(Continued from page 29)
in his life. He sold two hundred to Tiffany's, the famous New York City jewelers. They used them as patterns for pins and brooches and pendants. Others of his snowflake glass plates were used as patterns for wallpaper design. They've found their way, also, into the design of metal and other crafts, cloth and silk, Christmas ornaments, and more.

His glass plates are in museums all across the country. While visiting with the curator of the Bentley Museum in Jericho, she said to me, "you didn't have to come so far to see some of Mr. Bentley's glass plates. There are some of them at the University of Wisconsin in Madison. Do you live near Madison?" Obviously, when I got home I started to track them down and learned that the UW-Madison's snowflake expert, Dr. Pao Wang, was on sabbatical. When he returns I fully intend to get to the bottom of this wonderful possibility.

Bentley photographed snowflakes in many locations, but the best crystals were right there in his backyard. Places with winters warmer than Jericho, Vermont frequently produced snowflakes that had flawed patterns before they fell. The humidity of Great Lake states like Wisconsin also distorted snowflake forms. Hudson Bay snow fell in the same category as Wisconsin. What luck for Bentley, and the rest of the world really, that he lived near Mt. Mansfield.

Bentley, despite his humble background and lack of formal education, was widely respected in scientific circles. He was voted membership in the American Association for the Advancement of Science and was honored with a fellowship in the American Meteorological Society. I've already noted his co-authorship of a monumental book; he also wrote many articles on the subject during his life and his monographs on snow, frost and dew were well known. The treatment given the subject in Encyclopedia Americana was written by...you guessed it—Wilson A. Bentley.

It was really a thrill this autumn to get directions to the old farmhouse he lived in, drive out to it and take a close look. My hope of having the current resident home when I was there didn't come true; I'd loved to have had a tour of it. A snowflake pattern from one of his photographs is painted near the peak of the main part of the house.

I ate lunch in Jericho, sat in the park in Jericho Center and soaked in the view of majestic Mt. Mansfield. Both are especially beautiful villages on a fall day. Even though it was mid-autumn, there was an unmistakable hint that winter wasn't far away.

I visited the Bentley Museum in the Old Red Mill and learned of where he was laid to rest after his death on Christmas Eve in 1931. The little cemetery is just a bit south of Jericho Center, in a very rural setting in Vermont.

And as you read this today, Snowflake Bentley is under several feet of snow. We can hope his soul is where the snowflakes he so dearly loved are made.

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A PERFECT WEEKEND

By Bruce Worzella

Have you ever planned anything, hoping that nothing goes wrong—weather is nice and everyone comes and has a good time? Well, that is what I wish for each year when it is time to hold the annual couples dinner dance. I hope Mother Nature grants us at least tolerable weather, that the couples in attendance like their accommodations and food selection and, finally, that the band plays music that everyone enjoys.

This year my wishes were granted! The weekend of October 4th and 5th in LaCrosse was perfect. Host Mike and Mary Drugan went out of their way to make sure everyone in attendance had a terrific time. Lunch was superb, the weather was in the 80s, the golf events kept everyone on equal terms and laughing, and the dinner was fit for a king and queen. Finally, a five-piece band rocked the house! The old saying, "if you did not have a good time, it was your own fault," was on the mark this weekend.

The 1997 prestigious Mr. & Mrs. Mow champions are Roy and Geri Zehren. They had a wild and wobbly putting play-off against Steve and Cheryl Schmidt. Believe me, it took steady concentration and a sense of humor to win this award!

A very special thanks needs to be given to the Drugans for all their hospitality and EXTRA effort. A big "thank you" goes to Cubby O'Brien from Cannon Turf Supply for hosting the distributor hospitality room. And last but not least, gracious thanks to the attendants; this is a WGCSA social event that gives thanks to that special person (wife!) who has to put up with us throughout the golf season.

Next year's event is already in the planning stage, I am informed. I am passing on the chairmanship to Dave Brandenburg. I encourage all of you who have never attended this relaxing and fun event to make room on your busy calendar for it in 1998. I know my wife and I will continue to enjoy the festivities.

