill, and the texts weave in and out of the multiple facets of each bead.

Large bead upper: Last Judgement with Saint Matthew and Job
Large bead lower: Cleansing of Naaman and Judas Thaddeus
Bead B: Members of the Church; Good Samaritan?
Bead C: Baptism of Jesus; Pentecost
Bead D: Last Judgement; Judgement of Solomon
Bead E: Ascension; Transfiguration; Murder of Amos
Bead F: Death and Elijah Raising the Widow's Son; Resurrection
Bead G: Descent and Harrowing of Hell; Death of Zachariah
Bead H: Crucifixion; Entombment; David before the Ark
Bead I: Annunciation; Nativity; Death of Isaiah
Bead K: God in Majesty; Christ Child in Glory; Habakkuk; Feeding Daniel in the Den of Lions
Bead L: Creation of the Heavens; Christ Child in the Sun; Moses Receiving the Tablets (Ten Commandments)
Cross: Crucified Jesus; Saint Anne with her Daughter Mary and the Infant Jesus

The original owners can be identified by a motto – *sans faulte* (without fault) – and a coat of arms, both carved on the ring at the top. They refer to a Dutch noble couple: Count Floris van Egmond (died 1539), chamberlain to Philip the Handsome, and his wife Margaretha van Glymes (died 1551). Because the motto and arms are only on the ring, it is not clear whether they ordered the rosary or simply asked the carver to personalize the ring at the point of sale.

11

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11. Prayer Bead with the Story of King David. Made of boxwood from the Netherlandish, early 16th century. Owned by the Thomson Collection at the Art Gallery of Ontario, Toronto.

Like curtains at the theater, two tiny hinged wings and a medallion carved in low relief can all be opened so that the drama of the biblical king David's life unfolds act by act. For Christians, David was a model ruler. The top half of the bead celebrates his prowess in battle. The lower bead, on the other hand, emphasizes that David's laudable character, recognized by his virtuous wife Abigail, was compromised by his murderous passion for Bathsheba.

Left wing outside: David kills a lion to protect his sheep
Right wing outside: The prophet Samuel blesses David

Left wing inside: David removes the armor of Saul
Center stage: David beheads Goliath
Right wing inside: Saul and David carry Goliath's head
Medallion outside: The women of Israel greet Saul and David with tambourines
Lower main stage: Abigail kneels before David
Medallion inside: David watches Bathsheba bathe

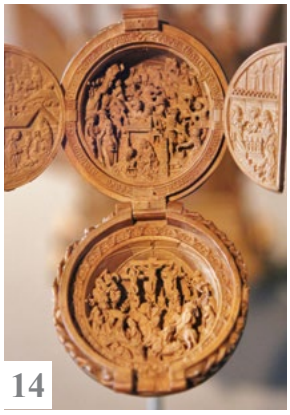
12. Prayer Bead with God in Glory and the Last Judgement. Boxwood with traces of later paint. Owned by Musée du Louvre, Département des Objets d'art, Paris.

While the Last Judgement subject provided ample opportunity for terrifying – and sometimes humorous – details, this carver has chosen to amplify the images of paradise with choirs of angels and ranks of saints. The inscription ringing the center is a line from the biblical book of the Apocalypse, sung on the Feast of All Saints: "O how glorious is the kingdom where all the saints rejoice with Christ, clothed in white robes." On the left wing, Saints Stephen, Lawrence, and George are distinguished in the front row by the symbols of their martyrdom.

13. Prayer Bead with the Legend of Saint Jerome. Made of boxwood from the Netherlandish, early 16th century. Owned by the Thomson Collection at the Art Gallery of Ontario, Toronto.

The legend of Saint Jerome appears on a deep stage constructed from successive layers of carving. Scientific imaging has revealed eleventh-hour additions by the carver, including the tiny deer on the left in the upper half.

In the lower half, we see the happy ending of one part of the legend. A partly obscured lion, famously befriended by Saint Jerome in the wilderness, has caught traders (some on camelback) who had stolen a donkey red-handed; with a great roar, he facilitates the rescue of the kidnapped beast. The guilty cohorts in the front beg for mercy.



14

15

14. Prayer Bead with the Adoration of the Magi and the Crucifixion. Made of boxwood from the Netherlandish, early 16th century. Owned by The Metropolitan Museum of Art, New York, a gift from J. Pierpont Morgan in 1917.

