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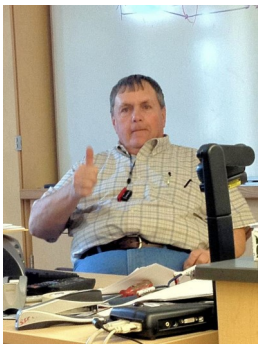
Bob's News & Musings



What's New?

Spring is rapidly approaching, which means Thecla and I have to get several garden projects completed before the weeds reappear and the garden plants awaken from their winter rest.

Our Puyallup garden covers less than a half acre, which includes the house. It still requires work, but nothing like I had before on my five acre Eatonville garden. At least now I can enjoy the garden with an occasional burst of hard work.

Unfortunately, I have to remove several conifers. I will try to dig a *Taxus baccata* 'Icicle' (5-6 feet tall). Three large spruce will have to be removed with a chain saw. The three are *Picea abies*: 'Pusch', 'Dandylion', and 'Dazzler'.

A garden is a living construct and the plants either grow or die. Even dwarf and miniature selections can outgrow their spaces if given enough time.

When I gardened on five acres in Eatonville, I had a collection of close to 1000 different cultivars. I started the garden in 1995 and by 2010 I had parts that were getting badly overgrown. I knew when planted the 2000+ conifers that I could never dig any due to the rocky soil. So I could only make space through tree removal.

I hired a group of college boys and gave them a chainsaw and had them clear a spot for a large burn pile. Then I tagged about 200 of the worst congested trees and they destroyed them.

Quite a few of them were rare and had a high value but were not moveable. The ones left behind had space and continued their growth without any competition (for now). Eventually another chainsaw episode would be needed, but I sold the place before that became necessary.

I do not like removing trees from our new garden, but I have learned to make the hard choices where my conifers are concerned.

The four conifers are in line from left to right in this picture with 'Dazzler' at the left followed by 'Pusch', 'Dandylion', and 'Icicle'.

Special points of interest:

- **Gardens are living structures with variable life spans.**
- **Two containerized Japanese maples once sold for $10,000.00 in the 1970s.**
- **Read about a possible cause of witches' brooms.**
- **Meat for the grinder can be applied to education.**

Inside this issue:

I could tell that Picea abies 'Acrocona' is not suitable for the smaller garden.

Below

An 'Acrocona' witches' broom at Gee Nursery named *Picea abies* 'Biggie'

Picea abies 'Pusch'

The Arnold Arboretum, Jamaica Plain, Massachusetts, has an interesting conifer collection with many of the spruce having been planted about 1900. Among these old trees is a specimen of *Picea abies* 'Acrocona'. When I first came across it in the late 1970's, I was struck by the large number of cones (picture, upper left margin). I also found it interesting that the cones were on the ends of the branches. I searched quite a while before I was able to locate and purchase one for our garden.

I could tell that *Picea abies* 'Acrocona' is not suitable for the smaller garden. I always felt that this was an unfortunate fact of life, until about 1989 when Dianne and I were visiting Jan zu Jeddeloh in Germany. He was growing a miniature form of *Picea abies* 'Acrocona', and he had hundreds of them in a small greenhouse. He explained to me that it was discovered as a witches' broom on *Picea abies* 'Acrocona'. In effect, it was a miniature 'Acrocona', making it very suitable for the smaller garden. It had been given the name of *Picea abies* 'Acrocona Nana', which was later changed to *Picea abies* 'Pusch'. It had only recently appeared in Europe, and zu Jeddeloh planned to "corner the market".

In the spring 'Pusch' develops red cones on most of its branch tips, making a colorful display in the garden and showing that not only herbaceous plants produce colorful 'flowers'. It develops into an irregular mound when left to its own devices and will take over twenty years to become 2' (60 cm) high by 3' (1 m) wide. The foliage is dark green, and the cones develop normally, gradually turning brown by the fall, but they never develop any size and stay quite small.

Picea abies 'Pusch' has many uses in the garden and does what a conifer should do- produce cones. Plant it in full sun with well drained soil that need not be very fertile.

Acer palmatum 'Red Filigree Lace'

The *Acer palmatum* 'Red Filigree Lace' originated in Canada and was brought into America by John Mitsch for his nursery in Aurora, Oregon. John purchased it from William Goddard who owned a nursery in Victoria, British Columbia in the early 1970s. It was and still is a very special plant.

There are two very special attributes possessed by 'Red Filigree Lace'. First, its leaves are so deeply dissected as to be almost threadlike. One wonders how they manage to survive being so narrow. Second, the red color is deep and long-lasting, even in partial shade. The color lasts until autumn, at which time the leaves turn brilliant scarlet before falling to the ground.

Here in Washington it thrives in the full sun. In some parts of the country it may suffer tip burn in a hot afternoon sun.

The stems are dark red, and the growth rate is slow. It takes a considerable length of time before a plant attains any reasonable size so it can be used in the landscape. That also means it produces less scion wood for propagation than a typical *Acer palmatum*.