Thank you, everyone, for your support!

1997 Mr. and Mrs. Mow — Roy and Geri Zehren!

Steve and Cheryl Schmidt "cut a rug"!

Our gracious hosts—Mike and Mary Drug

Don and Chris Ferger *finally* played golf!

Mike Handrich has to wait for the smoke to clear before he can putt!

Bev Quast and Jo Ann Otto "kick off!"

Janell Johnson and Mary Worzella — "don't let that putt get away!"

C-5: The Turfgrass Science Division of the American Society of Agronomy

By Dr. John C. Stier,
Department of Horticulture
University of Wisconsin-Madison

Turfgrass science is booming everywhere! Nineteen ninety-seven was an unprecedented year in terms of activity in turfgrass programs at universities and private companies. This year we saw several states either create new turf programs (Montana, South Dakota) or add additional faculty positions to existing turf programs (Washington State, Arkansas, Missouri, Rutgers, Kentucky, Colorado, Kansas State, Nebraska, etc.). Other states were kept busy refilling vacant positions (Wisconsin, Michigan State, and Massachusetts; Florida State tried but failed). Currently, 47 states have turf programs. The only states without turf programs are North Dakota, West Virginia, and Wyoming. Even Alaska and Hawaii have turf programs: I'm not sure, but I would suspect their main turf management problems are related to polar bears and lava flows, respectively.

Did you know Wisconsin ranks 10th in the nation in the number of golf courses? I learned these and many other turf facts at the American Society of Agronomy (ASA) national meetings last month. The conference began Sunday October 26 and went through Thursday October 30. The meetings lasted from 7:45 a.m. until usually 7-8:00 p.m. and consisted largely of oral and poster research presentations. By the way, the meetings were held at the Anaheim Convention Center in California, giving me a preview of where to eat (and where not to eat!) during the GCSAA convention in February.

The ASA was founded in 1907 as a forum for researchers in agronomic fields to develop new relationships, exchange ideas, and present their research. A turf committee was formed in 1946 which was composed of H.R. Albrecht, M.E. Farnham, H.B. Musser, and F.V. Grau. Today, these early turfgrass science pioneers are remembered by turfgrass societies: the Musser Fellowship is awarded annually to a Ph.D. candidate in turf, while the Fred V. Grau Turfgrass Science Award goes to a prominent turfgrass researcher (past recipients have included Dr. James Beard, Dr. James Watson, and Dr. Reed Funk). In 1952 a Turfgrass Management Division of ASA was formed. Seven turf research papers were presented that year: 1) Potash and nitrogen fertilization of fescues and bentgrasses, 2) Lime and compost on velvet bentgrass greens, 3) Soil acidity and the Japanese beetle, 4) Aerification and fertilizer penetration, 5) Combinations of cool- and warm-season grasses, 6) Problems of national turf trials, and 7) Clover control. It's interesting that so many of the topics covered then are still of interest today (although I'm not sure of who has velvet bentgrass greens anymore).

Currently there are three primary divisions in ASA: the American Society of Agronomy (Education, agroclimatology, environmental quality, international agriculture, etc.), the Soil Science Society, and the Crop Science Society. In 1963, Division C-5, Turfgrass Management, was reorganized under the Crop Science Society. Today, while total ASA membership is declining (probably a reflection of fewer farms), membership in C-5 is rapidly growing. At the meetings, the number of people in any given turfgrass presentation was usually over 200 with standing room only. This is pretty good considering there are probably less than 400 turf researchers in North America, including graduate students and turfgrass scientists from private companies (e.g., breeders) and other organizations (e.g., the USGA). The research from these programs is applied to over 13,000 golf courses, 1,400 sod growers, some 5,500 lawn care companies, approximately 50 million single family homes, between 30,000 to 40,000 school and park systems, perhaps 2,000 strictly athletic field facilities, and of course all the seed, fertilility, chemical, irrigation, equipment, journals, architect/construction, and consulting companies (Watson et al., 1992).