The carvers of boxwood miniatures regularly introduced interesting variations on standard subjects. Here it appears that one of the kings who brings offerings to the baby Jesus is running late. His African servant is still handing him a bag of gold coins (at right), as the first king already kneels before the infant, sitting on his mother's lap. Other servants work with a camel and horses; one at the right, his back to us, prepares to tether a horse to a spike in the wall. This may be playful on the part of the artist, for the pin that secures the dead to the case is set not far above. In the Crucifixion below, a man (at right) with a wheelbarrow laden with hammers looks back at the scene. Is the regretting his role as one who made the Cross or drove its nails in place?

15. Medallion with the Betrayal of Jesus. Made of boxwood from the Netherlandish, early 16th century. Owned by The Metropolitan Museum of Art, New York, a gift from J. Pierpont Morgan in 1917.

This medallion serves as a reminder that one of the most important skills of miniature boxwood carvers was their ability to create deep, stage-like spaces for the reenactment of the drama of the Bible. In this carving, the action is intense, but the faces are summarily rendered in some areas. Were elements such as these perhaps consigned to apprentices?

16

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16. Prayer Bead with the Crucifixion and Jesus before Pilate. Made of boxwood from the Netherlandish, early 16th century. Owned by The Metropolitan Museum of Art, New York, a gift from J. Pierpont Morgan in 1917.

This carving of exquisite complexity was surley intended for prayer during Holy Week, when the full drama of the final days of Jesus' life are traced. In the lower half of the bead, Pontius Pilate washes his hands of responsibility for the fate of Jesus. In a master stroke, the carver has made the stream of water stand free of the background. As if to remind us to look carefully, he shows a figure near the front poring over a text with the aid of magnifying glasses. Is the artist also hinting that magnification facilitated his own work? The carving warrants a careful look, for at the back Jesus is led away and then flogged.

17. Miniature Altarpiece with the Adoration of the Magi. Made of boxwood from the Netherlandish, early 16th century. Owned by the Thomson Collection at the Art Gallery of Ontario, Toronto.

In this miniature altarpiece, the entourage of the Wise Men who pay homage to Jesus includes both camels and an elephant. The names linked to these magi are spelled out beneath: Casper, Melchior, and Balthasar. Images of lions had long served as supports for small altarpieces and reliquaries. Here they give no hint of ferociousness or even vigilance; rather they appear well-fed and happy.

18

19

18. Miniature Altarpiece with the Nativity. Made of boxwood from Netherlandish in the early 16th century with later additions. Owned by the Detroit Institute of Arts, Founders Society Purchase, Robert H. Tannahill Foundation, Benson Ford Fund, and Henry Ford II Fund.

The artist seems to have adopted a fairly conservative approach for this altarpiece, with few anecdotal details. An exception is the group of three shepherds who dance in a circle behind the figure of Joseph.

Recent research by the staff at the Detroit Institute of Arts has revealed restoration done by a 19th century artisan named Baudoin. Among his alterations to the altarpiece are the wings at the bottom with a little dog and a vase of flowers.

19. Miniature Altarpiece with the Virgin in Glory, and Saints Barbara and Catherine. Made of boxwood from Netherlandish in the early 16th century. Owned by Rijksmuseum, Amsterdam, on loan from Museum Catharijineconvent, Utrecht, Netherlands.

The wings of this altarpiece are unusual. Saints Barbara and Catherine appear not only with references to their suffering (in a tower for Barbara and on the wheel for Catherine) but also, rather unexpectedly, with birds of prey. This, in addition to their pairing with Saints Christopher and George on the exterior, suggests an as-yet-unrecognized special commission.

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20. Miniature Altarpiece with the Crucifixion. Made of boxwood from the Netherlandish, early 16th century. Owned by The Metropolitan Museum of Art, New York, a gift from J. Pierpont Morgan in 1917.

Mary, Jesus' mother, her head covered with a veil and her back to us, is almost lost in the crowd at center. Saint John gently places his hand at her back, protecting her from the clamor of men and horses. Close to the Cross, the Roman centurion Longinus touches his eye, which, according to the Golden Legend, was miraculously cured by blood and water that dripped from Jesus' side.

The left wing shows Abraham's sacrifice of his son, understood by Christians to presage the Crucifixion. At right, the healing power of the Crucifixion is compared to God's favor toward the Israelites.

With Moses they gather beneath a great bronze serpent that has been set atop a pole at God's command, with the promise that a mere glance at the serpent would cure poisonous snake bites. In the roundel below is Christ's Resurrection on Easter Sunday. In the left wing, Samson carries away the doors of the city of Gaza, a remarkable display of power clearly being likened to Jesus bursting out of his tomb. At right, Jonah emerges from the belly of a whale after three days, a miracle that resonates with the Resurrection.

