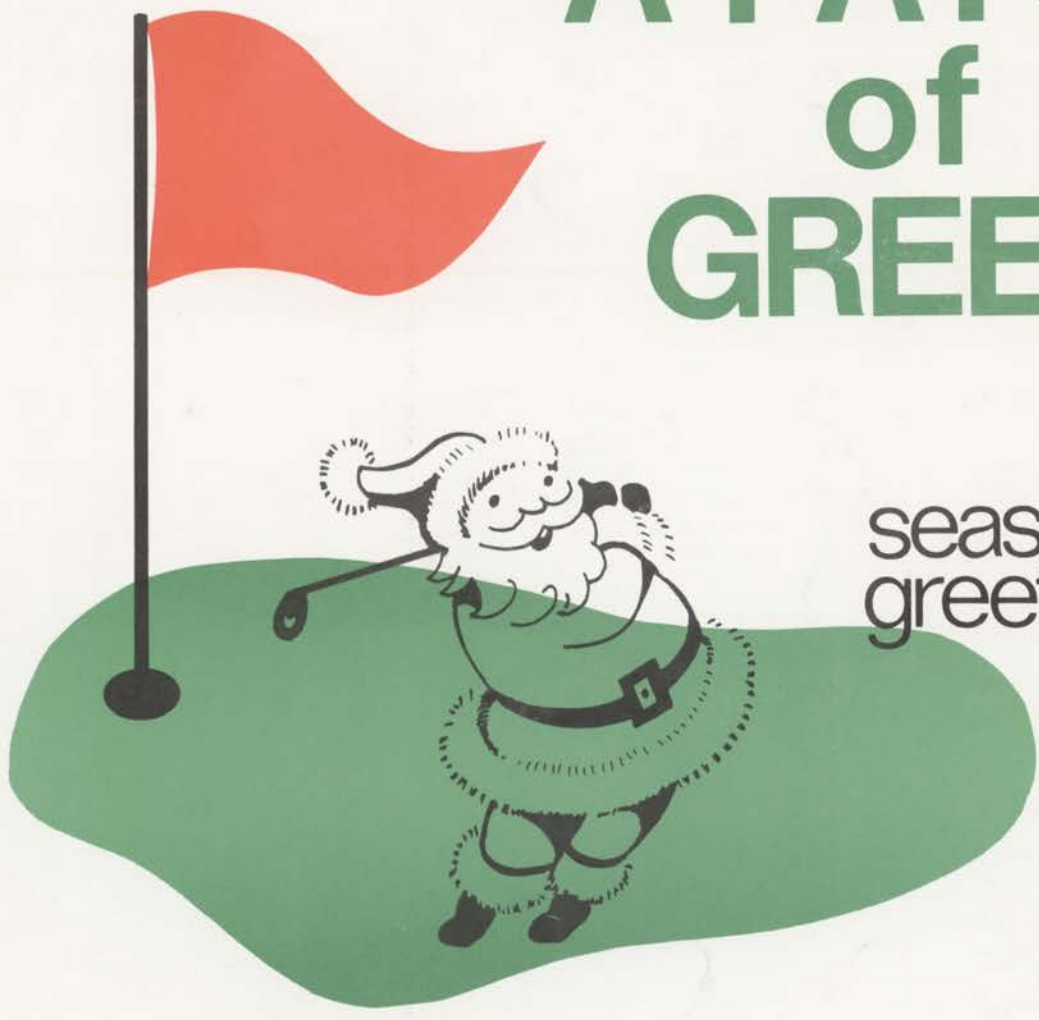


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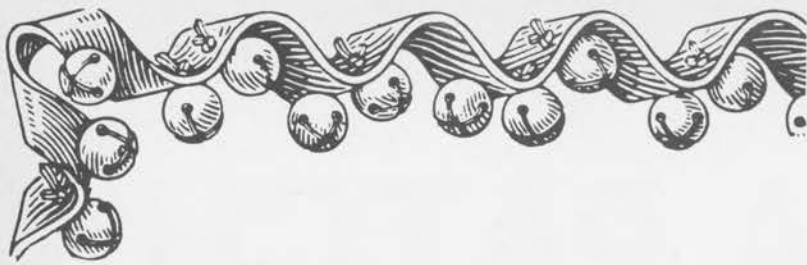
# A PATCH of GREEN



season's  
greetings

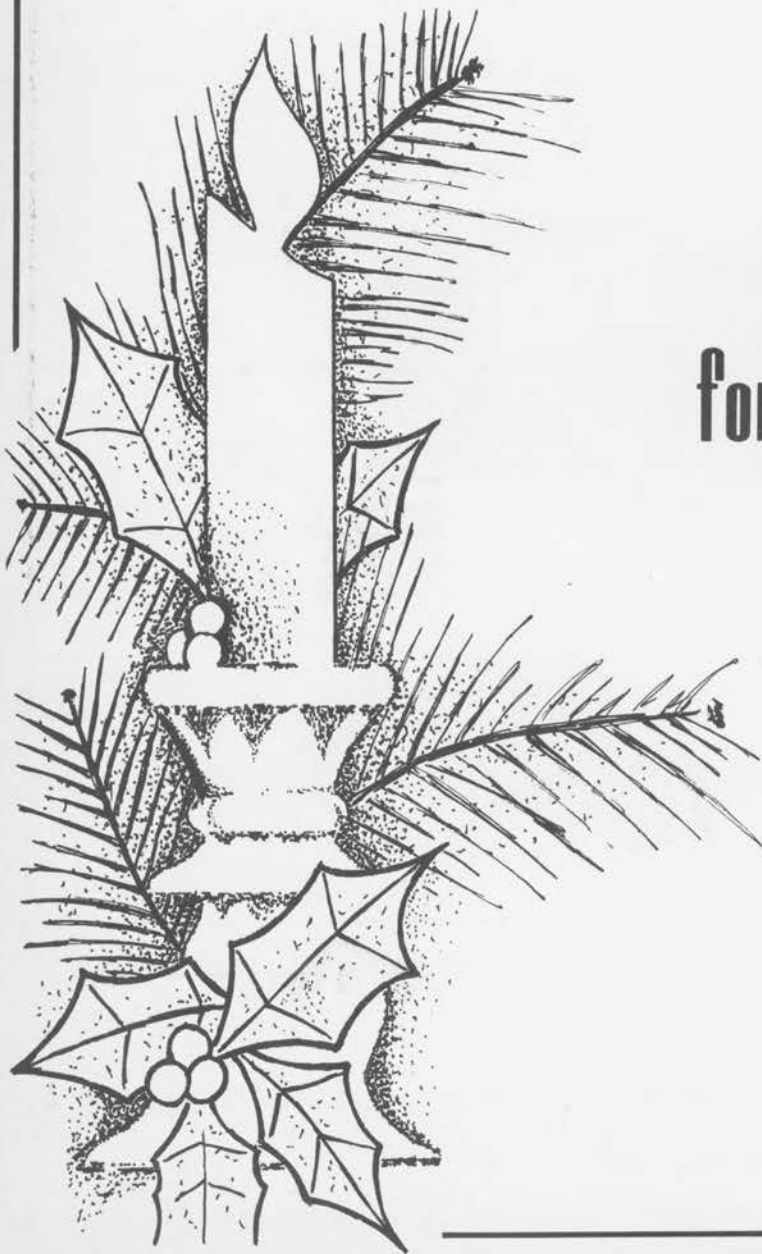


OFFICIAL PUBLICATION OF THE MICHIGAN & BORDER  
CITIES GOLF COURSE SUPERINTENDENTS ASSOCIATION



# Season's Greetings

and Best Wishes  
for the Coming Year



from the  
Editor and Publisher

# 1989 ANNUAL MEETING

President Charlie Gaige, Superintendent of Lakelands Golf and Country Club, called the Annual Meeting to order on the evening of October 17, 1989 at the Maple Lane Golf Club.

