

industry, including his tinkering with the gene gun. Peterson explains: "I was a little skeptical. Then I saw the 'Rounder-ready' herbicide resistant turfgrass selections at the O.J. Noer Research Facility and was convinced. After having a few Lienies with Chris May, we came up with the idea of the 'Gene Gunner.'

"Our original idea was to assemble several gene guns on the back of a greens mower and use it as a field tool, instead of just a laboratory research tool." Back then, the gene guns were selling for approximately \$17,000, a price tag that was a difficult obstacle to overcome. Oscar and Chris were undeterred. Oscar continues: "After finding out how much the gene guns cost, we thought our dream was crushed. But we convinced the Turf Department to lend us the gene gun for on week."

Chris May, CEO of World Wide Turf, says after reading the gene gun manual, they realized it was nothing more than a high priced toy. Explaining how he and Peterson came up with the Gene Gunner, May says, "Basically, what the gene gun does is air-inject foreign pieces of DNA into another organism's DNA. The procedure is rather simple. First, you find a piece of DNA that you are interested in introducing to your target organism. Oscar and I, of course, chose to introduce Rounder-ready genes to the 10th green of the Leopold Hybrid Course. Our next step was to coat tiny pieces of gold with the Rounder-ready genes, load the gene gun chamber with our DNA gold bullets, and shoot them into the nucleus of the turfgrass cells. Some of the turfgrass cells that were not blown to pieces took up the foreign Rounder-ready gene and began to produce the gene product. We waited one season and then applied Rounder on the area. The turf that had incorporated the gold-blasted Rounder-

ready gene was not killed by the herbicide. The one-inch swath within the killed area had been transformed with our Rounder-ready genes. This was the first field application of the gene gun!"

This experiment garnered little attention because of the impracticality of buying a \$17,000 gene gun. Oscar and Chris went back to the drawing board. They knew this technology could work, but the expense was too high. What they needed was something cheaper and easier to operate.

Chris came up with the ingenious idea of using b.b. guns instead of the gene gun. "The idea actually came about when my son asked for a b.b. gun for Christmas. I remembered, after reading the owner's manual for the gene gun, that Oscar and I joked about it being nothing more than a fancy air-powered b.b. gun. I was in the checkout lane when the adrena-

line almost overpowered me from by brainstorm. When I realized a \$20 b.b. gun was the solution to our problem, I bought every gun Wal-Mart had in stock. I rushed them out to the maintenance facility and by the next morning, Oscar and I had welded ten b.b. guns to the back of a greensmower. Then we transformed the rest of the tenth green."

The dream of Oscar and Chris resulted in a patent and World Wide Turf, makers of the Gene Gunner, soon became Wisconsin's leading Turfgrass Technology Company, now employing more than 1,500 workers in Verona.

Since then, World Wide Turf has joined the Turf Department at the UW-Madison in the quest to transform the newly acquired cold regulated genes - cor genes. The cor genes were first isolated from the snow mold fungus *Typhula ishikariensis* biological



The gene gun that started Wisconsin's turfgrass dominance.

species III. These genes help the fungus stay alive at subzero temperatures by giving it the ability to breakdown stored carbohydrates at suboptimum conditions. When these genes are transformed into turfgrasses, it protects turfgrasses from winter kill and keeps other snow mold pathogens from attacking.

This new technology has grown tremendously these last few years. Shawn Hilliard, World Wide Turf's Gene Gunner salesman, says, "The herbicide genes were the first genes to be transformed into turfgrasses. However, they are not our number one seller anymore. Today, our hot sellers are the Bt (*Bacillus thuringiensis* gene for insect management), chitinase (for antifungal properties) and of course the amenity genes.

"The amenity genes are the most expensive ones, ranging from \$2,000 to \$10,000 per application. The mint and lemon balm essential oil genes are the trendiest and sweetest smelling products I have ever sold. There is nothing like the smell of a freshly mowed lemon balm putting green!"

However, the sense of smell can't compete with World Wide Turf's most bizarre amenity gene: the Luciferase gene. The Luciferase gene is what makes the tail of our summer insect friend, the firefly, glow. It now lights Wisconsin's putting greens at night. The first Firefly Tournament at Blackhawk Country Club (BCC) attracted the world's best golfers and captivated the hearts of golf enthusiasts around the world.