It will always be a rare plant since the slow growth rate and limited scion wood makes it more expensive to produce and necessitates a high selling price for a retail garden center. That is unfortunate since this cultivar is very desirable, especially for the smaller garden.

Jean Iseli heard of *Acer palmatum* 'Red Filigree Lace' and wanted it for his nursery. He recognized its uniqueness and desirability. He was able to purchase it from Mitsch for the price of $10,000. I believe he received two larger plants and several young ones for that amount.

Jean had a plan for it. He was very good at marketing. He knew it was hardly worth that much of an investment simply to add it to an availability list. Jean's idea, however, was to have a plant that he could use to introduce himself to new people. There was a lot of publicity about that plant purchase and the few plants offered for sale years later were at a very high price.

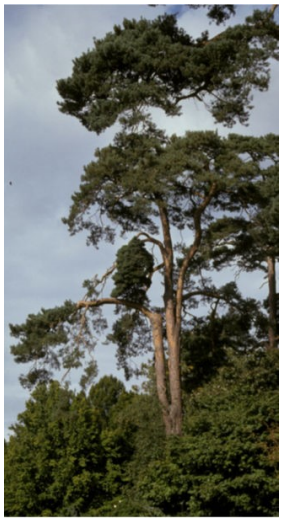
Jean had created an excellent "calling card" for himself. Whenever Jean wanted to make a visitor or customer feel special, he would gift them a young plant. He gave more away than he ever sold and the return in goodwill was many more times than its financial cost.

I have two large plants growing here in Puyallup. I do not grow them just for their beauty. I grow them because anytime I pass one in the garden I briefly think about a good friend who is no longer here.

Jean Iseli heard of Acer palmatum 'Red Filigree Lace' and wanted it for his nursery.

Witches' Brooms

Several ideas attempt to explain the origin of a witches' broom.



A different class of conifer seedlings has been experimented with since about 1960. These are seedlings grown from witches' brooms. A witches' broom is a bud mutation that develops into an area of congested growth on an otherwise normal tree. The name resulted from the earliest discoveries of witches' brooms. They were, and still are, often found around and in old cemeteries. Superstitious people believed these were places where witches rested when flying through the night skies.

Superstition aside, a witches' broom can provide material for propagation that produces a dwarf conifer, provided the broom is genetically changed and not altered due to insect damage or parasitism, usually by mistletoe. Many of the conifer cultivars available today originated from witches' brooms. Some of them bear only a faint resemblance to the original broom while others are almost identical.

Several ideas attempt to explain the origin of a witches' broom. Most brooms are thought to be viral in origin. A virus upsets the hormonal balance in an elongating bud, causing it to grow little but produce many lateral branches. Such growth continues until the broom chokes itself or is shaded to death, provided the hormonal irregularities themselves are not fatal. If this type of broom is propagated, the progeny will fail immediately or within just a few years. One clue that a discovered broom is of this type would be observing several brooms within a small area, indicating that the virus spread through the site like a disease.

Brooms that do propagate successfully are attributed to other causes. These 'other causes' have never really been defined. But some interesting facts or clues are known. Cytokinins are found at a higher-than-normal level in a witches' broom. Cytokinins are hormones that do not move very freely around the plant. Their presence stimulates cell divisions. Another hormone named gibberellin is present at reduced levels. It encourages shoot elongation. This sort of combination would tend to promote the formation of many shoots while keeping them short.

Additionally, the excess cytokinin can interfere with an auxin-regulated bud. In normal plant function, an auxin would keep bud tips from overgrowing and encourage apical dominance, but cytokinin can sometimes interfere with this control, causing these buds to grow into witch's brooms.

Cytokinins or CKs are a group of chemicals that influence cell division and shoot formation while auxins and the gibberellin these auxins synthesize influence stem elongation. CK's are responsible for mediating auxin transport throughout the plant and affect internodal length and leaf growth. Cytokinins and auxins often work together, and the ratios of these two groups of plant hormones affect most major growth periods during a plant's lifetime.

Excess cytokinins will block auxins, causing short distances between buds and possibly influencing the numbers of buds being formed. They block the auxins from moving out of the bud area and damage the normal growth processes. It seems that excess auxin in a growing shoot is detrimental to the shoot.

Since the imbalance between cytokinin and auxin appears to be a genetic issue, the property is carried over into asexually propagated offspring.

Grafting a small piece of a 'nonviral' witches' broom onto a seedling will generally create a plant with the original broom's characteristics. The hormonal imbalance apparently remains, even though a new stem and root system with a standard balance have been added. *(Of course, the broom itself was on a species-normal trunk and root system while attached to the parent tree.)* Either a causative agent was in the piece of the broom that was grafted, or the genetic structure of its cells was imprinted with a new hormonal code equal to that of the whole broom.

Studies by Jerry Morris, a Colorado resident who spent most of his life in the forests of the Rock Mountains, indicate that brooms are caused by radiation-induced mutations in buds. In that case, there is no causative agent being carried along in propagation material.