Forty-seven voting members were present for the annual election and the name change proposal. This was the largest gathering of voting members in recent memory.

Jon Maddern, the Secretary/Treasurer, started by reading the minutes of last year's meeting and giving the treasurer's report which showed a healthy \$45,711.22 in the treasury. Of course there are still some unpaid obligations to be made.

Committee reports followed after several introductions. Host superintendent Paul Kolbe was introduced as well as owner Pete Roehl and they were thanked for their fine hospitality. Also introduced was Ed Hock, the newly-hired superintendent of Grosse Ile Golf and Country Club.

Welfare Committee chairman Jon Maddern announced that two deaths occurred this year; Jack Slikboer of Dominion Golf Club and Norma Benham wife of member Don Benham. A moment of silence was given in their memory.

Jon was also responsible for the MTF liaison and the Association Policy Book. He announced that the Turf Conference this year will be three full days and that the Policy Book will include past winners of the C.H.

Wolfrom Classic, the John Walter award and the Superintendents Chapter Golf Championship.

Jim Eccleton, chairman of the Education and Special Olympics Committee's reported that fifty-six players participated in the Special Olympics Tournament and they contributed \$4,225.00. He also thanked the tee sponsors for their efforts in making this such a success.

Ed Heineman, co-chairman of the Scholarship Committee and chairman of the Christmas Party, Industrial Relations, and By-Laws Committees announced that this year's Christmas Party will be on Friday, December 8, 1989 at the Lakelands Golf and Country Club.

Steve Kolongowski, chairman of Membership and Historian Committees reported that we now have 321 members.

Gary Thommes reported on his committee responsibilities which were Golf Day - he reported raising \$23,000.00 this fall at Oakland Hills, Golf Shirt Committee - he still has a good selection of colors and sizes and he reported good results in the Golf Show where we hosted an informational booth and a putting contest. It afforded us good publicity and exposure. He thanked his assistant David Pawluk for building the green that provided the challenging contours for the contest.

CONTINUED PAGE 24



## "A PATCH OF GREEN"

Published Bi-Monthly by the  
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## A Short Wrap-Up Of The 1989 Golf Season

By James M. Latham, Director  
Great Lakes Region  
USGA Green Section



A recap of the 1989 golf turf season is difficult because it was so varied — from sheer disaster to disappointment to downright delightful, depending upon where you were at what time. It was a year of opportunity for many because of an apparent return to the usual Midwestern climatic patterns and for others because Mother Nature suddenly eradicated *Poa annua* in places few superintendents would dare to try.

At some time during the winter, golf courses from Michigan to Montana experienced classic winterkill of *Poa annua* and perennial ryegrass. This phenomenon can be expected locally in almost any year, but seldom has it been so extensive. The greater Chicago area, for example, missed the experience by less than 60 miles, but the six states to the north, east and west, were extensively blessed (?) with this cheap *Poa annua* control process.

It seemed to work this way:

- The soil was frozen.
- There was a thaw and the meltwater was retained at the turf surface (even with sand greens) in depressions, on gentle slopes or even flat spots where *Poa annua* dominated in the past.
- The temperature dropped suddenly to well below freezing.
- Ice formed in the saturated crown tissue of the bunch grasses and destroyed cell structure.

To make matters even worse for some superintendents, the thin green cover materials **did not** prevent damage. The only escapes in the epicenters of winterkill were greens (etc.) which retained snow-cover or those covered with thick, excelsior mats.

Comments by superintendents who used covers:

- The thin covers may have aggravated the situation by broadening the day/night temperature spread.
- The thick covers probably kept the green surfaces from thawing.
- Medium thickness covers on top of a rather heavy, late, topdressing apparently gave enough insulation to prevent surface thaw or refreezing.

This situation was compounded by very poor growing conditions in early spring which defied attempts to reseed. Even *Poa annua* seed germination was minimal. The superintendents who persevered with multiple reseeding operations now have bentgrass in quantity where it has not been in a long time. By initiating maintenance operations which keep it competitive, they can use *Poa annua* suppressants to their best advantage. Otherwise, the spring miseries will return to plague them again and again.

Substantial losses of perennial ryegrass occurred in South Dakota and Wisconsin underlining their unreliability as a primary golf turf species in this latitude. They apparently need backup by Kentucky bluegrass, fine fescues or some type of more winter hardy grass.

There are, of course, exceptions to those loss patterns, but they were rare at the courses visited during Turf Advisory Service tours this year. In some instances, I simply confirmed the superintendent's statements that it was impossible to predict the episode and that normal maintenance operations could not prevent this kind of winterkill. It became evident that agronomics must play a larger role in golf turf management so that bentgrass can become more competitive to help *Poa annua* controls become more effective. Now that we have the means to suppress *Poa annua* aggressiveness, it is possible to reestablish bentgrass and/or Kentucky bluegrass in key areas, but it's imperative that they **compete** or the cycle will begin again.

Some other strange events took place this season. The sudden appearance of mini-fairy rings on the greens at a couple of courses was one. At about the same time, similar rings elsewhere disappeared after a couple of years in residence. Why? How?

The black layer syndrome hasn't gone away, either. The sporadic rainfall pattern had a great deal to do with this — probably. Soil oxygen is still the key to prevention and cure. Internal drainage and the elimination of spongy organic layers by aeration and topdressing are necessities. And remember that black layers aren't new. O.J.Noer commented on black, odorous soil profiles in greens over 50 years ago. They were just harder to see at that time.

Supplying the anaerobic organisms with oxygen by applying potassium nitrate or similar materials will help to reduce immediate damage, but that is simply treating a contributing factor and not the cause. The cause of black layer in sand, clay or stratified profiles is usually an excess of water. The non-capillary (drainage) pores or air spaces are filled with water. Buried thatch becomes a saturated sponge. Layers of anything restrict the downward flow of water which pulls air into the soil after it. And let's not forget that plant roots need oxygen, too.

It seems that more clubs are accepting their greens' Stimpmeter readings of 8 to 9 feet. A high percentage of the membership are enjoying that speed. There is also the realization that juicing the surfaces up to 11 feet from 9 for a member-guest event destroys the home course advantage. In other words, maybe speed-need is the figment of the imagination of would-be Tour-ists and not the will of the bill-payers.