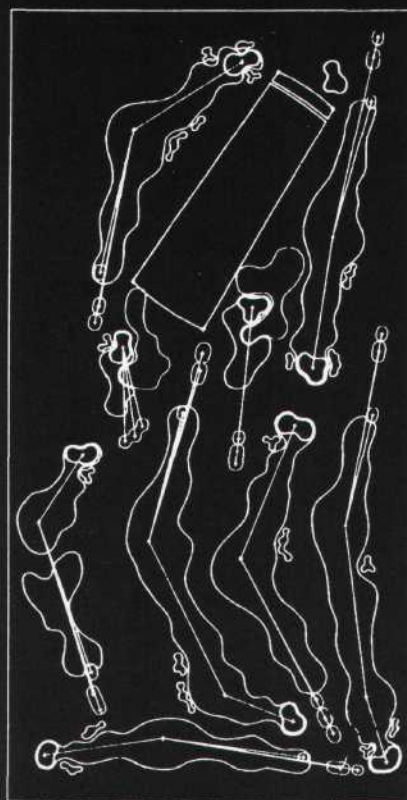
Tiger Woods was impressed with the technology and said, "This technology is going to change the way I golf. I had to use my global position system to find my GPS balls that I lost in the rough. Even though the golf balls glow, they can still be overlooked. Infra-red night goggles can help in setting up your

line, but keeping your balance and sense of positioning definitely comes into play. Teeing off under the stars while crickets sing and fireflies streak across your line of vision is an unforgettable experience. Hopefully, this night course will host a major event in the near future. Is this heaven?"

Although the Luciferase gene has created media hype in the golf world, it has also affected other areas of our life. Monroe Miller, currently the Turf Engineer at BCC, accidentally stumbled onto another application. Monroe explains: "While Dave Noltner and I were loading the Gene Gunner with Luciferase, I inadvertently pulled the trigger while I was holding the end of the gun. I felt the warm, high-pressure air hit my hand. Three days later, I noticed my hand glowing. The doctors at the UW-Madison hospital performed tests on my glowing hand and found nothing to worry about. Today, I received a patent on my Luciferase tattoo idea and will soon be opening up my own body piercing and Luciferase tattoo shop on State Street. This accident has turned me into a billionaire!" We all wish Monroe the best in his new adventure.

Biotechnology has benefited many Turf Engineers, but there are also drawbacks and failures. "The University of Minnesota's Rounder-ready *Poa annua* was a mistake." So says Josh LePine, CEO of Stoughton Transgenics. "Bioengineered crops can't be recalled. I wish the State of Wisconsin had tighter release regulations when the Rounder-ready *Poa annua* was first released. Now those areas that bought and used that first transformed seed are having problems with the transgenic turf escaping into the wild. These aren't the first examples of unforeseen consequences of alien species being introduced,

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deliberately or accidentally, into new environments, as has happened with zebra mussels, Dutch elm disease, kudzu, multi-flora rose and chestnut blight. The delicate ecological balance can be severely affected by a new species."

LePine hopes the new regulations in place will prevent this from happening again. "To release our nitrogen-fixating bentgrass line, 'Nitrogen-free,' Stoughton Transgenics had to conduct thousands of experiments just on the safety issue of escape."

The biomolecular revolution has also affected the Turf Engineer by helping reduce the amount of physical labor needed on the course. Noltner Robotics of Middleton has created a niche for itself in the turfgrass industry by spinning off advancements made with the 'Gene Gunner.' Dave Noltner, who was instrumental in the creation of the first Gene Gunner, used his royalties to invent the first robotics laser mower. Noltner says, "The UW-Madison's alliance with the Wisconsin turfgrass industry has allowed us to bring practical solutions to everyday problems. Our automated laser mowers are now being equipped with weed, insect and disease monitoring devices that were first developed in the laboratories at the UW-Madison."

Jeff Gregos, the Turf Health Clinic (THC) Coordinator, says, "Robotic greensmowers equipped with weed, insect and disease sensors have accelerated progress in pest management. The number of samples coming into the clinic have been drastically reduced, due in part to the turf industry's dedication to research and education. Now the THC spends most of its time helping Turf Engineers adapt to the new technology of gene therapy. Before the turn of the century, the THC's research

effort was focused on chemical control. Now genes and gene vectors make up 75% of our management trials. Biological agents and chemicals are still needed in today's pest management arsenal, but the genes are the THC's big money maker."

The biomolecular revolution has touched many aspects of our world today. James Watson, Nobel laureate who discovered DNA, once said, "We used to think that our future was in the stars. Now we know it is in our genes."