21. Prayer Bead with the Annunciation and the Nativity. Made of boxwood from the Netherlandish, early 16th century. Owned by the Thomson Collection at the Art Gallery of Ontario, Toronto.

This relatively simple bead presents two of the most well-known scenes from the life of the Virgin Mary: the angel's announcement that she will be the mother of Jesus, and his birth at Bethlehem. Two of the wood pins that secure the lower half of the bead in its shell can be seen in the upper left and right at ten o'clock and two o'clock, near the shepherds in the fields. The source of the inscriptions that ring the scenes has not been identified, and, exceptionally, there are no inscriptions on the outside of the bead.

22. Prayer Bead with Jesus Carrying the Cross and the Lamentation. Made of boxwood from the Netherlandish, early 16th century. Owned by the Thomson Collection at the Art Gallery of Ontario, Toronto.

This bead is simple but clear in its focus on poignant, central moments in a story often conceived by the boxwood carvers in a more complex manner. In the upper half, the labored and difficult path that Jesus follows to the Crucifixion site is smoothed by Veronica's quiet offering of a cloth to wipe his face. His mother, Mary, quietly mourns his death in the companion scene below. In an unexpected detail, a man behind her holds a large circlet. Is it the Crown of Thorns that had been placed around Jesus' head, or perhaps a ring of roses, signifying the cycle of prayers known as the Rosary?

23. Boxwood specimen, *Buxus sempervirens*. Owned by Lynn R. Batdorf, Bethesda, Maryland.

Boxwood was cultivated in Northern Europe in the Middle Ages. Although the evergreen plant grows slowly, boxwood forests in France provided raw material for artists as well as makers of scientific and musical instruments. While difficult to carve, it was appreciated for its smooth, fine grain and the precise detail that could be achieved. The artworks gathered in this exhibit have an appealing chocolate tint; freshly carved boxwood is creamier, approaching ivory.

Native to the Mediterranean, boxwood retained an association with the Holy Land in the minds of medieval Christians, a notion reinforced by contemporary translations of the Bible that mentioned it and by a belief that was one of the woods used to make the Cross. In European churches of the Middle Ages (and still today), priests and parishioners carried branches of boxwood in Palm Sunday processions. Prayer beads of wood were used even by kings during Lent, the forty days of fasting and repentance before Easter.

24

24. Prayer Bead with the Man of Sorrows. Made of boxwood from the Netherlandish in the early 16th century. It is from a private collection.

This prayer bead has lost the carving that would have been set in the upper half of the shell, allowing an insider's look at the refined openwork carving of the exterior.

The lower scene portrays Jesus surrounded by the tools and people linked to the torture he endured just before the Crucifixion. The inscription at the top suggest that it was originally paired with an image of the mourning Virgin. On the exterior, another inscription advises the user of this bead that good deeds are repaid sevenfold.

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25. Prayer Bead with the Last Judgement and the Coronation of the Virgin. Made of boxwood with traces of later gilding. From the Netherlandish, early 16th century. Owned by the Thomson Collection at the Art Gallery of Ontario, Toronto.

Chaos reigns in the upper half of this bead, as angels at the sides sound the trumpet of the Last Judgement. Demons of different shapes and sizes delight in hauling away sinners. To create this scene, the artist carved and assembled multiple elements. The torments of hell are carved on a piece inserted into the disk from the bottom, and a tiny figure is set in the mouth of hell. Angels are slotted in at the sides, and the arc of heaven is also a separate element.

In the lower half, choirs of angels and saints watch as the Virgin Mary is crowned Queen of Heaven. The surrounding inscription, words sung by monastic choirs in the Middle Ages, adds to the celebratory atmosphere: “In the city of the Lord, there sounds continually the organs of the saints; there is cinnamon and balsam, a most sweet odor; celebrate them.”

26. *The Grete Herball* was printed by Peter Treveris, a British citizen active from 1525 to 1529. It was printed from woodcuts on paper. Printed in London on July 27, 1526. Owned by the Metropolitan Museum of Art, New York. From the Elisha Whittelsey Collection. Purchased by The Elisha Whittelsey Fund in 1944.

From ancient times, boxwood was considered useful for carving. This book, printed around the same era as the carvings in this exhibit, focuses instead on the plant’s quasi-medicinal properties. It claims that the wood can help bring down a fever, if it is put in lye, and that a person wishing to have blond hair should use a shampoo of lye in which the plant has been allowed to soak. Boxwood, it notes, is a “little tree” with leaves like myrtle.