There are, of course, clubs in which the majority of the members **want** tournament class greens at all times and are willing to pay for them. That's fine with me as long as they realize that fast greens are, necessarily, firm and that fast, firm greens should be accompanied by fast, firm fairways and the level of management they require. The bottom line is a golf course that equates to 18 very large greens, mown at

CONTINUED PAGE 29



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# GCSAA UPDATE

## Sent to "A Patch of Green" by William R. Roberts, CGCS - Director of GCSAA

I trust the 1989 golf season has treated you well and that as things wind down, in the northern climates anyway, you are getting ready to enjoy the upcoming Holiday season.

As you may know, the 1989 Fall Board of Directors meeting of the Golf Course Superintendents Association of America was held in Orlando, from October 26 through October 29. This session was, in my opinion, an extremely productive time which will help GCSAA continue its progressive direction for the future. We have continued to enhance our role as a true leader in the golf industry and are looked to, on an ever increasingly frequent basis, for opinion and expertise. It is, quite frankly, a most gratifying time to be involved, at any and all levels, with GCSAA.

Once again, it is my intention, with this "update", to highlight some specifics from our October meeting and to solicit your comments as we move toward our annual Conference and Show in Orlando. (Editor's note — February 19-26, 1990)

**BUILDING COMMITTEE** — Specification plans are being finalized in preparation for the bidding process as GCSAA looks to a major investment in its own future through the construction of a new headquarters building overlooking the newest Alvarado golf course in Lawrence, Kansas. The \$4.2 million building will allow the association to keep pace with the rapid growth we have experienced over the past four to five years and, perhaps even more importantly, will allow for continued expansion of staff and services well into the next century. This exciting commitment to our future will undoubtedly be of primary benefit to our members and to the industry.

**PUBLICATIONS COMMITTEE** - Chairman Joseph G. Baidy, CGCS, reported on Committee activities including the meetings of the Technical Resource Advisory Committee and the Publications Committee. These committees deal with a variety of issues but find a primary importance in providing input to the staff of **GOLF COURSE MANAGEMENT** magazine. In helping to determine ideas for the magazine editorial calendar, the technical integrity of the magazine is insured and GCM readers can be assured that timely topics will be available. The Publications Committee also has responsibility for input to GCSAA's Awards programs and as a result of that input GCSAA will be presenting its 1990 Distinguished Service Award to William Bengeyfield, National Director of the USGA Green Section and to Thomas Watschke, Professor of Turfgrass Science at the Pennsylvania State University. Also, the Committee recommended that the Leo Feser Award, presented

for the outstanding article written by a Golf Course Superintendent, be presented to Mr. Ted Horton, CGCS, Director of Sports and Grounds at Westchester Country Club, and Ms. Mary Medonis, Assistant Superintendent at Westchester. The Award-winning article, entitled "Employee Safety on the Golf Course", appeared in the April, 1989 issue of **GOLF COURSE MANAGEMENT** magazine.

The Publications Committee has also recommended to the Board of Directors that GCSAA host a Newsletter Editors seminar at Headquarters in Lawrence next Spring. This exercise will, in my opinion, not only provide some valuable insights for those who produce chapter publications, but will also allow for a substantial dialogue between some of our association's primary communications and our association staff.

**PUBLIC RELATIONS** — The discussion centered on several topics covered at the Public Relations Committee meeting in September including the thrust of GCSAA television advertising vis-a-vis the media analysis provided by Bernstein-Rein, the need to pursue joint public relations efforts with PGA and, possibly, CMAA and the recommendation that the name of the organization be changed from the Golf Course Superintendents Association of America to the Golf Course Manager's Association. Further, the Board continued to focus on the need to explore the inextricable link between public relations efforts (perception), government relations efforts, education efforts, communication efforts and research efforts as we continue to deal with the issue of the Golf Course Superintendent and the environment.

Specifically, it should be noted that it was the consensus of the Board of Directors that an association name change to the Golf Course Managers Association may not be prudent at this time. Survey work done by association staff in 1987 showed that no one clear focus in terms of a new title/name could be identified at that juncture and it was felt that the supposition was still valid currently.

**TOURNAMENT** - Chairman Randy Nichols, CGCS, updated the Board on tournament activity noting that, to date, approximately 400 entries, out of a maximum 600 entrant field, had been received and processed. He also reported on the strong support and favorable comments received from last year's participants regarding the new tournament format and indicated that several other procedural changes being initiated this year would only enhance the strength and efficiency of the tournament process.

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## New Video Tape Illustrates Environmental Benefits of Turf, Supports PLCAA Foundation

(Las Vegas, Nevada, November 6, 1989) A new educational tool, a videotape titled "The Value of Turf — For Today and the Future," is now available for the turf industry. The 10-minute tape was premiered at this year's Professional Lawn Care Association of America (PLCAA) annual meeting and show.

The videotape is available through PLCAA's Education and Research Foundation. Funds from sales of the tapes will support PLCAA's work with educational and research-based programs. The program is sponsored by Ciba-Geigy's Turf And Ornamental Products, which funded initial production and duplication of the tapes for the foundation.

"We're pleased to support some of the breakthrough research that's going on in turf today," says Bill Liles, director of Ciba-Geigy's Turf And Ornamental Products. "This videotape should really get the foundation up and running."

The videotape features interviews with three top turf researchers: Dr. Tom Watschke, Penn State

University; Dr. Harry Niemczyk, Ohio State University; and Dr. Marty Petrovic, Cornell University. Their comments, combined with the new information about turf, illustrates the positive effects turf has on our environment.

The videotape is designed to help turf professionals more effectively address customer concerns about chemicals, the environment and groundwater. Scenes include home and commercial lawns, golf courses, sports fields and sod operations.

"Research and education are key to the future of professional turf care, and PLCAA's Education and Research Foundation can go a long way toward advancing knowledge in the field," says Bob Earley, chairman of the foundation's fund-raising committee. "Support from important members of the turf industry like Ciba-Geigy will help the foundation expand the boundaries of knowledge about turf."

For more information about "The Value of Turf — For Today and the Future," or to order copies, contact PLCAA at 1-800-458-3466.

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## GUESS AGAIN

The evening TV weather forecasters said last night there was a 60 percent chance of rain today. This morning's Chicago Tribune gave the same report — a 60 percent chance of showers. But, guess what? It was a most beautiful day, and not a drop of rain. Sixty percent? Come on. Perhaps we should go back to the old way.

On the farm my Dad would arise early, look up in the sky and check the cows, chickens, and the birds, then wet his finger and stick it into the air. He could tell how much humidity was in the air by how fast his finger dried and, of course, which way the wind was coming from.

When the birds weren't rehearsing their symphony or were unusually quiet, he knew that inclement weather was on the way, and referred to it as the, "lull before the storm". And, if the crows seemed to be flying erratic, it was certain to storm shortly.

If the cows huddled in a group close to the barn, a thunderstorm was inevitable, and on its way. Also, one of his many quotes (all in Plattdeutsch, the Low German vernacular language of his ancestral northern Germany heritage) was, "When the cows chase flies with with switching tails, a thunderstorm to drive them away, never fails".

And if the chickens were reluctant to leave the hen house, "donner and blitzen" would soon announce the coming of rain from the dark approaching clouds.