Recent work with witches' broom seedlings prove a genetic causation for broom development. Roughly 50% of seedlings grown from a witches' broom seeds demonstrate some degree of dwarfness. Since most brooms are female, the pollen comes from a species-normal parent leading to about half the seedlings being normal or near normal offspring and half being dwarf to some degree.

I have been trying to puzzle-out the genetics at work in these seedlings. Read on if you would like to see why I am a bit confused.

In high school biology, the genetics chapter tells us that genes are dominant or recessive. The dominant gene, when present, will always affect the appearance of the plant.

We also learn that genes occur in pairs and if a pair has a dominant and a recessive gene, it is heterozygous. If both genes are the same, it is homozygous.

We also learn that some traits are the result of two or more pairs of genes acting together.

The gene for dwarfness in a witches' broom must be affecting the cytokinins and auxins. If it is a gene acting in a single pair, it must be a dominant gene since it masks the one that leads to normal growth. That means if pollen has all normal genes while the zygotes or egg cells in the female cones of the broom have the dwarfing or wb gene then all the seedlings would have to appear species-normal from their combination. Dwarf plants would not appear until a second generation of seedlings is grown from the first generation of seedlings.

Likewise, if dwarfness is a single recessive gene, then pollen would need to be heterozygous to

produce any dwarf seedlings. That would require all species of conifers to have a recessive gene for dwarfness. That is highly unlikely since forests are not 50% dwarf trees.

If the witches' broom underwent a genetic mutation that caused it to be heterozygous for dwarfness, all offspring would be normal, unless the trait involves two pairs of genes working together. Then if one gene has mutated, the 50% rule works.

You may remember Punnett Squares from high school biology. They are great for picturing and calculating what is happening. In this Punnett Square, the 'T' is normal hormone production while the 't' indicates a mutated gene that affects the production and causes multiple bud formation and short internodes. If a normal plant has 'TT TT' for its genotype and a witches' broom has 'TT Tt' for its genotype, the results of pollination are shown below. Keep in mind that these are probabilities, not exact ratios for the results.

Each pollen grain (across the top) has one gene from each of the two pairs. The same is true for the egg cells down the left side. Notice two eggs out of every four are normal. When a pollen grain fertilizes an egg, their genes combine to make a new double pair. The upper left cell has 'TT TT' producing a normal seedling. The lower right cell with 'TT Tt' will be a dwarf seedling. Overall, half of the seedlings are going to display some degree of dwarfness.

I am sure the actual process is much more complex than this simple explanation. However, I think it works as an explanation for dwarf witches' broom seedlings.

I hope I did not give you a headache from all this science stuff.

The picture to the right shows a witches' broom in an old *Picea abies* in the Gotelli Dwarf Conifer Collection and a grafted plant from the broom (*Picea abies* 'Gotelli Honey').

Punnett Square

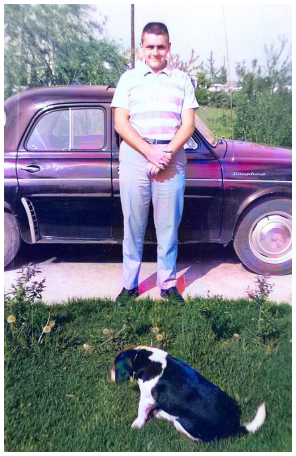
TT TT = TT:TT:TT:TT Each cell has a possibility of 4
TT Tt = TT:Tt:TT:Tt sex cell genotypes.

	TT	TT	TT	TT
T T	TT TT	TT TT	TT TT	TT TT
T t	TT Tt	TT Tt	TT Tt	TT Tt
T T	TT TT	TT TT	TT TT	TT TT
T t	TT Tt	TT Tt	TT Tt	TT Tt

Pinus contorta 'Taylor's Sunburst' witches' broom at Iseli Nursery

If the witches' broom underwent a genetic mutation that caused it to be heterozygous for dwarfness, all offspring would be normal.

Picea abies 'Pusch' witches broom at Trompenburg Arboretum found by Dick van Hoey Smith.



I have often speculated how I managed to survive my years enrolled as an undergraduate working toward a Bachelor of Science Degree in Secondary Education.

Stack 'em Deep & Teach 'em Cheap

Section Five: Teachers

Unit One: The New Teacher

Chapter One

Teacher Training: Preparing Fresh Meat for the Grinder

When a graduate from an accredited college enters the teaching profession, they must earn additional college credits to maintain their teaching license.

For example, when I graduated from college in 1967 in Pennsylvania, I had three years to get 24 semester credit hours in any academic field to maintain my certification. One semester hour equaled 18 hours of classroom instruction, and most courses were three semester hours in length.

I always wondered about that requirement. I believe it was and still is encouraged by the colleges since it gives them more students and income. The compulsory continuing education also sounded good to lawmakers since it supposedly made for better teachers. However, I always thought the requirement meant colleges were producing teachers who needed more training and education, so colleges' education programs must be deficient.