27. The *Garden of Health* (*Gart der Gesunthelt*) was printed by Peter Schöffer the Elder (German, Gernsheim 1425-1503 Mainz). It is hand-colored woodcuts on paper. Printed in Mainz, Germany on March 28, 1485. Owned by the Metropolitan Museum of Art, New York. From the Elisha Whittelsey Collection. Purchased by The Elisha Whittelsey Fund in 1944.

For my nearly 40 year professional career, I have often seen facsimiles of this famous and earliest boxwood print. I was unaware an original was in this exhibit. It was an exciting and delightful surprise! In this book, boxwood appears as #70 among 150 plants printed by Peter Schöffer, who served as an apprentice for Johannes Gutenberg, creator of the first printed Bible. (This story is very familiar to me. I have long studied Gutenberg and have a Gutenberg Bible, *Biblia Sacra Latina*, facsimile.) As a guide to health, Schöffer’s book was so popular that it was reprinted ten times before 1499. Boxwood is named in both Latin and German. The text describes it as an evergreen with a strong smell.

28. Standing Virgin and Child. Attributed to Niclaus Gerhaert von Leiden (active 1460 to 1470). Made of boxwood, probably in Vienna about 1470. Owned by the Cloisters Collection and Lila Acheson Wallace Gift in 1996. Former owners include: Baron Anselm von Rothschild in Vienna (1803-1874); Baron Nathaniel von Rothschild in Vienna; Alphonse de Rothschild; Rosenberg and Stiebel in New York (until 1948); Julius Wilhelm Böhler in Munich (d. 1967); Julius Harry Böhler in Munich (d. 1979); Marion Böhler-Eitle in Munich (d. 1991); Florian Eitle in Starnberg.

Niclaus Gerhaert, a seminal artist of the generation preceding Albrecht Dürer’s, presumably was born in Leiden and was active in Strasbourg and Vienna, as well as several cities in between. Only three signed works are known and a mere four other, including this sculpture, have been seriously thought to be by Gerhaert’s hand.

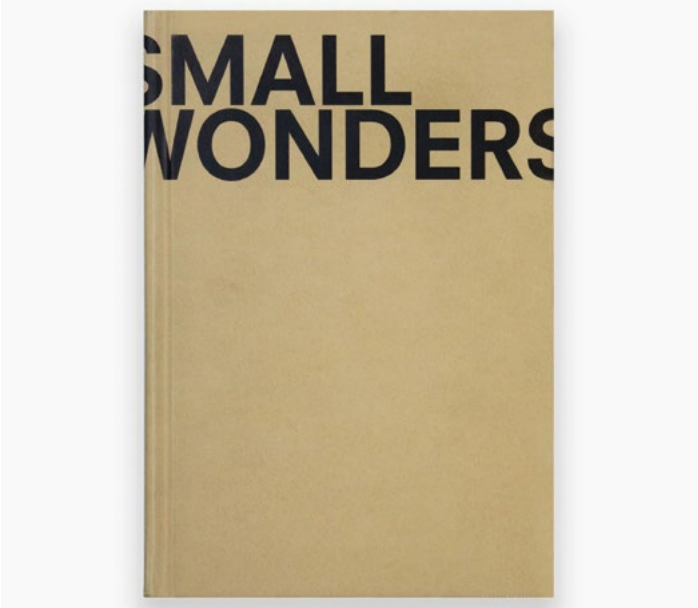
This statuette expresses a combined sense of drama, monumentality, and elegance through the extraordinarily accomplished carving of the fine-grained wood. The rhythm and balance of the complex drapery folds are counterpoised by the fine linear details and textural contrasts. Among the naturalistic details that subtly enhance the total form is the delicate manner in which the Virgin’s fingertips press into the chubby flesh of the child. Intended as an object of private devotion and continuing a long tradition in the use of boxwood for this purpose, it may well have been commissioned by a member of the imperial court in Vienna. The dark base with the fictive Dürer monogram and date on the back is of later date. Both arms of the child and the section of drapery held in his left hand are replacements.