The techniques of molecular

biology have allowed us to read the genetic code of life just as we would read a book. The complete human genome, which was decoded just five years ago (2005), has given us an "owner's manual" for the human being. This has set the stage for science and medicine in this young century. By incorporating these techniques into the realm of turfgrass science, it has given us the almost God-like ability to manipulate turf almost at will instead of passively watching the dance of life. ♣



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A Trip Through The Ocooch Mountains



By **Monroe S. Miller**, Blackhawk Country Club

We were both ready for a road trip. The unusually early golf course opening, at least early for veteran guys who'd seen a score or more other openings and had a better reference, had both Tom Morris and me in need of some windshield time. No better way to satiate that need than attending the first WGCSA meeting of the season.

I had talked to a lot of the guys at the March spring business meeting. But back then we were all speculating about course conditions and what to expect. Now, we all knew what we had after the winter and were dealing with it, good or bad.

Mostly, from reports I'd been hearing via the admittedly unreliable grapevine, it was a good spring. Everybody was working hard, but the golf players were enjoying the prospect of yet another unusually long Wisconsin golf season. Spirits among Wisconsin's superintendents were pretty high.

As usual, Tom was driving. He had another new vehicle - an "upgrade" he explained over the phone - and wanted to break it in with some country miles. Really, the man just plain likes to drive. And, as I'd learned over a lot of years, the man liked BIG vehicles and new ones. The truck he drove into our shop yard was both - big and new - and in his usual style, it was bright red. Badger Red. The driver had a big smile on his face as he pulled his new Ford Expedition right into the middle bay of our shop. The window rolled down, Tom looked over the top of his trooper shades, and asked if I was ready yet.

"I'll need a step ladder to get into this truck, Tom," I replied with a bit of sarcasm. Actually, I was excited about riding in a vehicle that cost

almost twice as much as my first house in Madison. I noticed that Tom had a couple of fishing poles and some tackle in the back of the third seat.

We took off west. The meeting was in my favorite part of Wisconsin - the southwest corner. The Links at Lynxville overlooked the Mississippi River, or so I had heard, high on the bluffs over the village of Lynxville. Village is a bit of exaggeration for Lynxville; it is more like a wide spot on the road between Prairie du Chien and LaCrosse. It consisted of a gas station, a bait shop, a small grocery store and a handful of houses.

Lynxville is pretty much backwater Wisconsin, known only by fishermen who fished the area. But then the new Links Golf Course was built. It received rave reviews from players and pretty soon some serious numbers of people were making Lynxville a destination. Today there are a few new homes on the golf course, talk of a new motel in Lynxville. Morris and I were anxious to see what all the commotion in western Wisconsin was about.

Nothing does more for my state of mind than fresh air, sunshine and wide open spaces. Those elements

are most often part of the pleasure of managing a golf course, and they were what amplified the anticipation of this trip through the Ocooch Mountains.

The Ocooch Mountains are actually found not only in the southwest of Wisconsin, but northwest Illinois and northeast Iowa as well. The mountains are less the result of a geologic event and more a result of a non-event.

The million years of the ice age produced four successive sheets of ice in north North America. The ice would advance, temperatures would warm and they'd retreat back north. A glacier is like a monumental plow moving across the land, scooping out depressions in the earth, grinding boulders down to pebbles and using them to act like sandpaper on the earth's surface. The ice sheets that affected Wisconsin radiated from two points around Hudson Bay. As a result, a driftless or unglaciated area was left, an area today known as the Ocooch Mountains. It is hilly and steep, beautiful but difficult to farm. Every turn affords a new vista, it seems. The Ocooch area was where the earliest efforts at strip cropping and contour farming took place,



This State Historical Marker is located in the foothills of the Ocooch Mountains.

efforts to arrest soil erosion. It is where the first farm in Wisconsin to receive electricity from the Rural Electric Cooperative was located. And it is the place where the first Mastodon skeleton was found, a relic from the cool and wet weather and the spruce forests of 13,000 years ago when the last glacier retreated. Golf courses in the area are beautiful, too, and challenging, but difficult to maintain.