I had worked my way through college. I went to what was then called Millersville State Teachers' College. It was part of a Pennsylvanian statewide system originally established as State Normal Schools to train teachers. Gradually, the system expanded, and the various campuses/colleges offered a wide range of liberal arts degrees outside the educational programs.

I have often speculated how I managed to survive my years enrolled as an undergraduate working toward a Bachelor of Science Degree in Secondary Education.

I could not live on campus since I had to work to pay my way through school. I had a forty-mile commute each way to school while also working at Sears for twenty-five hours per week in the automotive department.

Don, my department manager at Sears, was a big help to me. He ensured I always got my 25 hours of work weekly in the store. He even took pity on me and helped me purchase a new pair of shoes. Finances were a significant issue, and this example was one of many that helped me survive my college years.

I had worked in the paint department on a night when they were short-handed. I cut some glass for a customer and pushed the stack of glass panes back into their niche with my foot. Unfortunately, I sliced my shoe's sole, which became two flaps connected by a small, uncut piece near one end. When Don saw that, he set things up with the shoe department, where he paid for a new pair of shoes and had me give him a few dollars a week until I paid him back.

Money was always a concern. I was earning $1.50 per hour with a 25-hour workweek. I had to pay my living expenses and $600.00 tuition per semester plus book costs. I also sent some money home for my parents since things had gotten tight for them. My finances were often a touch-and-go situation, especially since transportation back and forth to Millersville was particularly expensive.

Academically, college was a traumatic experience for me. I knew that I could do better but got off to a bad start, and every time I began to work my way up, something slapped me down. As a result, I passed my classes with low marks and was often on the edge of being put on grade probation.

Some required classes involved pure memorization (not my strength), and I considered them of little value. Prime examples were Music Appreciation and Art Appreciation. Supposedly the teaching curriculum was designed to produce well-rounded teachers. I suspect these requirements have been around for the last hundred years to create socially acceptable teachers. I was lucky to scrape by and watched my grade point average drop slightly more.

I also had great difficulty with a class in philosophy taught by Professor John Ellsworth Winter, Ph.D. I was failing until I turned in a research paper on laughter. He accused me of plagiarism and asked to see other writings I had done. Then he met with me and offered me a C grade, or ten points added to my average. I took the C since ten points didn't add enough to offset my failing average. He did that same thing with several other students. I suspect he knew that the material was just beyond some of us. I never forgot that big favor.

The education classes I needed for my degree were an even bigger waste of time than art and music. My only failing grade was in an education class. One lesson I remember from the course was that anyone with an IQ below 80 should be sterilized so as not to reproduce. The instructor postulated that people with a low IQ produced more babies than others and that these babies would grow up to have the same intelligence level as their parents, a dumbing-down of the population. That was a great thing to teach in an education class.

Many of the instructors in the education classes exhibited terrible teaching techniques. It was a "Do as I say, not as I do." situation.

However, I did learn how to thread a projector in the audiovisual class. I even presented a lesson using the classroom television. I do not recall a thing about the lecture portions of the course other than they were shown over televisions and proctored by lab assistants.

As a result of these experiences, I refused to take any education classes after receiving my undergraduate degree. Any doctorate program in education requires several such classes. Few of the instructors have ever seen the inside of a public-school classroom. They just parrot information they had learned or read from other education instructors who had never been in a teaching space. My most inferior under-

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graduate classes were the education classes, and I would much rather take a science class with more practical information.

Student Teaching

Professional Practicum was a class offered in conjunction with student teaching. During my student teaching experience, I showed what I could do in that class. First, I had to overcome my fear of being the center of attention for everyone in the room. Second, I had to meet the expectations of the students and their cooperating teacher. Third, I also had to meet the standards set by my college supervisor. All this was a lot of pressure, but I discovered I had a knack for teaching.

I still have no idea what the various philosophies of education say. I never bothered to memorize them. Still, I have realized that most of these historical education explanations are nothing more than common sense put into fancy words.

I did my 18 weeks of student teaching at Dover Area Jr.-Sr. High School, in Pennsylvania, during the fall semester of 1966, working with Luther Wilt in Seventh Grade Physical Science. I counted on my student teaching grade to raise my GPA to a halfway respectable level. Unfortunately, this was the first year that student teaching was changed to a pass/fail status and had no effect on GPAs.

My first day was a teacher workday, and I was given a grade book and a few other supplies, just like all the other teachers. After orientation, Luther and I went to our classroom. We discussed his expectations as well as how he conducted his class. I was fortunate to have him as my cooperating teacher. He was an excellent instructor and worked very well with seventh-grade students. I learned a lot from him.

I discovered early in this experience that I had to thoroughly understand the subject matter to explain the concepts to the students. As a student, I only had to know the material well enough to "parrot it back" to the teacher on an answer sheet. Now I had to know it and understand it thoroughly. I learned more physical science teaching it to seventh graders than in any of my classes up to this point. After student teaching, I had a completely different outlook on what I wanted to gain from my classes when I attended graduate school.

I discovered several things as I taught seventh graders. First, they loved scientific demonstrations, and second, they responded well to discipline when administered fairly and without anger. I also discovered the more advanced classes needed less discipline and tended to show their feelings to a lesser extent than the lower-level classes.