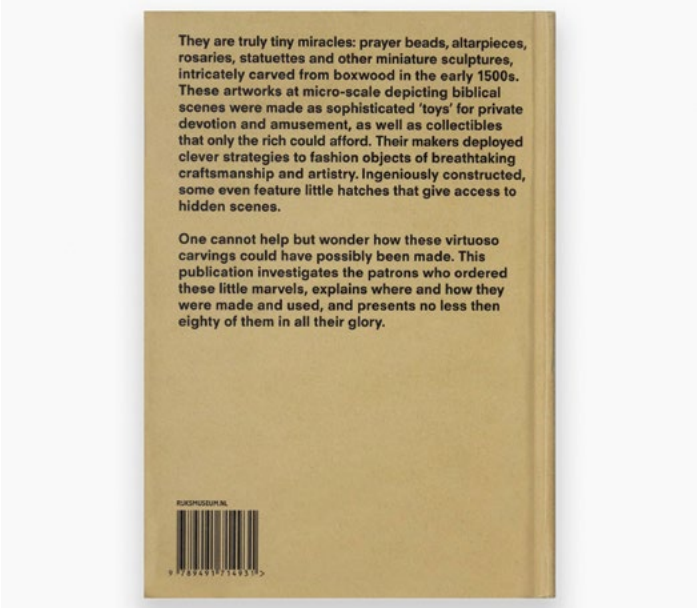
Article & Photos by Lynn R. Batdorf

We want to hear from you!

Do you have a question about boxwood?
Is there a subject you want to learn more about?
Have you taken any boxwood photos that you want to share? Email us at
amboxwoodsociety@gmail.com

Book Review | *Small Wonders: Late-Gothic Boxwood Micro-carvings from the Low Countries*





This exciting new book has three primary purposes. It serves as the most definitive examination and explanation of 264 historical boxwood artifacts. Secondly, it serves as an in-depth companion to *Small Wonders: Gothic Boxwood Miniatures*. Third, it is a scholarly documentation to the largest ever collaboration of 35 international museums to document virtually every important Gothic boxwood artifact! This unprecedented scope presents the reader with an informative and exciting understanding of this eternally alluring boxwood subject.

Released in 2016, this hardback book has 687 pages. With this large a book, it could justifiably be titled, *The Mammoth Book of Small Wonders*. The text was decades in preparation. In 1968, Jaap Leeuwenberg, former curator of sculpture in the Rijksmuseum, began to write this book. Then Susan Romanelli, a former Met curator, wrote a 1992 dissertation devoted to micro-carvings, joining Leeuwenberg. It is the joint efforts of these two scholars who blazed the trail for the new and comprehensive research conducted by the authors of this book. The successful editing of the contributions of the five authors fell to Frits Scholten, senior curator of Sculpture at the Rijksmuseum, who also contributed book chapters.

There are hundreds of full color photographs – some showing the entire art object and others providing exquisite and extreme close-ups to highlight tantalizing details. The bibliography reads like a Who's Who of boxwood wood carvings with a complete listing of hundreds of important books from 1640 to date.

The Foreword aptly explains this detailed comprehensive tomb, "Art can amaze and inspire, and that is particularly true of miniature art. Just like the awesome scale of a Gothic cathedral, the microscopically small also makes us wonder about its unimaginable size: how could something so tiny have been made by human hands? People have been captivated for centuries by the Gothic micro-carvings created in the Low Countries in the late 15th and early 16th centuries. These miniature altarpieces or prayer beads were initially admired for the religious visions that unfolded upon opening them, but there was soon equal fascination with their artistry and craftsmanship. These objects became fashionable and found their way into some of the most important collections of the period. Perhaps possession of the world in miniature reinforced the collectors' sense of power and status in the real world?

"Today, most of these boxwood miniatures are in museums the world over, three of which have joined forces to share this remarkable art with the public: the Art Gallery of Ontario in Toronto, The Met Cloisters in New York, and the Rijksmuseum in Amsterdam. The result is Small Wonders, an exhibition that will travel to each museum, as well as a website with high-quality photographs of these micro-carvings, and this book designed by Irma Boom."

Book Review by Lynn R. Batdorf

2019 Addenda to International Registration Lists of Cultivar Names in *Buxus* L.

Inclusive addenda to "International Registration List of Cultivated *Buxus* L." *The Boxwood Bulletin* 48(4):58–63.2009.

Buxus microphylla Siebold & Zuccarini in *Flora japonicae familiae naturales* 1:34.1845.

'Grebor' Green Borders™ *Catalog*, Greenleaf Nursey, Park Hill, OK.2008.
'Little Missy' *Catalog*, Conard-Pyle Co., West Grove, PA.2014. US 20140101798P1.
'Peergold' Golden Dream™ *Inventory*, H. Gallikowski, Emden, Germany.2004. PP16052.
'Robbuxupt' Planthaven International, Santa Barbara, CA.2010. USPP 21390P2. Selection from sport of *B. sinica* var. *insularis* 'Wintergreen' in Grain Valley, MO nursery.

Buxus microphylla Sieb. & Zucc. **var. *japonica*** (Muell.) Rehd. & Wils. in Sargent, *Plantae Wilsonianae* 2:168.1914.