The air was very cool and crisp and very springlike. We staked out a route of backroads that would take us through some small towns and villages - the foothills at Gotham, on to Boaz, Gays Mills, Mt. Sterling, Seneca and then cross country to the Links Golf Course. Apple trees were in bloom and, along with spring wildflowers, dappled the very green landscape. The spire to the Holy Angels Lutheran Church rose through trees to heaven; we spotted it miles away. A little farther down the road was the St. Philomena Catholic Church,

centered among the ancient grave stones of her founders, immigrants no doubt.

We made good time despite the winding roads and lower speed limits, due likely to the nearly total lack of traffic. The entrance to the Links at Lynxville led us to a modest clubhouse sitting on a steep bluff overlooking the Mississippi. It was gorgeous.

The parking lot was full of pickups, a sure sign of a WGCSA meeting. And there were more present that I'd have guessed; apparently a lot of guys had the same hankering that had come over Tom and me. Bogey Calhoun, Scottie Fennimore, Steady Eddie Middleton and the rest of the gang were loosening up and getting ready for the simuttee. Calhoun shouted some insults which Morris ignored and I acknowledged with a wave.

"I like this place," Tom said in his often understated style. "It's nice."

Just then the Links superinten-

dent, Stephen Grass (Honest!) came into view as he worked his way through his colleagues. "Remember, you guys," he admonished, "Dr. Stier is speaking for a short time in 15 minutes. After a quick lunch we'll get started with golf."

Steve took a lot of grief about his name - "you should have been an insurance man or a banker or something other than a golf course superintendent" - was a line he had heard anytime he was among his colleagues. He was teased unmercifully: "What did you name your kids, Steve? Bent? Quack? Rye? Blue?" He actually enjoyed it all.

Professor Stier gave a talk about the research he had planned for the summer and answered questions the guys had. It was a polite and informal meeting, just as these meetings should be. The luncheon was typically Wisconsin - brats, burgers the size of a bread plate, kraut, German potato salad, cheese and dill spears. Nothing fancy; big portions.

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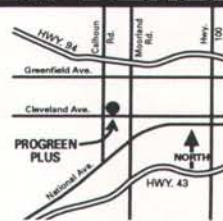
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Morris commandeered Calhoun and Middleton's golf car; they faked outrage as he and I drove off on a self guided tour. We were interested in the water diversion berms, the subtle terracing and the strategically placed holding ponds. Erosion control and runoff elimination were obviously key design elements, as they should be in an area where so much pioneering had been done. The Links at Lynxville was involved in those same good management practices, preserving the land on the beautiful site overlooking the river and the steep, tree-faced bluffs and the valleys below.

We tracked down Steve before we left, shook hands, told him to be careful cutting the "Grass" and started back home to Madison through the Ocooch Mountains. Tom had a different return route planned: "No sense in looking at the same scenery twice in one day," he mused.

We were not far from the course when Tom made the switch to backroads - back backroads. Although the sun was bright and warm and the sky was deep blue, it was still chilly. Morris had his tank of a vehicle going down some steep gravel roads; the saving grace was that he was driving slowly, negating the sharp turns and loose stone of the road.

"You are carrying this scenery thing a little too far, Tom," I said, halfway irritated with his routing plan. "I cannot enjoy the landscape when I'm worried about ending up in a ditch somewhere. Plus, you are going to get lost."

"Quit worrying and quit whining," Tom said sternly. "I know where I am going."

Not five minutes after that we pulled up to a pasture gate. There was a drop off on either side, the flanged end of a culvert on each side, and fairly tall and dry mixed grasses and weeds.

"What are you stopping here for?" I asked because I was totally clueless.

"We are goin' fishin'!" Tom said

with real excitement in his voice. "I've fished here before and got permission from the farmer last week. So hop out; let's go!"

I sat there, half irritated because I wanted to get home and half aggravated because I didn't particularly like to fish. But every once in a while you have to go with the flow, be a good sport, give a little. I could tell Morris was fired up and figured I didn't have much choice - he had the truck keys.

I grumbled about not being dressed for fishing just as Tom threw a pair of boots at me with a "Your rod and reel are in the back of the Expedition."

"So, Tom," I offered, "are we taking the Ford Expedition on a fishing expedition?"

"That's it!" Tom shot back as he got the bait around and locked up the truck.

We crawled through the barbed wire fence and walked less than a hundred yards through some fairly heavily wooded ground. We were on the west side of a narrow valley that seemed to run about north and south. The sun was over the slope and it was beyond chilly, almost cold. We made our way to the creek that ran along the foot of the slope. It was dead quiet and you could here the stream babble as it ran over rocks

and through its course.