I cannot speak for a young woman starting a teaching career, but I noticed that some female students immediately became infatuated with me. An occasional message for me would show up on the teacher's desk after I took over the classes. My cooperating teacher Luther told me to ignore notes like that and throw them away. However, some girls went out of their way to talk to me after class or during lunch. I was not used to being the center of attention for girls until this point in my life. These were too young for me and were my students, but I was flattered anyway. I found this situation consistent whenever I changed teaching positions while still a young man.

I worked with three student teachers during my thirty-nine years in the classroom. Two of them were with me teaching eighth-grade science at Keithley Middle School.
Mary and Jack had significant issues involving their teaching abilities and needed a lot of extra training. They had high opinions of their performance and felt that their college evaluator and I were unfair. I even received intense criticism from one of my eighth-grade team members, who had befriended Jack. Both student teachers received poor grades from their respective universities. I gave Jack an unfavorable evaluation the following year when he applied for a job at our sister middle school. The district hired him anyway. They fired him before the end of that same school year.

If such programs met the new teacher's needs, the attrition rate would be considerably less than it is. But unfortunately, new teachers are often poorly prepared for the job and are required to complete an additional year's schooling after graduation by taking classes that often have little to do with the realities of the classroom.

I was ill-prepared for college, but I loved student teaching. I survived the teacher education program, graduating from Millersville State Teachers' College in January 1967, then went on to stay thirty-nine years in the classroom.

I may have been "meat for the grinder." Still, I survived by spending my early years observing and listening to experienced teachers while using my failures to make myself stronger and more aware of the intricacies of successfully working with teenagers in the classroom.

Here I was in 1968 at my desk, a new teacher in the Weatherly Jr.-Sr. High School. Notice the intimidating haircut.

I was ill-prepared for college, but I loved student teaching. I survived the teacher education program, graduating from Millersville State Teachers' College in January 1967, then went on to stay thirty-nine years in the classroom.

The Death of an Army (cont. from February issue)

Battle of Franklin, TN

Chapter Five: 5th/13th Combined Arkansas, November 30, 1864

Aaron found some comfort in his thoughts of home as he continued marching forward. Becky was his childhood sweetheart. Their family farms were in the same Arkansas valley and both attended the same schoolhouse. He was a typical farm boy who could drive a plow horse to make perfect furrows or shoot and kill a running rabbit at fifty yards. Becky came to school with colored ribbons in her cinnamon-brown hair, drawing attention away from her nondescript dresses. Aaron could not function whenever she was near, and his friends had considerable fun at his expense. He did not care. From the time he first saw her, he knew they were meant for each other. Neither one graduated from high school but they were married before he was eighteen and just after she turned fifteen. Their first child, a daughter, was born two years after they married. Two sons and another daughter followed during the next four years and Aaron was farming his own property. Those were the happiest days of his life. He relived those days immediately before every battle.

Aaron was smiling until he stumbled as he tripped over the body of a Confederate picket, who had gotten too close to the Union lines earlier that morning. It was already bloating, and flies had been investigating areas where fluids had flowed, creating rich homes for their eggs. Startled out of his reverie, Aaron thought to himself "Goddamned flies will soon have more food than even they can infest with their eggs." He had no time for any additional thoughts as he regained his balance and the Yankee artillery opened their long-range bombardment of their advancing lines. It was not that he had become callous to the horrors of war. Rather he had learned to suppress his true feelings in order to retain some of his sanity in this insane war.

Puffs of white smoke appeared at several places along the Union fortifications to their front as well as at a small stronghold to their right. Tiny black specks appeared to fly out of the smoke. They were coming toward the advancing Confederates like a flock of birds being chased by the devil himself. The veterans had seen all this happen before. The specks were round balls of iron or shells packed with explosives and iron balls. They knew death was coming through the air. Aaron watched the specks grow and knew that they would cause a small number of deaths. The biggest problem with a barrage of this type was the ways men died. It often led to fear among the survivors and could affect the impetus of the attack.

Aaron knew that the twelve-pound iron balls were deliberately fired to land short of the first battle line. They would then bounce or skim along the ground, traveling at high speeds for over a hundred yards before slowing to a stop. Often a ball would bounce over a battle line or simply land wide of it. However, all too often it would pass through a tightly packed line of battle, pulping anyone unfortunate enough to be in its way. As these thoughts went through Aaron's mind, the shot and shells reached their targets. Three balls impacted in front of the Arkansas battle line. One of them imbedded into a hillock and went no further. One bounced over the line. The third bounced at a low angle and passed through the line. Private Jenkins fell screaming, grabbing at the stump where his left arm had been just a second ago. Private Johnson, in the following line was directly behind and slightly to the left of Jenkins. He never said a word as the ball smashed through his chest. Blown backwards, he came to rest as a pile of red flesh next to his own lower torso.