His consolation to hot days and muggy uncomfortable evenings was, "When the winds blow over the stubble of harvest fields, the hot days to cooler evenings will have to yield". And some of his other quotes were, "A sun of morning red, I can tell, will

put water in the cistern and the well". Or "A evening sun, red, bright and clear, will tommorrow bring hope, relief and cheer".

His prediction for Ground Hog was, "If he doesn't see his shadow there or here, it will be for farmers a super corn year". And of hoarfrost (or whitefrost as he called it) on the ground, plants and roofs, he would say, "Rain will wash away, Jack Frost's work and play". And on a dewless summer morning his comment would be, "Lack of dew on stalks of corn, will be refreshed by tommorrow 'morn". And he was right more often than he was wrong.

And there were always the pesky flies. Now let me tell you, those little rascals knew hours ahead of time it was going to rain. They would hang around the windows and doors and stick to one's self, and sting and bite with the voraciousness of a piranha. A sure sign of rain.

And whatever meteorology information my Dad couldn't get from the animals, he was filled in by my Mother's corns and bunions, or the hired hand's rheumatism. As I recall, he was right 90 percent of the time.

Now, maybe it's because the weather service guys and TV weather seers don't have access to animals and flies to observe. Or, maybe they don't eat the right kind of breakfast or something. But, with all their modern equipment, not to mention satellites, it seems to me they could at least come closer than 60 percent. My Dad sure did.

Edwin Wollenberg  
from "The Bull Sheet"

# Reader Feedback

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## EDITOR'S NOTE

The articles appearing in the "A Patch of Green" do not necessarily reflect the views or opinions of the editors. We present articles for their informative value — it is up to each reader to evaluate the information presented.

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**A Patch of Green**  
Mr. Ted Woehrle, Editor

Dear Ted:

I just read "Thoughtful Tree Planting" by Paul Vermeulen (USGA) in the September/October issue of "A Patch of Green". The guidelines, for the most part, seem to make a lot of sense and are well thought out. . . with one notable exception.

In guideline number eight, Mr Vermeulen advises us to ". . . try to limit the number of different species as much as possible. A continuous vegetation scheme is often the trademark of many of America's highest ranked courses." As an example, Mr. Vermeulen cites

Oak Hill as having a "continuous theme of oak trees from the first tee through the 18th green."

When I came to my present job here at St. Clair Shores I was given the task or rebuilding the old Lakepointe Country Club. . . a course that had its origins in late 1920's. What I found when I arrived was a parcel of 120 acres with hardly a trace of any trees. It turned out that the owners of the Lakepointe Club followed advice similar to guideline number eight. They did almost the same thing that Oak Hill has done. The only difference was the Lakepointe's selection was the American Elm Tree. Too Bad.

When I first got into the golf business in 1964, I came from a background of finance and, as a stockbroker, had always advised my clients of the wisdom of diversifying their investments. . . "don't put all your eggs into one basket," I warned.

Too bad Lakepointe Country Club didn't follow that advice.

Very Truly Yours,  
Jerry Comeau  
Manager, St Clair Shores Country Club

Editor's Note: Thanks for the letter. I couldn't agree with you more.

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**ED STESNEY HONORED AS "SALESMAN  
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NATIONAL SALES MEETING**



ED STESNEY, second from right, accepts "Salesman of the Year" Award from Ransomes, Inc.

Ed Stesney of Ideal Mower Sales in Ferndale, Michigan was recently honored as "salesman of the Year" by Ransomes, Inc., one of the world's leading manufacturer's of commercial turf equipment.

Stesney was selected from among hundreds of distributor personnel selling Ransomes equipment in the U.S. and Canada.

The award was announced on August 21 at the Ransomes National Sales Meeting held at Olympia Resort in Oconomowoc, Wisconsin. At the same meeting, Ideal Mower Sales was recognized as Ransomes "Regional Distributor of the Year".

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I paid a dime for a package of seeds  
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He said with a smile on his lip,  
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Ten cents a package! And pick as you please!"

Now seeds are just dimes to the man in the store,  
And the dimes are the things that he needs;  
And I've been to buy them in seasons before,  
But have thought of them merely as seeds;  
But it flashed through my mind as I took them this time  
"You have purchased a miracle here for a dime!"

"You've a dime's worth of power which no man can create,

You've a dime's worth of life in your hand!  
You've a dime's worth of mystery, destiny, fate,  
Which the wisest cannot understand.

In this bright little package, now isn't it odd?

"You've a dime's worth of something known only to God!"

These are seeds, but the plants and the blossoms are here

With their petals of various hues;  
In these little pellets, so dry and so queer,  
There is power which no chemist can fuse.  
Here is one of God's miracles soon to unfold,  
Thus for ten cents an ounce is Divinity sold!

Edgar A. Guest

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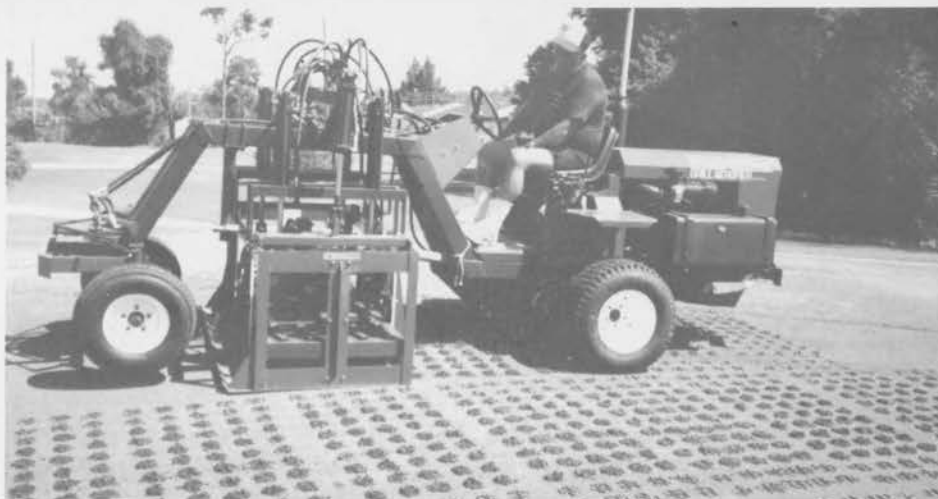
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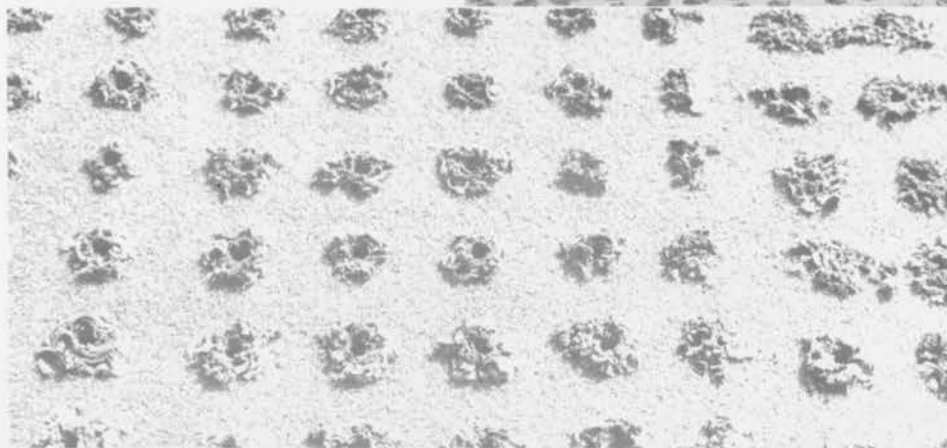