'Belvèdére' L. Batdorf, *Boxwood: An Illustrated Encyclopedia* 65.2004.
'Bulthouse' *Catalog*, Spring Meadow Nursery, Grand Haven, MI.2015. USPP 25896. Mutation of 'Winter Gem'.
'Fernwood' L. Batdorf, *Boxwood: An Illustrated Encyclopedia* 47.2004.
'Fileleaf' L. Batdorf, *Boxwood: An Illustrated Encyclopedia* 47.2004.
'Frierson's Compact' *Catalog*, Carolina Nurseries, Moncks Corner, NC.2002. Selected by John Frierson, Lexington, SC.
'Garden Gate' *Inventory*, Chicago Botanic Garden, Glencoe, IL.2018.
'Golden Triumph' *Catalog*, Firma C. Esveld, Boskoop, Netherlands.2017. Selection from 'Faulkner'.
'Gregem' Baby Gem™ *Catalog*, Greenleaf Nursery, Park Hill, OK.2010. PP21159.
'Green Jade' L. Batdorf, *Boxwood: An Illustrated Encyclopedia* 68.2004.
'Grejade' Baby Jade™ *Catalog*, Greenleaf Nursery, El Campo, TX.2016. USPP 26656P2.
'Green Prince' L. Batdorf, *Boxwood: An Illustrated Encyclopedia* 68.2004.
'MonAlex' Petite Pillar™ *Catalog*, Monrovia Nursery, Azusa, California.2015. PP27647. PPAF.
'Sprinter' *Catalog*, Proven Winners, Grand Haven, Michigan.2017. Selection from 'Winter Gem'.
'Unraveled' Selected by Bill Barr, Hines Nursery, Brookshire, TX.1999. Introduced by Yucca Do Nursery/Peckerwood Garden, TX.

Buxus sempervirens L. *Species Plantarum* 983.1753.

'Beckett' L. Batdorf, *Boxwood: An Illustrated Encyclopedia* 109.2004.
'Buddy' *Catalog*. Chris Sommers Nursery, Crestwood, KY. 2002. Named for Buddy Hubbuch, curator Bernheim Arboretum, Claremont, KY.
'Chloe' *Inventory*, Missouri Botanical Garden, St. Louis, MO. c.2010.
'Cowles House' *Inventory*, Chicago Botanic Garden, Glencoe, IL. c.2017.
'DSNH 1216' Shadow Sentry™ *Catalog*, Greenleaf Nursery Co., Park Hill, OK.2010. [DSNH is an acronym for Don Shadow Nursery Hibiscus; Shadow Sentry is a non-registered trademark]
'Eseles' Wedding Ring™ Gerard Katerburg, *Catalog*, Spring Meadow Nursery, Grand Haven, MI. USPP 22328; CPBR 4595. 2011.
'Furore' Jade Pillar™ Jan Cornelis van Waaij. Hazerswoude-Dorp, Netherlands.2010. USPP 21319. Shorter internodes than *B. microphylla* var. *japonica* 'Faulkner'.
'Gray Dawn' *Inventory*, Chicago Botanic Garden, Glencoe, IL.2018.
'Gray Summit' L. Batdorf, *Boxwood: An Illustrated Encyclopedia* 137.2004.
'Highlander' Mutation of *B. sempervirens* discovered by Norman Cole, Pipestem, WV.2012.PP22978.
'King Midas' *Catalog*, Firma C. Esveld, Boskoop, Netherlands.2000.
'Marian' *Catalog*, Firma C. Esveld, Boskoop, Netherlands.1995.
'Sentinelle' *Catalog*, Firma C. Esveld, Boskoop, Netherlands.1984. RHS.

Buxus sinica (Rehd. & Wils.) Cheng **var. *insularis*** (Nakai) M.Cheng in *Acta Phytotaxonomica Sinica* 17(3):100.1979 & *Flora Reipublicae Popularis Sinicae* 45(1):37.1980.

'Bob' Sweet 'n Low™ L. Batdorf, *Boxwood: An Illustrated Encyclopedia* 235.2004.
'Meadows Garden' *Catalog*, Pine View Nursey, Leitchfield, KY.2017.
'Miss Jones' L. Batdorf, *Boxwood: An Illustrated Encyclopedia* 239.2004.
'Nomar' *Catalog*, Hortico Incorporated, Waterdown, Ontario, Canada.1982. COPF.
'Sunburst' Golden Sunburst™ *Inventory*, van der Giessen Nursery, Semmes, Alabama.2004.