Tom picked a spot and we got set up. Although we were past the water cress season, there was a patch of it on the opposite site of the creek, near the bank. When I said I'd like to harvest it, Tom said, "we're here to fish, not pick water cress. Here, your equipment is ready."

There were some dark figures moving in the water, which I quickly pointed out to Morris.

They are the reason we stopped here. Let's catch 'em!"

In a matter of a few minutes, Tom had two fish on the stringer and within 15 minutes I landed a beautiful trout. I went from chilly to almost cold, but the fish were biting and we didn't quit until the dew was on the grass and it was nearly dark.

We made it back to the truck, and I was really happy. "What a great time, Tom!" I said as I gave him a pat on the back.

"I figured you would like the fishing down here," Tom smiled.

We got loaded, headed back toward the capital city and called home to tell our families we were alive and well and two hours from home.

It was quite a day in Wisconsin's Ocooch Mountains, one of the innumerable reasons why we love our state. I was already looking forward to our next meeting. ♣

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The Last Season of the Millennium

By **Monroe S. Miller**, Blackhawk Country Club

It seems safe to say, as the ink dries on these words in the last days of February, that we have had another very mild winter. In our town, winter started around Christmas and ended, more or less, at the end of January.

The January and February contrast was sharp and clear. Parts of Wisconsin came close to breaking the snowiest January record. And overall, the state finished February with the 3rd lowest snow total since record keeping began. When we returned from the GCSAA conference, putting greens almost

looked ready for cutting!

The lack of winter pleases some, but not me. The past few winters have been brown and drab and uneventful. I am tired of rain and drizzle in the months when precipitation should be adding to the whiteness and beauty of the landscape. The storms of February 11 - heavy, heavy rain accompanied by strong winds and lightning and hail - should be reserved for months outside the November to March period. Rain in the winter turns driving and other travel into roulette, and ice accumulation

makes for sleepless nights in the lives of Wisconsin golf course superintendents. I have enough restless nights during the season; none of us needs that stress in the winter.

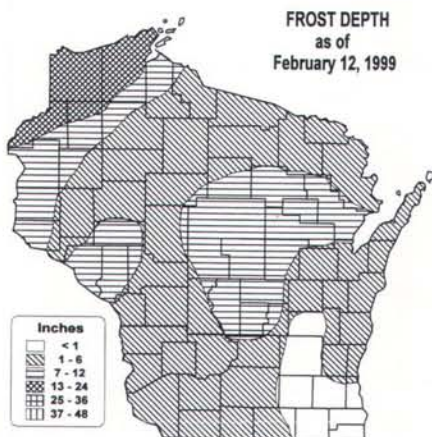
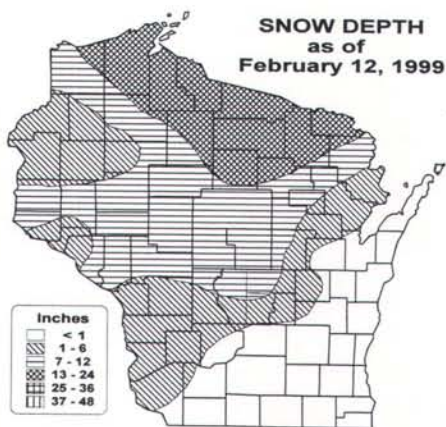
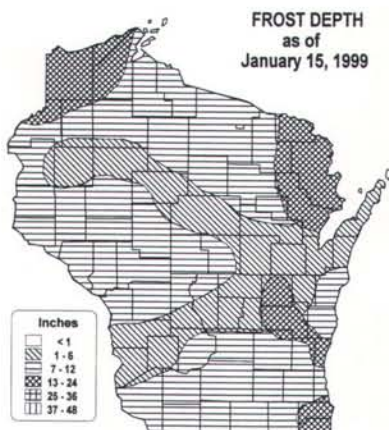
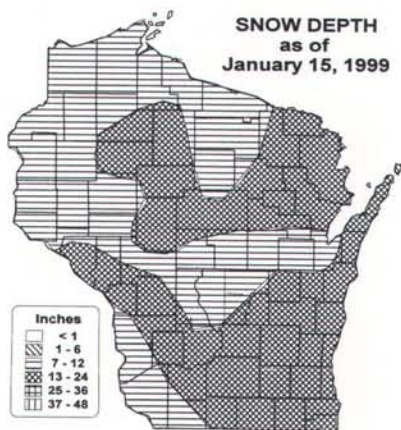
The winters of my youth and early adulthood were the kind I like best. They were snowy and blizzards would last for two or three days. When the sun would finally come out, the Wisconsin landscape was beautiful, breathtaking and gorgeous.