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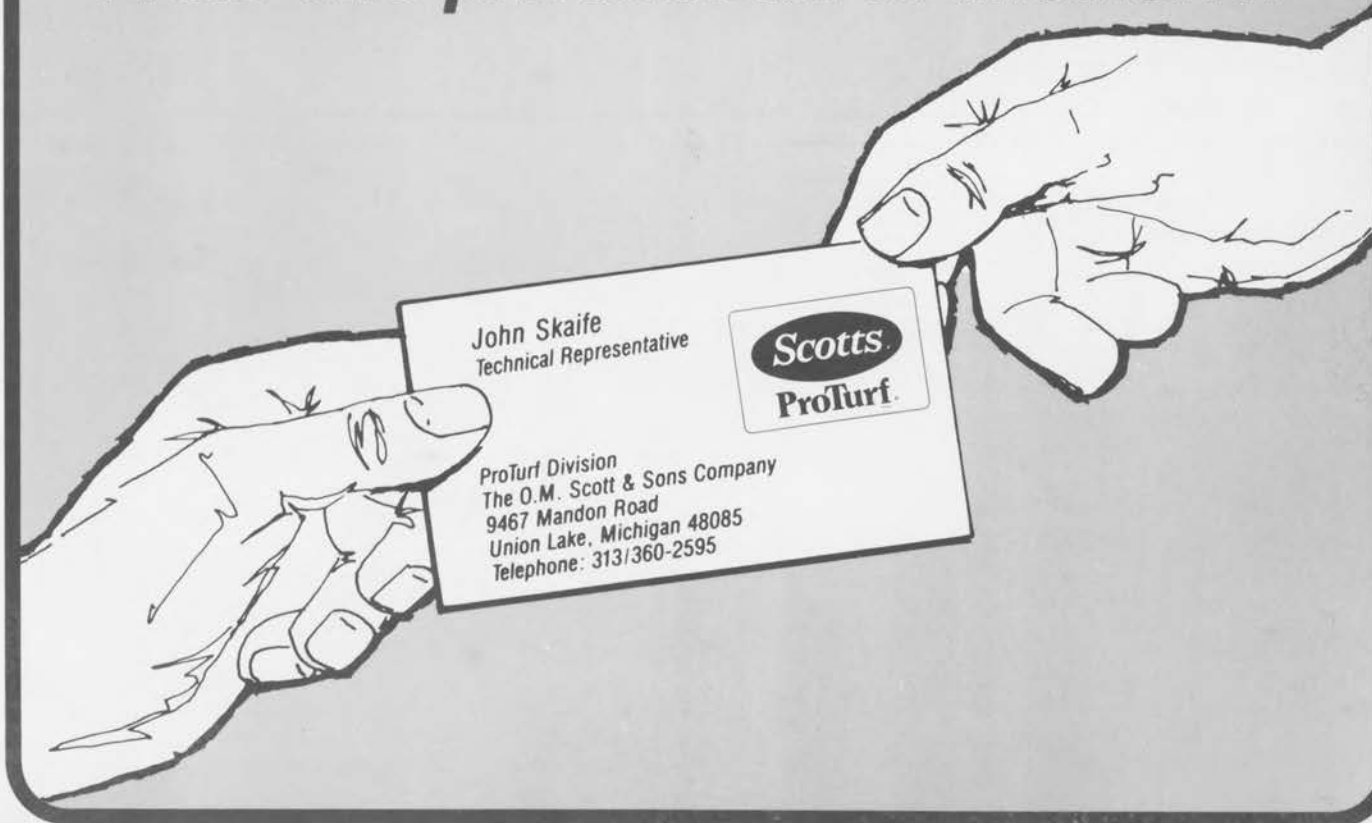
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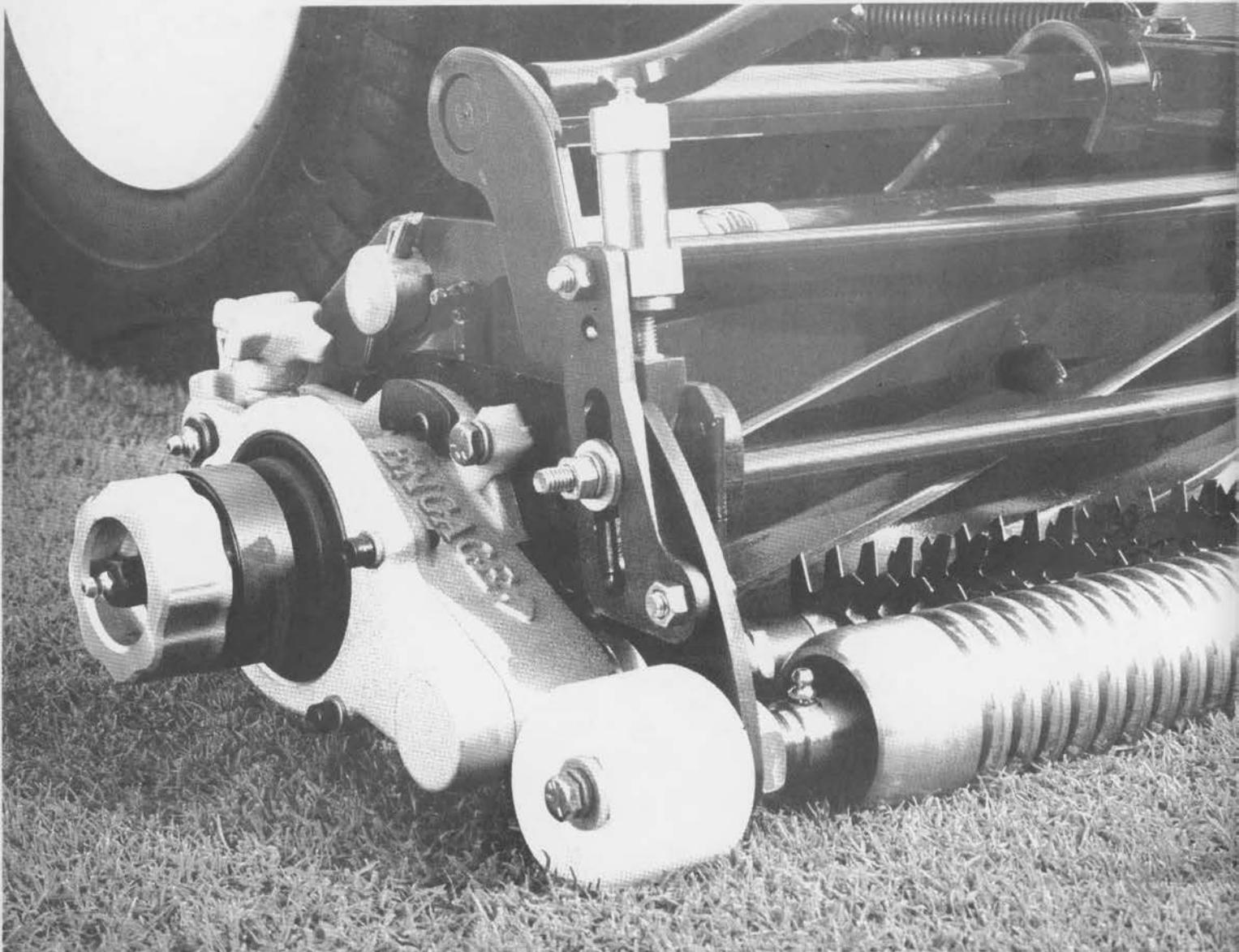
runners so they can be sliced before they lie down.