The Arkansas Line marched on toward the Union lines now less than a mile away. Aaron watched the men close ranks to fill in the gaps left by Johnson and Jenkins. He could hardly hear the thunder of the distant Union artillery since its sound was hidden by exploding shells and the screams of men as they fell. Iron balls bounced and slammed through the lines, decapitating heads and severing limbs while shells exploded overhead, forcefully showering jagged pieces of hot metal over a large area. Through it all the battle lines marched, bugles and drums playing, as a scattering of mutilated bodies marked their passage.

Aaron almost breathed a sigh of relief when the shells started exploding behind them as the main battle lines became the focus of the cannon fire. Large iron balls made a whistling sound as they passed overhead before skimming over the ground to cause havoc among the following troops.

Aaron watched Captain Murray as he led the 5th/13th

The specks were round balls of iron or shells packed with explosives and iron balls. They knew death was coming through the air.

The Death of an Army (Working Book Title)

Combined Arkansas into the inferno of shot and shell. Rather than being scared, Aaron's mind had assumed a fatalistic attitude. If he was to die on this battlefield, there was not much he could do about it. Watching the army parade across that field, he was proud to see the lines close ranks whenever the shot and shell opened large gaps. This was the glory of war that poets and other fools extolled in their writings.

When the line was well within rifle range, Aaron watched the Captain for a signal to halt and assume firing positions. As soon as the captain raised his sword, signaling a halt to the marching line, Aaron turned and shouted "Halt! Prepare to volley fire!" At the other end of the line, Lieutenant Davis gave a similar order. As the men halted, Hundreds of Yankees came into view just above their parapets with their rifles leveled.

Before Captain Murray was able to slash down with his sword, the Union line lit up with an orange glare and a massive cloud of white smoke. Thousands of rifles had fired in one massive volley.

Meanwhile the Union artillery had been maintaining a hot barrage of fire and three explosive shells bracketed the Arkansas line just as the air filled with the buzzing sound of a million bees. No one heard the Minié balls passing through the air, nor the thwack of balls impacting with flesh. The exploding shells had drowned out all other sounds while the jagged shards of iron working in concert with the swarms of Minnie balls smashed into the Confederate li**n**e.

One of the shells had exploded near the right end of the Arkansas Line and wounded several men. Aaron had a jagged piece of iron embedded into his shoulder. He could not get at it. Potter stepped forward and used his Bowie to get under it and pry it out. Some blood flowed out from the wound, but it was shallow and not serious.

"Y'all be just fine, Sergeant. It be a flesh wound." Potter shouted over the din of the battle as he wiped his Bowie on his pant leg. Then he stepped back into line.

"Thanks Potter." Aaron replied as he winced from the pain in his back. He was glad he did not see Potter moving up on him with a Bowie aimed at his back. Otherwise he might have had a bad reaction.

Looking down the line, he saw there were many gaps in the line where men had fallen. The shells and Minié balls had done damage. Men were lying on their backs staring at the sky with lifeless eyes. Some almost appeared to be sleeping, with bright red patches adorning their uniforms or faces where a ball had entered. It would make a small hole in front, before it tore through muscle and tissue, throwing each man backward as if kicked by a mule.

The soft ground beneath each man cushioned the fall and then absorbed much of the blood that flowed from the massive wounds made by the flattened balls as they exited the bodies. The blood of the dead was anointing this ground, making it sacred those who would survive.

The sweet, sickly aroma of death was just starting to pervade the air as bowels were emptied and bellies torn open by lumps of lead and shards of iron. Soon this smell would blanket the battlefield and breathing would become an effort. The smell was nothing new to Aaron. He had known it would come. He also knew that it would not last very long as a cloud of gun smoke would soon smother any sense of smell.

Aaron observed all this carnage and compared it to the other times he had gone through the same thing in earlier battles. Here it was the worse he had ever experienced. At the same time, he noted the men were ready to return fire, but Captain Murray had disappeared. Many of the men were looking in his direction. Knowing they had to move on and not seeing Lieutenant Davis at the other end of the line, Aaron quickly stepped up to the Captain's position, raised his right arm, and swung it down as he screamed at the top of his lungs "Fire!"

The line fired a volley into the smoke swirling around the Yankee positions and immediately worked at reloading their rifles. Meanwhile, seeing the Captain's sword laying beside a bloodied boot, Aaron picked it up and took command of the line.

Gunsmoke was beginning to obscure the battlefield. Aaron could still see most of the Arkansas Line and as soon as the men had reloaded he ordered another volley fire. Thousands of balls flew in both directions and more men fell.

Thanks to the thickening smoke, accuracy was not possible by either side. Scoring a hit was more luck than skill. Meanwhile, the various battle lines were gradually coalescing into an amorphous mass of yelling, shooting, and dying men.

Before Captain Murray was able to slash down with his sword, the Union line lit up with an orange glare and a massive cloud of white smoke.

Short Story Serial Part I

Bloody Knife was proud of his Arikara heritage and preferred not to think about the half Sioux blood that flowed through his body.