Sledding and skiing and snowmobiling were taken for granted. Not so these past few winters. And if one wasn't a winter sports enthusiast, you could bask in the stillness and quiet, feeling a sense of peace impossible in the busy summer months. Those winters were exhilarating; what we have had of late have been dreadful.

But, as I cross my fingers in hope for snow, I recall that March can be a month of heavy snow and almost always the state boys basketball tournament in Madison brings some solid, white precipitation. Maybe it will this year, too.

Stats from the past couple of months in Wisconsin are shown here in graphics, thanks to the good work of the Wisconsin Ag Statistics Service.

This past Christmas, as in many Christmases gone by, we locals had a lunch with the four emeritus faculty who did so much for the turfgrass program at the UW - Madison and solved untold numbers of field problems for superintendents from border to border in all directions. Profs. Love, Worf, Newman and Koval all looked great, were in



great spirits, and can still talk at considerable lengths. The photo here shows them at our lunch. Drs. Love and Koval are facing; Drs. Newman and Worf had their side to the camera.



Golf course superintendents are, in a general way, interested in the outdoors and natural phenomenon that take place. Did you notice that there were two full moons this past January - January 1 and January 31? The second full moon in a month is called a "blue" moon and happens only once every 2.7 years. That might explain the phrase "once in a blue moon."

What is really weird for 1999 is that we will have two blue moons during the year - March 2 and March 31 will both have a full moon. That occurrence will happen again in 2018, and it last happened in 1915.

The full moons are variously named; most familiar is the September full moon (harvest moon) and the October full moon (hunter's moon). I like the name of the April full moon - the grass moon!

Like most golf course superintendents this time of year, I am spending some time filling our staff for the last season of the millennium. That is probably why an article about a Brookfield firm's statistics on resumes caught my eye.

Jude M. Werra & Associates has compiled a "liar's index" for the last four years, identifying resumes and credentials that are "puffed up." They specialize in reviewing executive job applications for businesses, so they know of what they speak. Their semi annual survey usually indicates 13 to 15 percent of applicants misrepresent their educational credentials.

Here's what caught my eye; in the first half of 1998, the figure for lying jumped to 21.65 percent of 300 executives and managers

nationwide. In the second half of 1998, however, the index dropped to 7.8 percent. The theory is the nation's fixation with lying during the miserable Clinton affair contributed to more truth-telling. If the theory is correct, it is the only good thing to come from events caused by the irresponsible person living at the end of Pennsylvania Avenue in D.C.

Also, if the theory is true, one has to wonder if Clinton's brazen and unashamed immoral behavior might, in turn, inspire through citizen disgust with him, more moral behavior.

What a legacy . . . What a loser.

Congratulations to James Krutilla and Gordy Waddington; they were honored at the GCSAA conference in Orlando with environmental steward awards. Gordy was a chapter winner in the public category and James was a merit winner in the public category.

During the tournament, the team of Randy DuPont and Mark Hjortness won their net division of the two-man competition. Mark Kienert won the eighth flight gross title.

Congratulations to all of them for representing us so well.

And congratulations to the authors and advertisers who make the *Grass Roots* what it is. What it

was in 1998 was the winning entry in Category 2 of the GCSAA chapter publication contest. I am feeling great indebtedness to them - the writers write for free and the advertisers pay the bills.

It is this spirit that impresses me - the work is given for the right reasons. In the end, we all hope to educate ourselves, tell the world who we are, and preserve our history for the generations of WGCSA members to come.

Hurrah for all who work to get each issue onto the newsstands!

It is getting more familiar, and more scary each year. The Wisconsin Department of Agriculture, Trade and Consumer Protection is gearing up in its war against gypsy moths. My suspicion is that in the end we will never win the war against the moths, but hopefully we can keep this horrible pest somewhat in check.

The plans this year are to spray 83,400 acres at 80 sites in 20 counties in Wisconsin. Infected areas will be sprayed with *Bacillus thuringiensis v. kurstaki*, harmless to humans and animals but effective enough to help control the spread of the moths.

Btk is not the long term answer, but may allow us time until research gives us better and more effective weapons. One of those being tested is the fungus