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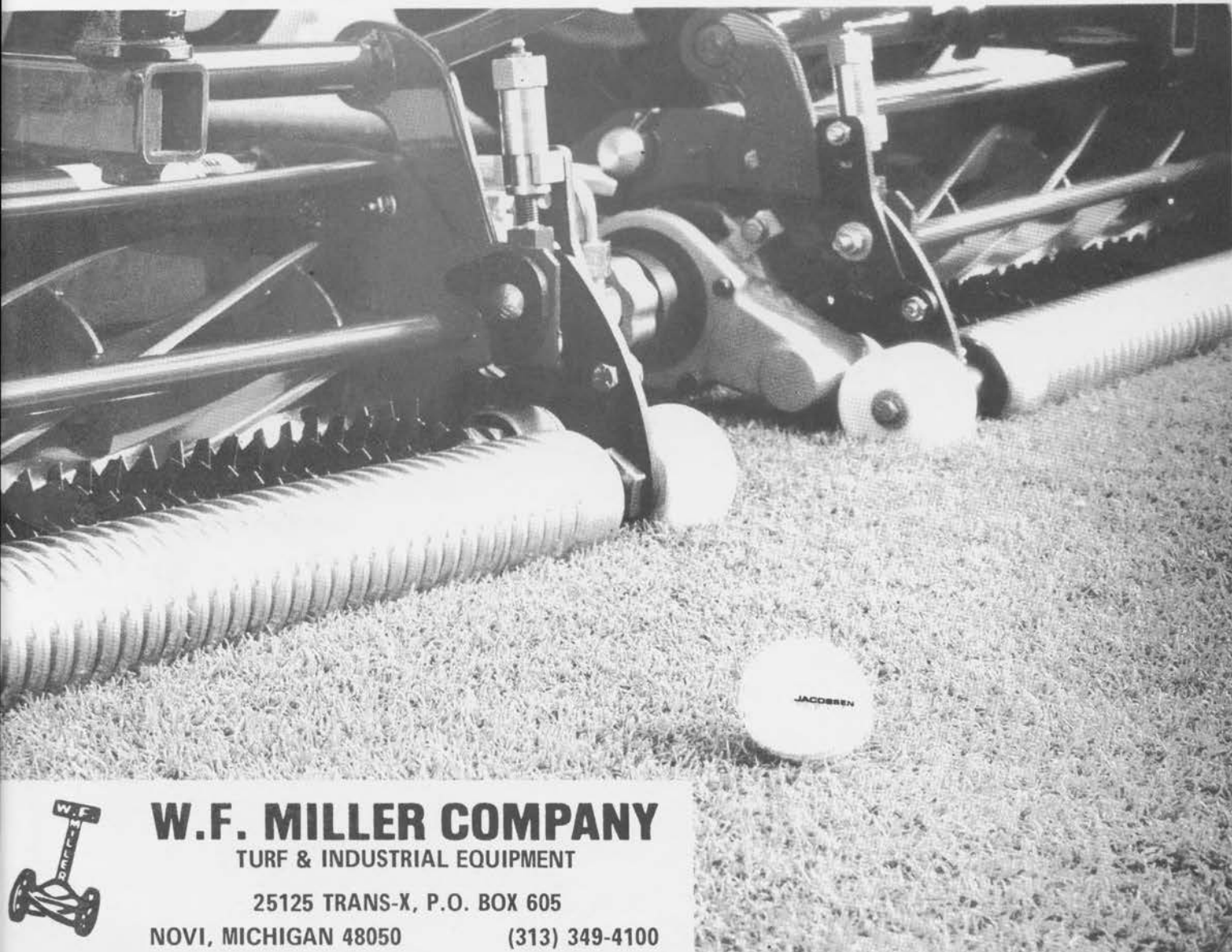
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# EARTHWORMS: Beneficials or Pests?

By Karen Delahaut and C.F. Koval  
Department of Entomology  
University of Wisconsin-Madison

Earthworms are found in a wide range of habitats throughout the world, having adapted to many different soil types as well as to lakes and streams. Earthworms — often called nightcrawlers, garden worms, red worms, or, simply, worms — are a valuable resource to many people. They provide bait for fishing, a source of protein for food, and most importantly, they play a unique and important role in conditioning the soil.

With the advent of chemical pest control, however, earthworms have become non-target recipients of many pesticides. Some of the most effective pesticides are broad spectrum in action, and they may inadvertently harm earthworms and other beneficial soil organisms.

Earthworms belong to the phylum Annelida and the class Oligochaeta, which consists of over 7000 species. Their bodies are long and tube-like, tapering at both ends and ranging in length from one to six inches. Another characteristic of the phylum Annelida is a segmented body, including an enlargement of several segments to produce the clitellum, a glandular organ used for reproduction. Earthworms are hermaphroditic and homosexual, and thus they may function as either a male or a female during reproduction. Self-fertilization does not occur.

Although one acre of soil may hold up to eight million earthworms, most people pay little attention to these productive and beneficial animals. They mostly go unnoticed from day to day, unless a heavy rain forces them to the surface of the soil, an angler needs some bait, or their casts disrupt a game of golf.

## Builders of Soil

Earthworms benefit the soil in many ways, primarily due to the physical and chemical effects of their casts and burrows. Earthworm casts, consisting of waste excreted after feeding, are composed of soil mixed with digested plant residues. Casts modify soil structure by breaking larger soil particles into finer granules. As plant material and soil passes through an earthworm's digestive system, its gizzard breaks down the particles into smaller fragments. These fragments, once excreted, are further decomposed by other worms and microorganisms. Earthworm casts can contribute up to 50 percent of the soil aggregates in some soils.

Cast production is most abundant in spring and fall when earthworms inhabit surface layers of the soil.

During this time, 20 casts per square foot of soil surface are not uncommon, and as much as 40 pounds of casts per 1000 square feet per year have been recorded. Under conditions of extreme temperatures or moisture stress during the summer and winter, earthworms migrate downward into subsoil horizons. In irrigated areas, such as golf course greens, fairways, and tees, this behavior may be altered and earthworms may not migrate during the summer months. Thus, their activity may be regarded as a problem requiring management.