Research presentation topics ranged from turfgrass genetics to root zone construction of putting greens. Several symposia were held with papers presented on very specific topics, followed by lengthy discussion. Symposia for this year were: 1) Environmental impact of turf,

2) Applications of biotechnology to turf management, and 3) Graduate student training for future turfgrass research scientists.

Dr. Beard started the presentations in the environmental turf symposium. Dr. Beard reminded the audience of how much turf chemicals have changed compared to products once deemed suitable for turf use: gasoline (ant control), carbolic, hydrochloric, and nitric acids (dandelion control), carbon bisulfide and sodium cyanide (ant and earthworm control), lead arsenate (earthworm and disease control), copper sulfate (diseases) and of course the cadmium and mercury compounds. One USGA member discussed the potential environmental dangers associated with pesticide and fertilizer application near surface waters. Also discussed were the dangers to the golf industry of the trend of many new courses (including many municipal courses) being developed which cater exclusively to wealthy clientele. There was a tremendous amount of concern expressed that this trend will exclude the majority of the population from golf, thereby eliminating a substantial population base as a political ally during future legislation actions. As one participant stated, as a boy he would sling a bag of clubs over his shoulder and bicycle down to the locally owned mom and pop golf club, and pay $1 for a round of golf: where are those types of courses now?

The symposium on biotechnology was notable for two main reasons. Dr. Mike Kenna from the USGA proposed the question, "What has biotechnology done for the turf industry?"— his answer, not much (yet). My reaction is that there seems to be a great deal of hope that biotechnology will solve most or all turf management problems, but experience should teach us that rarely, if ever, does a potential product or technique solve all problems. The potential of biotechnology in turf will be discussed further in future articles in *The Grass Roots* as part of the series on turfgrass breeding. The other interesting discussion was on biological chemicals: chemicals which are found in nature (e.g., in plants or microbes) or, more typically, synthetic analogs. Synthetic analogs are produced in laboratories. Synthetic analogs have a chemical structure similar to naturally occurring chemicals but have an additional chemical group(s) or altered atomic bonding. From a company's perspective, synthetic analogs are usually more desirable than naturally occuring compounds because they can be mass produced, often have greater efficacy, and most importantly, can be patented. Patenting is important because it allows the companies to recoup their costs associated with production, testing, and registration over the 8-10 years required to bring a new product to market. "Heritage" fungicide is one such type; many more are in the works at a number of major chemical companies. Exciting stuff!

The final symposium was on graduate student training for future turfgrass scientists. As you would expect, some discussion was focused on the type of coursework required (soil science, plant physiology, chemistry, physics, etc.). To me, the most interesting part of the discussion was the notable lack of training programs/courses to teach graduate students how to run successful extension programs. While there was widespread agreement on this issue, there was no consensus on how to achieve extension training. Typically, graduate students gain extension experience by helping to write extension bulletins and by attending site visits with their major professor.

Your turf representative from UW-horticulture (yours truly!) was coauthor on three presentations. The first, "Statistical Analysis of Qualitative Turfgrass Ratings", was presented by Dr. Oliver Schabenberger, a statistician at Michigan State University (Schabenberger et al., 1997). Although I was a coauthor, I have to admit the actual concept and development of the computer program were developed by Dr. Schabenberger. The paper was important because it discussed a new, probably more accurate way of analyzing turf quality ratings. In the future, this could change the way NTEP data are analyzed and reported, which will directly affect golf course superintendents and other turf managers who use NTEP data to select new varieties.

I had substantially more input on the two other presentations. One was titled "The Effect of Mowing Height and Traffic on Supina Bluegrass" (Stier et al., 1997). This paper discussed the effects of simulated football traffic on Supina bluegrass mowed at 9/16", 1.25", and 2.25". Although the grass did not withstand much football traffic at 9/16" (few grasses would), it provided outstanding density (99-100%) at 2.25" after 26 simulated football games. In the non-football trafficked plots, Supina bluegrass demonstrated outstanding potential as a fairway or tee grass.