The Dog Soldier and The Army Scout (May 1874)

Bloody Knife moved silently through the forest, carefully avoiding anything lying on the ground that might make a sound. He had left his army issue boots with his horse. He wore moccasins, both for their comfort and adaptation for silent movement. He still wore his government-issued blue jacket and trousers with their brass buttons and yellow stripes and emblems.

His long, straight, black hair extended from beneath his slouch hat down past his shoulders. That, plus his breechcloth and brass tacks decorating his rifle stock, showed him to be an army scout, not just another trooper.

Bloody Knife was proud of his Arikara heritage and preferred not to think about the half Sioux blood that flowed through his body. The Sioux were his enemy, especially the chief named Gall. He hoped one day to kill Gall in revenge for the deaths of his own two brothers.

Today, he was hunting game for the U. S. Army. A patrol of twelve troopers and a Lieutenant from Company G, 7th Cavalry, had been sent into the Black Hills on a scouting mission by Colonel Custer. Two of the soldiers were accompanying him on the hunt. They were so inept at moving through the forest that Bloody Knife had told them to stay put while he chased game toward them. That was over an hour ago.

He planned to kill a deer and have them carry it back to camp. Bloody Knife knew that the bluecoats were terrible shots and would probably shoot him by accident if he chased a deer past them. He also figured that if he did not wear the blue jacket, they would shoot him as a hostile. Most of the soldiers at Fort Lincoln, home of the 7th Cavalry, could not tell one Indian from another and treated them all as hostiles.

It was midmorning when Bloody Knife considered turning back to where he had left his two companions. He stood at the edge of a meadow and scanned the forest on the other side. He had a tingling sensation along the back of his neck and stayed very still.

Three deer suddenly rushed out of the trees into the open just as a rifle shot sounded. One of them fell to the ground, and five warriors came running out of the forest toward it. There were two Cheyenne and three Lakota Sioux in the hunting party.

One of the Sioux was behind the other four. He raised his rifle as if to shoot at the two surviving deer. When he fired, he hit one of the Cheyenne in the middle of his back, killing him instantly.

When they realized what had happened, the others stopped and turned to face the shooter. The second Cheyenne raised his bow with a knocked arrow as if to shoot the killer. Before he could stretch the bowstring, one of the other Lakota hit him on the side of his head with a gunstock.

Bloody Knife watched from his place of concealment as the dead Cheyenne was stripped of his weapons. Then he was scalped and tossed aside. The unconscious warrior was spread-eagled on the ground and tied to four stakes driven deeply into the soil. They slapped him awake and demonstrated what they planned on doing by running a scalping knife over his bare skin.

The Cheyenne spat in the face of the Sioux wielding the knife. Bloody Knife figured he was trying to anger the Sioux to gain a quick death. Being skinned alive was not a very pleasant way to die.

He had seen men tortured in this manner before, and one time the victim had lasted for almost two hours. He found it to be a disgusting practice and considered killing one or two of the Sioux to put an end to it. He did hate the Sioux, but at the same time, he had no love for the Cheyenne. These thoughts were going through his mind as he slowly raised his Sharps and cocked its hammer.

He held his fire when the Sioux stopped chiding their prisoner and looked toward the forest where the deer had disappeared. A lone figure had walked out of the trees into the open. He had a headdress made up of many raven feathers and approached the center of the meadow as the Sioux stood still, watching.

When he reached the center, the newcomer stopped and forcefully shoved a war lance into the ground. There was a long sash attached to it and tied to his waist. He walked to a point about six feet from the lance, stretching the sash to its limit. Then he took out a tomahawk and a knife and shouted insults at the three Sioux.

Bloody Knife knew about the caste of warriors

Short Story Serial Part I (cont.)

known as Cheyenne Dog Soldiers but had never seen one in a fight. The three Sioux seemed to be confused about what to do. They spoke among themselves for a moment. One of them suddenly cut the throat of their captive, and the other two rushed toward the dog soldier. As they ran, the one who had killed the helpless Cheyenne raised his rifle to fire at the dog soldier.

Without thinking, Bloody Knife fired his Sharps rifle, blowing a large hole through the chest of the third Sioux before he could shoot at the dog soldier. The other two were intent upon their attack and did not immediately realize that the shot had not come from behind. They stopped just before coming into reach of the Cheyenne. They were confused. The man was unwounded.

Looking back, they saw their friend lying on the ground and noticed Bloody Knife standing at the edge of the meadow with a rifle pointed in their direction. When he motioned toward the Cheyenne with the barrel, they realized their best chance of survival was to kill him and escape into the woods.

They turned back toward the dog soldier, but the distraction proved to be fatal for one of them. He never saw the tomahawk coming. It buried itself deep into his chest, taking a slice out of his heart. Falling to the ground, the critically injured warrior watched his friend rush into the circle of death defined by the Cheyenne dog soldier. As his world went dark, he knew he would not leave this world alone.

The fight was a short one. The onrushing Sioux cursed himself for not merely standing back and killing this Cheyenne with his rifle from a distance. Now he had to do it with tomahawk and knife. Rushing into the circle, the Sioux threw his tomahawk at the Cheyenne. He figured on making the dog soldier dodge the throw, allowing him to either grab the lance or catch him off balance.