Many species of earthworms deposit their casts beneath the soil surface within their burrows, where casts contribute to pedogenesis. Species that excavate permanent, vertical burrows, however, deposit their casts on the soil surface, where they play a greater role in soil profile development. In addition to benefitting soil structure, casts also provide nitrogen in a useable form for other organisms that decompose organic material on the soil surface. This interaction stimulates an accelerated decomposition rate, which helps reduce thatch buildup.

## Soil Fertility Enhanced

Earthworms are also important to nutrient availability of the soil. As they feed, they deposit digested organic matter and minerals along their burrows in the form of casts, a rich source of nutrients placed in close proximity to the plant roots growing through the burrows.

Comparative analyses of casts and surrounding soil have shown that casts contain five times more nitrogen, seven times more phosphorus, eleven times more potassium, three times more exchangeable magnesium, and one-and-one-half times more calcium. One explanation for this dramatic increase is that earthworms liberate nutrients from the mineral soils that would otherwise remain unavailable to

CONTINUED PAGE 21

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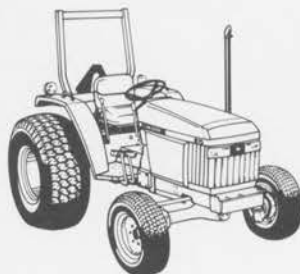
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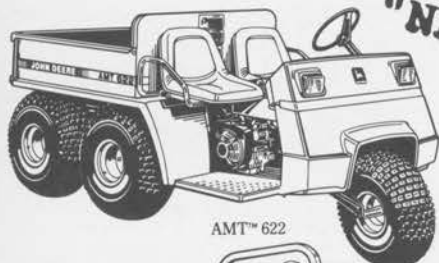
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plants. Another factor is soil microbial activity within the casts, which promotes rapid transformation of soluble nitrogen into microbial proteins, thereby reducing the leaching of available nitrogen.

In soils populated by earthworms, accelerated decomposition of organic matter and an increase in available nitrogen results in greater numbers of nitrogen-fixing bacteria. Phosphorus availability also increases, due to earthworms' ingestion of phosphate rock particles and the consequent movement down burrows of phosphorus-containing casts. Furthermore, an abundance of earthworms means an abundance of decomposed organic matter — decomposition is limited only by the amount of material available, not by earthworms' capacity to ingest plant material.

### Aeration and Drainage

Earthworm burrows, too, exert both physical and chemical effects on soil. Burrows are of two types. Temporary burrows are made by earthworms moving from one feeding site to another. Permanent burrows are homes to individual worms, are usually more extensive, and are open to the surface, allowing the resident earthworm to select the most favorable microclimate for feeding. Permanent burrows are fastidiously kept clean by earthworms removing casts, organic matter and soil that have washed in.

As they burrow, earthworms excavate networks of passageways throughout the soil, which improves the soil's porosity. Up to two-thirds of all soil pore space is estimated to be the result of earthworm burrows, which can increase a soil's moisture-holding capacity — in some cases by as much as 400 percent. Because of the large diameter and low surface-tension of most burrows, they also serve as drainage systems during irrigation and heavy rainfall. This may account for better mixing of soluble nutrients throughout the soil profile.

Earthworms also act as effective agents of soil aeration. As they penetrate the topsoil and proceed downward into the subsoil, they may increase the soil-to-air ratio by eight to thirty percent.

### Earthworm Attrition

With so many benefits to the soil accrued from the activity of earthworms, why are they given so little consideration when pesticides are selected, pesticides that ultimately bring them harm?

Pesticide registration guidelines initially placed little importance on the potential impact of pesticides on non-target species. This has changed dramatically in recent years, and the Environmental Protection Agency now gives considerable attention to the impact of pesticides on earthworms and other non-target species during the registration process. Use

patterns that negatively impact non-target species are unlikely to obtain registration; in fact, at present there are no pesticides registered by the EPA specifically for earthworm control.

Lack of knowledge is another problem — the applicator is often unaware of the detrimental effects that various pesticides have on earthworms. To be sure, the acute effects of various pesticides on earthworm distribution and abundance have been the topic of very little research in this country. Even less is known about pesticides' chronic effects on earthworms.

Another explanation may be linked to the increasing popularity of the game of golf during recent years. To meet the demands of greater use, more sophisticated means of pest control — and more advanced chemicals — are needed to maintain tees, fairways and greens under heavy use.

Finally, early chemicals with broad-spectrum pesticidal activity and long-term residual effects, such as chlordane, resulted in the chronic reduction of earthworm activity. A single treatment could hold earthworm numbers in check for multiple seasons, depending on soil type and climatic conditions. By comparison, pesticides in use today are generally less toxic to earthworms; consequently, earthworm activity is more noticeable.

### Pesticides and Earthworms

Toxicity to earthworms varies widely among types of pesticides classified by use — insecticides and related compounds, fungicides, herbicides, fumigants and vermicides. Two groups of pesticides are extremely toxic to earthworms and most other soil organisms — fumigants, such as chloropicrin, dichloropropane, and methyl bromide, and vermicides (designed intentionally to kill worms), such as ammonium sulphate, lead arsenate, and mercuric chloride.

Herbicides, at the other extreme, pose relatively little threat of earthworm toxicity. Their modes of action are directed toward plant regulation, and physiological processes of plants differ significantly from those of animals. This leaves fungicides and insecticides responsible for the most extensive pesticide impact on earthworms.

Insects, like earthworms, may be beneficial inhabitants of the soil in that they decompose organic matter; they may also act as predators or parasites to harmful insects. However, they can also be serious pests and must be maintained below damaging levels. Root- and shoot-feeding insects, which pose the greatest threat to golf course turf, are presently managed with organophosphate and carbamate insecticides to reduce their populations to non-injurious levels. However, a determination of non-injurious population densities is purely arbitrary.

As illustrated in Table 1, many of these compounds present a toxic threat to earthworms.

### Insecticide Toxicity

Earthworms are generally susceptible to carbamate compounds, which will significantly reduce their populations. Carbaryl, a carbamate pesticide often used for insect control, acts as a cholinesterase inhibitor, thereby producing long-lasting immobility and rigidity. Bendiocarb (Turcam) and propoxure (Baygon) are two other carbamate insecticides that cause paralysis in earthworms at normal dose rates. Carbofuran, another carbamate, is also very toxic to earthworms. Moreover, a sublethal response, characterized by weight loss, delayed clitellum development, and absence of cocoon production, has also been observed at recommended rates of carbofuran application.

Organophosphates are the most widely used class of turf insecticides. They have been successful in controlling white grubs, mole crickets, chinch bugs, and sod webworms, to name a few. Of the organophosphates, ethoprop is the most toxic to earthworms. In contrast, chlorpyrifos, isofenphos, and trichlorfon are considered non-toxic to earthworms when applied at normal dose rates.

Understanding how particular classes of biocides act upon target species may yield insights as to their effects on other living organisms. Organophosphates, as well as carbamates, mimic the structure of the acetylcholine molecule, an important component in the transmission of nerve impulses across synaptic gaps in many animals. Cholinesterase, an important enzyme in the nervous system, is responsible for the destruction of acetylcholine once a nerve impulse has crossed the synapse, thus preparing the synapse for another impulse. The presence of organophosphates or carbamates results in the phosphorylation of cholinesterase, thereby suppressing the destruction of acetylcholine. This results in a continuous firing of nerve impulses across the synapse, which is manifested as tetany.