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I gave the final presentation on the last day of the conference when people had tired and started to leave for home. Nonetheless, a few dozen hardy souls remained, including a group active in developing the turf for the new Diamondback Stadium (a covered stadium) in Arizona. The title of the presentation was "Nitrogen and trinexapac-ethyl effects on photosynthesis of Supina bluegrass and Kentucky bluegrass in reduced light conditions" (Stier et al., 1997). Our results showed that Supina bluegrass had a significantly higher rate of photosynthesis in shade compared to Kentucky bluegrass. Applications of trinexapac-ethyl, previously shown to enhance turf quality in the shade (Stier and Rogers, 1995; Stier and Rogers, 1996), enhanced the photosynthetic rates of both turf species. The idea here is to use low-rate applications of trinexapac-ethyl throughout the growing season to maintain turf in the shade. We maintained a small (325 ft2) turf stand in reduced light for several years under constant growth regulation, and numerous other plots were maintained for up to 12 months before the plots were dismantled to make room for new studies. One caution: experience has indicated an interaction (sometimes negative, sometimes neutral, sometimes positive) between the onset of cold weather and mid to late autumn applications of trinexapac-ethyl. Obviously this interaction needs to be further investigated to understand the relationship between cold tolerance and plant growth regulators.

Overall the C-5 meetings were quite informative and useful. The ASA meetings, like the GCSAA, are a wonderful forum to exchange ideas, renew and forge new acquantainces, and stimulate creative thinking!

Literature Cited

Schabenberger, O., J.N. Rogers, III, and J.C. Stier. 1997. Statistical analysis of qualitative turfgrass ratings. p. 128. *In* Agronomy abstracts. ASA, Madison, WI.

Stier, J.C., and J.N. Rogers, III. 1995. Response of *Poa supina* and *Poa pratensis* to plant growth retardant and iron treatments under reduced light conditions p. 145. *In* Agronomy abstracts. ASA, Madison, WI.

Stier, J.C., and J.N. Rogers, III. 1996. *Poa supina* for indoor athletic fields and other high traffic, reduced light situations. p. 8-9. *In* 66th Ann. Mich. Turfgrass Conf. Proc.

Stier, J.C., J.N. Rogers, and J.A. Flore. 1997. Nitrogen and trinexapac-ethyl effects on photosynthesis of supina bluegrass and Kentucky bluegrass in reduced light conditions. p. 126. *In* Agronomy abstracts. ASA, Madison, WI.

Stier, J.C., J.C. Sorochan, and J.N. Rogers, III. 1997. The effect of mowing height and traffic on Supina bluegrass. p. 129. *In* Agronomy abstracts. ASA, Madison, WI.

Watson, J.R., H.E. Kaerwer, and D.P. Martin. 1992. The Turfgrass Industry. *In* D.V. Waddington, R.N. Carrow, and R.C. Shearman (ed.) Turfgrass. Agron. Monogr. 32. ASA, CSSA, SSSA, Madison, WI.

CONSTRUCTION TOUR MINNESOTA STYLE

By Tom Schwab, Superintendent
O.J. Noer Turfgrass Research and Education Facility
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One of the best WGCSA monthly meetings that I've ever attended was the construction tour to Whistling Straits hosted by Mike Lee two seasons ago. It was so educational to see a golf course in all different phases of construction and establishment. Since most of the monthly meetings visit golf courses that are all complete and in peak condition, it was a welcome change to see how one is built.

I had the chance to repeat that experience this past fall when John Stier invited me to join him on a road trip to the Twin Cities area. We were going to visit some of Glenn Rehbein Companies' construction projects for athletic fields, residential lawns, and a premier golf course, in addition to their sod farm and home office. I couldn't pass up the opportunity to see so many turf sites all in a two-day trip. Our tour guide was a long time WTA member and past Turf EXPO speaker Mike Kelly. He is an agronomist at Glenn Rehbein Companies based out of Blaine, Minnesota. Glenn Rehbein is a company that reminds me of The Bruce Company in Middleton. They are both huge and involved in all kinds of landscaping endeavors throughout the nation. One area that sets Rehbein apart is they are getting very involved in growing and installing *Poa supina* in certain situations. John Stier has done much research on this species and wanted to see how the grass was performing in some real life situations.