The Cheyenne simply knocked the tomahawk aside with a sweep of his knife. Then he quickly reversed the motion to thrust it into the neck of his opponent.

Bending over, he deftly scalped the Sioux. Then he retrieved his lance and wrapped the sash back around his waist. Carrying the lance in one hand and the dripping scalp in his other, he left the circle. As he walked toward the dead Cheyenne warriors, he paused briefly to take the other Sioux scalp. He ignored the Sioux shot by Bloody Knife as he cut the bonds on the spread-eagled warrior. When he stood and whistled, a spotted pony came out of the forest and trotted over to him. He placed the two bodies on the pony, and only then did he acknowledge the presence of Bloody Knife, who had not moved from his position.

The Cheyenne dog soldier raised his hand in greeting and slightly nodded his head before returning to the forest. Bloody Knife faded back into the woods himself. He figured that other Sioux would come looking for the three dead ones. He did not want to get into the middle of an intertribal feud. He tried to conceal any sign of his presence and started back toward the two troopers. Hopefully, they had stayed out of trouble.

An hour later, he was within sight of the creek where he had left the troopers. They were not there. Before he could start searching the area, he heard some shouting from a short distance upstream. It sounded like a large group of men. Hurrying toward the sound, he quickly came upon the two troopers and three civilians. They were all splashing around in the water and shouting with glee.

When one of them noticed Bloody Knife standing at the edge of the water staring at them, he stopped moving and shouted, "Injun."

The men started running toward the creek bank and their rifles when one of the troopers yelled, "That there is Bloody Knife. He's a scout travelin' with us."

The men stopped their rush but continued a slow movement toward the bank.

Meanwhile, Bloody Knife moved closer and settled down beside their guns. The civilians stopped their movement and appeared to be nervous. The two troopers showed no concern as they came out of the water and sat beside him. When they showed Bloody Knife some small gold nuggets, he slapped their hands away and said, "Yellow metal make white man crazy. Sioux all through the Black Hills and maybe hear your shouting. Much danger here."

"If'n we stay here and pan these waters for a few days, we'll be rich and can tell Custer to take a hike."

"We go back to patrol and take these men with us. They no belong here, and Sioux will kill them."

The Cheyenne simply knocked the tomahawk aside with a sweep of his knife. Then he quickly reversed the motion to thrust it into the neck of his opponent.

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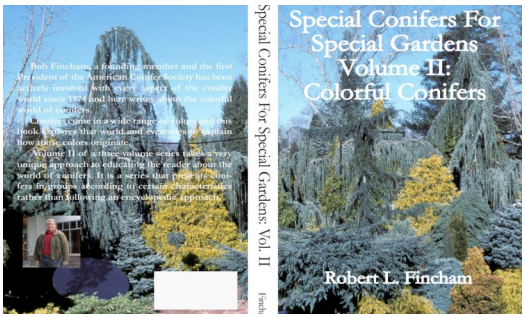

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The Role of Understock in Conifer Hardiness

Plants are grafted for a variety of reasons. Some cannot be propagated successfully by any other method. Sometimes grafting is used to accelerate the growth of a dwarf plant either for a quicker sale or to create more, larger cuttings for rooting or grafting. Grafting is also done to create a root system that is tolerable of soil conditions which would damage or kill the species being propagated.

Pinus thunbergiana (Japanese black pine) is sometimes used as understock for Pinus parviflora grafts being trained as Bonsai. Its toots are more tolerant of salt buildup in the container soil from fertilizer. However, the roots are not as winter hardy as parviflora roots so it is a bit of a tradeoff and can lead to problems in a col climate.

Around 1990, Aurora, Oregon had temperatures below zero Fahrenheit during the Christmas season. At that time we owned Mitsch Nursery and lost over a thousand containerized pines. They had all been grafted onto *Pinus thunbergiana*. Not one survived the cold. Other grafted and rooted pines exhibited no damage from the cold.

Root hardiness is a concern when plants are being grown in containers.

That is not the case when grafted plants are field grown (in the ground). For example, all true cedars (*Cedrus*) can be grafted onto *Cedrus deodara* and can be grown anywhere the upper part is hardy. Grafting onto a hardier species is not necessary and can even cause issues if the plants are to be dug at a future time.

Cedrus deodara develops a more fibrous root system than the other species and lends itself to being successfully dug and moved. The other species have coarser root structure and are difficult to dig and move.

Abies firma is touted as a premier understock for firs being grown in the Southeast. That is not due to its ability to tolerate the heat and humidity since only the roots are present and they are underground. Rather, it is due to an ability to tolerate the heavier soils.

I believe *Abies koreana* would be every bit as good of a choice for the Southeast.

Abies balsamea and concolor have been commonly used as fir understocks in the U.S. for many years. They are definitely terrible choices for the Southeast and caused many of the fir problems in that part of the country. I preferred *koreana* and *procera* myself.

There will be more on understocks in my April issue.