Buxus L.

'American Beauty' *Inventory*, Chicago Botanic Garden, Glencoe, IL.2017.
'Coolie Gardens' L. Batdorf, *Boxwood: An Illustrated Encyclopedia* 254.2004.

by Lynn R. Batdorf
International Cultivar Registration Authority (ICRA) for *Buxus* L. since 1985. Special Commission for Cultivar Registration, International Society for Horticultural Science (ISHS).

'Cranberry Creek' *Catalog*, Willoway Nurseries, Avon, OH. c.2002.
'Dorothy McCalley' *Inventory*, Chicago Botanic Garden, Glencoe, IL. c.2017.
'Elizabeth Lawrence' *Inventory*, Dawes Arboretum, Newark, OH.2005.
'Emerald Charm' *Inventory*, Chicago Botanic Garden, Glencoe, IL. c.2017.
'Emerald Knoll' RLH-BI Garden Center Marketing, Holly Springs, NC. c.2017. PP24443.
'Granny Smith' *Inventory*, Chicago Botanic Garden, Glencoe, IL. c.2018.

New synonyms

Buxus microphylla Sieb. & Zucc.

'Belvèdére' New Ornamentals Society.2003. = ***Buxus microphylla* var. *japonica* 'Belvèdére'**
'Filigree' *Catalog*, Firma C. Esveld, Boskoop, Netherlands.2017. = ***Buxus sinica* var. *insularis* 'Filigree'**
'Golden Triumph' *Inventory*, Chicago Botanic Garden.2018. = ***Buxus microphylla* var. *japonica* 'Golden Triumph'**
'Green Jade' *Catalog*, Firma C. Esveld, Boskoop, Netherlands.1989. = ***Buxus microphylla* var. *japonica* 'Green Jade'**

Buxus microphylla var. *sinica* Rehd. & Wils.

'Harlandii' *Inventory*, Chicago Botanic Garden.2018. = ***Buxus harlandii***

Buxus sempervirens L.

'Baldwin Dwarf' *Inventory*, Chicago Botanic Garden.2018. = ***B. microphylla* 'John Baldwin'**
'Candelabra' *Inventory*, Chicago Botanic Garden.2018. = ***Buxus sempervirens* 'Handsworthiensis'**
'Skywalker' *Inventory*, Garden Center Marketing, Holly Springs, NC. c.2017. = ***B. sempervirens* 'Dee Runk'.**

Buxus sinica* var. *insularis (Nakai) M.Cheng

'Justin Brouwers' P. Larson. *The Boxwood Bulletin* 29(1):3.1989; 33(1):11.1993. = ***B. sempervirens* 'Justin Brouwers'** Thammina, C., Olsen, R., Kramer, M., Pooler, M. "Genetic relationships of boxwood accessions based on genic simple sequence repeat markers" *Genetic Resources and Crop Evolution* 64:1281–1293.2016.

Buxus L.