That was one of the experiences we had. We saw *supina* at the Rehbein sod farm, at soccer and football fields, and in a home lawn. The stop that you would have enjoyed the most was our first stop, though. It was very similar to Mike Lee's construction tour. We visited Troy Burne Golf Course (designed by Michael Hurdzan and Tom Lehman and owned by Glenn Rehbein) which is being constructed in Hudson, Wisconsin. We saw soils excavated and blended from on-site quarries, California Greens being built, Netlon soil stabilizer being blended and used, big roll sod being laid as fast as the semi's brought it in, a "Living Water" recirculating river being built, use of native plants and numerous mulches for erosion control, and lots of shaping, constructing and planting in all stages of progress. This is going to be a high-end golf course that I hope you can sometime visit. But don't wait until it's all complete and in peak condition.

Troy Burne Golf Course in Hudson, Wisconsin

Our second and last stop on the first day was a new football field built

Part of Honeywell Corporation's parking lot was sacrificed to make room for the regulation size soccer field

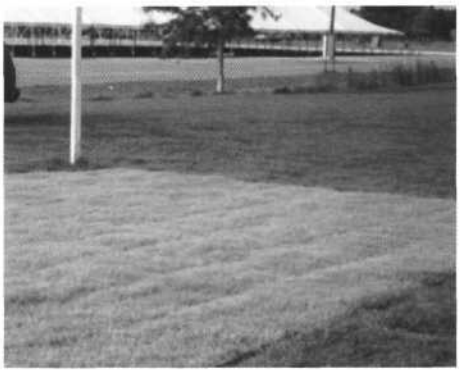
Urban Ventures soccer field, a turf parking lot in the foreground

by a high school in Woodbury, Minnesota. This was a 100% sodded *Poa supina* field. It was interesting to hear John start right in about some of the ways the field should be managed. He thought it should be fertilized right away because, even though *supina* is yellow-green compared to our more familiar species, this field was too yellow. He talked about the shorter mowing requirements and the additional irrigation needs that *supina* requires. Mike, our tour guide, informed us about the construction techniques and some of the politics involved in building the field correctly. Some of the construction techniques were inadequate because the school district decided to skimp on the materials for the root zone mix.

The next morning Mike picked us up for the grand tour. We started out by visiting his home headquarters then traveled north to their large and diverse sod farm. By diverse I mean they grow quite a few different species of turf including not only *supina* but also different cultivars of bentgrass. At the home headquarters we saw offices, labs, shops, and heard about tons of equipment (we didn't see much equipment because most had left for jobs that day). Then we headed out to see numerous athletic field situations.

The first was a combined soccer complex called the National Sport Center (NSC) in Blaine, Minnesota. NSC has 40 soccer fields and the city of Blaine has 15 more adjacent to it for a total of 55 fields. This complex is noted in the Guinness Book of World Records as being the largest soccer complex in the world. We met with the director and heard some common athletic field stories: everyone wants to play on the main stadium field in addition to the city's professional soccer team and of course the rock concerts get held in that one field also. We all noted that the professional management of complexes like this could be the up-and-coming profession in turf management in the near future. Turf positions like these could make a professional explosion much like management of golf courses did 20-25 years ago.

A completed Urban Ventures soccer field with a turf parking lot



One of the goalmouths of National Sports Center that was sodded to *Poa supina* in an attempt to increase wear recovery ability

John was interested in some of the space-plantings at the University of Minnesota

***Poa supina* football field in Woodbury, Minnesota**

Next we visited two new sand-based football fields built for Bethel College in the cities. The college had the foresight to build an adjoining practice field to ease the wear on the main field. The main field is usually where everyone from the freshman teams to the band wants to play and practice. A practice field is essential if you want to keep the main field in decent shape, even if the field is sand-based and more compaction resistant. They're not cheap though. A sand-based football field complete with drainage and irrigation can cost $200,000 plus.

The next stop was very interesting. We visited two *Poa supina* soccer

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