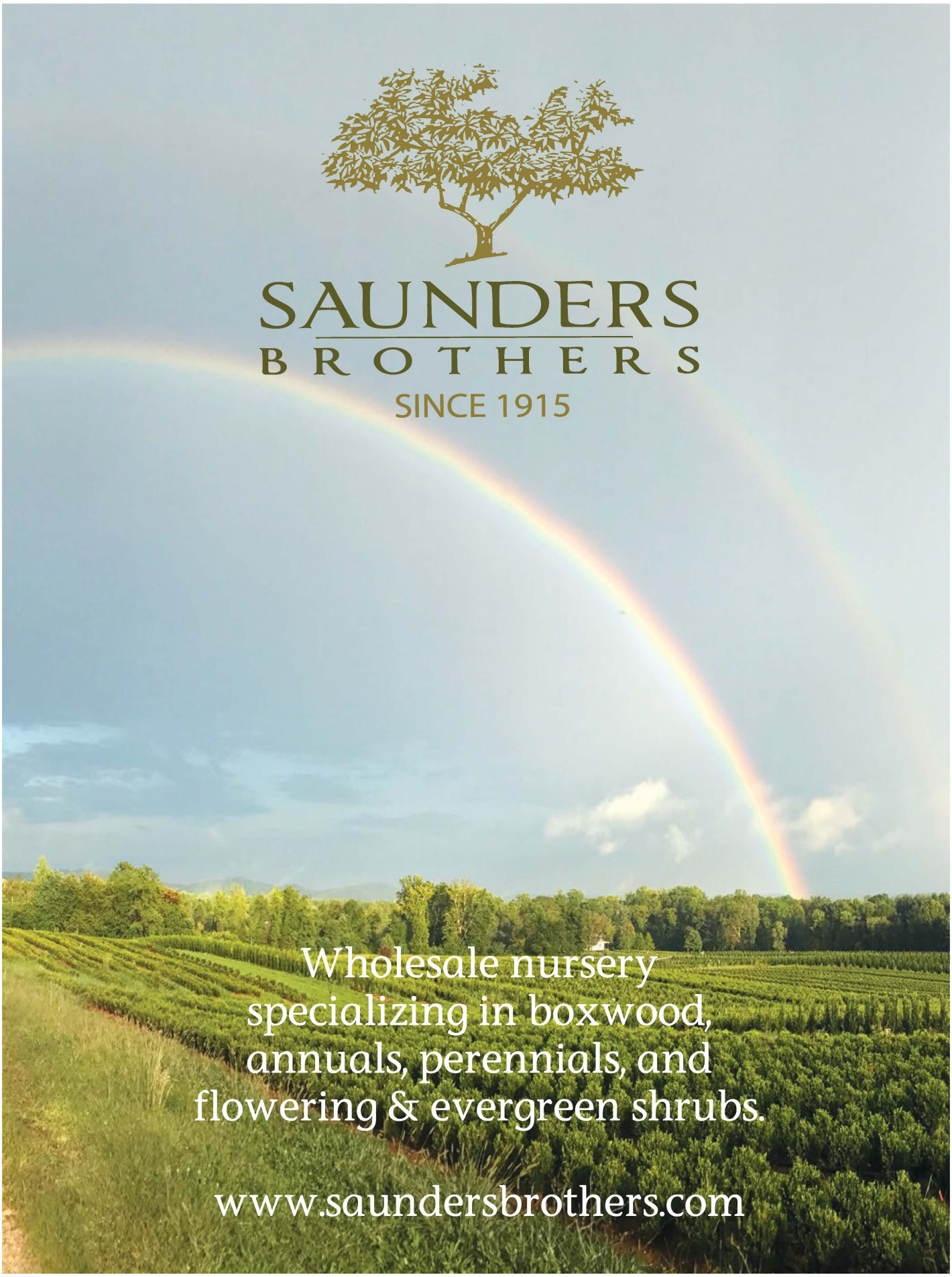
'Buddy' *Inventory*, Dawes Arboretum, Newark, OH.2010. = ***Buxus sempervirens* 'Buddy'**
'Himalayensis' *Inventory*, Chicago Botanic Garden, Glencoe, IL.2018. = ***Buxus wallichiana*** Baillon *Monographie des Buxacécs et des Stylocérées* 63–4.1859.
'Krazgreen' Various US and European nurseries = **B. 'Green Ice'**

Notes

A popular boxwood, 'Justin Brouwers' is reclassified from ***B. sinca* var. *insularis*** to ***B. sempervirens.*** Long suspected, but now supported with proper evidence. It is now correctly written as: ***Buxus sempervirens* 'Justin Brouwers'**.

During the nearly two years of research required to properly prepare this addenda, the registrar became aware of the website: http://www.cultivar.org. An official inquiry to the Secretary, ISHS Special Commission for Cultivar Registration, resulted in this reply, "Dr. John David (Royal Horticultural Society, Head of Taxonomy) is aware of this website. The OROC [Open Registration of Cultivars] scheme operated by Larry Hatch has nothing to do with the ISHS [International Society for Horticultural Science] ICRA [International Cultivar Registration Authority] scheme, of course and, as his set-up has to be self-financing, he charges for some of his products including registration. Dr. David advises that the advantage of OROC is that it does offer 'registration' for cultivars for which there is no ICRA. It's a moot point whether his registrations should be considered as such under the ICNCP [International Code of Nomenclature for Cultivated Plants]. The Code (Division IV: Registration of Names, which is not mandatory) lays out the system for registration of names with an ICRA and in clause 1 states that registration 'is the acceptance of a cultivar (etc.) by an authority responsible for registering such names.' Only in clause 2 does it mention ICRAs but does not explicitly state that registration can only be effected through an ICRA, although implies it and I think it is fair to say that would be our understanding. If this division is read 'inclusively' then the registrations through Cultivar.org are acceptable but there might be an issue with a cultivar registered by Hatch as well as by the official ICRA especially where the names registered differ for the same entity."

The Boxwood Bulletin (ISSN 0006 8535) is published by the American Boxwood Society, P.O. Box 85, Boyce, VA 22620.
Please send address changes to ABS, P.O. Box 85, Boyce, VA 22620.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