Because the axillary neuromuscular junctions of insects and lower animals do not contain acetylcholine or cholinesterase, organophosphate and carbamate insecticides act instead on the central nervous system. The result is hyperexcitability, tremors, convulsions, paralysis, and eventually death. Experimental evidence shows that long-term disruptions of the nervous system, such as excision of the brain, indicates that respiration in earthworms is not dependent on muscular contraction as in insects. Rather, it is the circulation of blood by rhythmic peristaltic muscle contractions that is affected. Thus, organophosphate and carbamate insecticides are believed to cause death by anoxia, not as a function of respiration but as a function of reduced blood circulation.

### Fungicide Toxicity

Of the numerous fungicides registered for use on turf, only those in the benzimidazole class have

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demonstrated any remarkable toxicity to earthworms. This class includes benomyl, thiabendazole, thiophonare-methyl, and carbendazim, which is a metabolite of benomyl, and thiophonate-methyl. These compounds are used as broad-spectrum protectants. Their mode of action is primarily systemic; the ester metabolites of these compounds interfere with DNA synthesis by disrupting microtubule formation, which results in delayed mitosis.

In addition to the acute toxicity of the benzimidazoles, other, sublethal effects, have been noted in treated worms, including reduced feeding, retarded growth rates, reduced cocoon production, and reduced nerve conduction velocity.

Carbamate fungicides will exert the same toxic effect on earthworms as do their insecticide counterparts, though their mode of action on the target pathogen may be entirely different. The thiocarbamates most often applied include various thiram products — Bromosan WP, Bromosan F, Lescro Thiram, Spotrete, and Thiramad, to name a few.

Although the abundance of earthworms may be affected by relatively few turf pesticides, earthworm distribution and behaviour may be altered to a greater degree. Litter and surface soils treated with certain pesticides have a repellent effect on earthworms, and this reduces the breakdown and incorporation of organic matter into the subsurface horizons. Benomyl and carbendazim are particularly lethal to earthworms and also exhibit this repellent effect, which results in the avoidance of feeding in treated soils. Consequences include reduction in the amount of available nutrients in the root zone, decreased porosity and aeration of the soil, decreased waterholding capacity, and poor drainage.

#### Managing Earthworms

Earthworms, though often regarded as an annoyance by golfers and golf course superintendents, also provide several benefits to turf, as we have just seen. Reduction in the number of earthworms, whether intentional or not, can have a detrimental effect on both the physical and the chemical properties of the soil. Therefore, to maintain good soil structure capable of sustaining optimum plant growth, it would appear that attempts should be made to reduce the application of biocides known to adversely affect earthworm populations.

Clearly, the earthworm and its presence on the golf course raises many more questions than there are answers. Earthworms are generally thought to be beneficial; however, as with any other species, populations which are too high or out of place may warrant control actions. Currently there is insufficient data to determine at what levels earthworms



## ANNUAL MEETING, CONT.

Jay DelCamp reported his Golf Committee supervised several events that produced the following winners — State of Michigan Champ, Jim Eccleton; C.H. Wolfrom Classic, Jim Koziatek; and Michigan and Border Cities Champ, Gary Thommes, Low Gross and Paul Kolbe the low net champion.

Jay was also chairman of the Publicity and Awards Committee.

Ken DeBusscher was chairman of the Education, Scholarship and Picnic Committees. Being chairman of the Education Committee involves making arrangements for meeting sites and speakers. This year found us at Bay Pointe, Salt River, Essex, Tam-O-Shanter, Knollwood, Red Run, Bald Mountain, Indianwood and Maple Lane.

The Picnic was held at Kensington Park where 130 attended a fun day for the family. This has become the highlight of the year. If you missed it, plan on attending next year. We guarantee that you and yours will have a great time. Once again, Special Thanks go to Ernie Fuller for his generous gifts to ensure that a good time was had by the kids. Thanks, Ernie.

Kevin Dushane reported that his Committee on Ethics was quiet this year and that all is going well with the Editorial Committee. He did ask that members consider writing articles for **A Patch of Green**.

### THE ELECTIONS

President Charlie Gaige turned the meeting over to

George Prieskorn to conduct the election of officers. The results were — **President**, Tom Mason, superintendent Birmingham Country Club; **Vice-President**, Ken DeBusscher, superintendent Wabeek C.C.; and **Secretary/Treasurer**, Jon Maddern, superintendent San Marino Golf Club.

Newly-elected **Directors** were Carey Mitchelson, superintendent Country Club of Detroit; and Jim Eccleton, superintendent Arbor Hills C.C. who was reelected to a second three-year term.

Kevin Dushane retired from the Board as **President Emeritus**; Charlie Gaige is replacing him in that capacity.

### NAME CHANGE DEFEATED

The suggested name change was soundly defeated 37 to 10. It was agreed however that the study will continue and when the committee feels that another attempt should be made, it will be presented.



New Board for 1990, L-R — Carey Mitchelson; Kevin Dushane, retiring from Board; Ken DeBusscher, Vice-President; Jim Eccleton; Ed Heineman; Steve Kolongowski; Charles Gaige; Jon Maddern, Sec./Treas.; Tom Mason, President; and Jay DelCamp.

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BILL ROBERTS, CONT.

**EDUCATION** — Chairman Randy Zidlik, CGCS, noted that preparations for the annual conference were progressing well and that GCSAA would, once again, be offering an extremely strong, focused educational opportunity for attendees. Topics to be covered will include, in six concurrent sessions, "Critically Evaluating Your Needs", "Golf Course Management Techniques, Part I and Part II", "Managing Today's Environment", "Southern Turfgrass Management" and "Water Quality and Distribution". Also being offered will be two major speaker sessions, computer usage group meeting, government relations forum, educational forums presented by allied associations including the golf course architects and golf course builders and the GCSAA Green Section program. These programs are offered, of course, in addition to 38 one and two day seminar opportunities.

**CERTIFICATION** — Chairman Zidlik reported on the overall progress of the Certification program which has now realized 1041 Certified Course Superintendents, with 70 certified to date in 1989 and an additional 154 in process. This compares with 944 Certified Golf Course Superintendents at this point one year ago.

**MEMBERSHIP** — Chairman Randy Nichols noted that 565 new member applications had been received and approved since the Spring Board meeting including 117 "Class A", 139 "Class B" and 109 "Class C". These totals were helping to push GCSAA membership rapidly toward the 9,000 member mark. Mr. Nichols also reported on the September committee meeting and received the topics discussed including enhanced chapter relations, membership promotion activities, membership services, merchandise program, membership classifications and the commercial use of GCSAA's logo.

I believe, again, that a great deal was accomplished at the Fall Board of Director's meeting and that things are well focused, not only for the short-term including the upcoming annual Conference and Show, but also for the future. In my opinion this is a result, to a great degree, of increased input to the Association through the committee process and for your involvement in that process you have our thanks. If I can answer any questions or offer any clarification regarding this report or any other matter, please give me a call at your earliest convenience.

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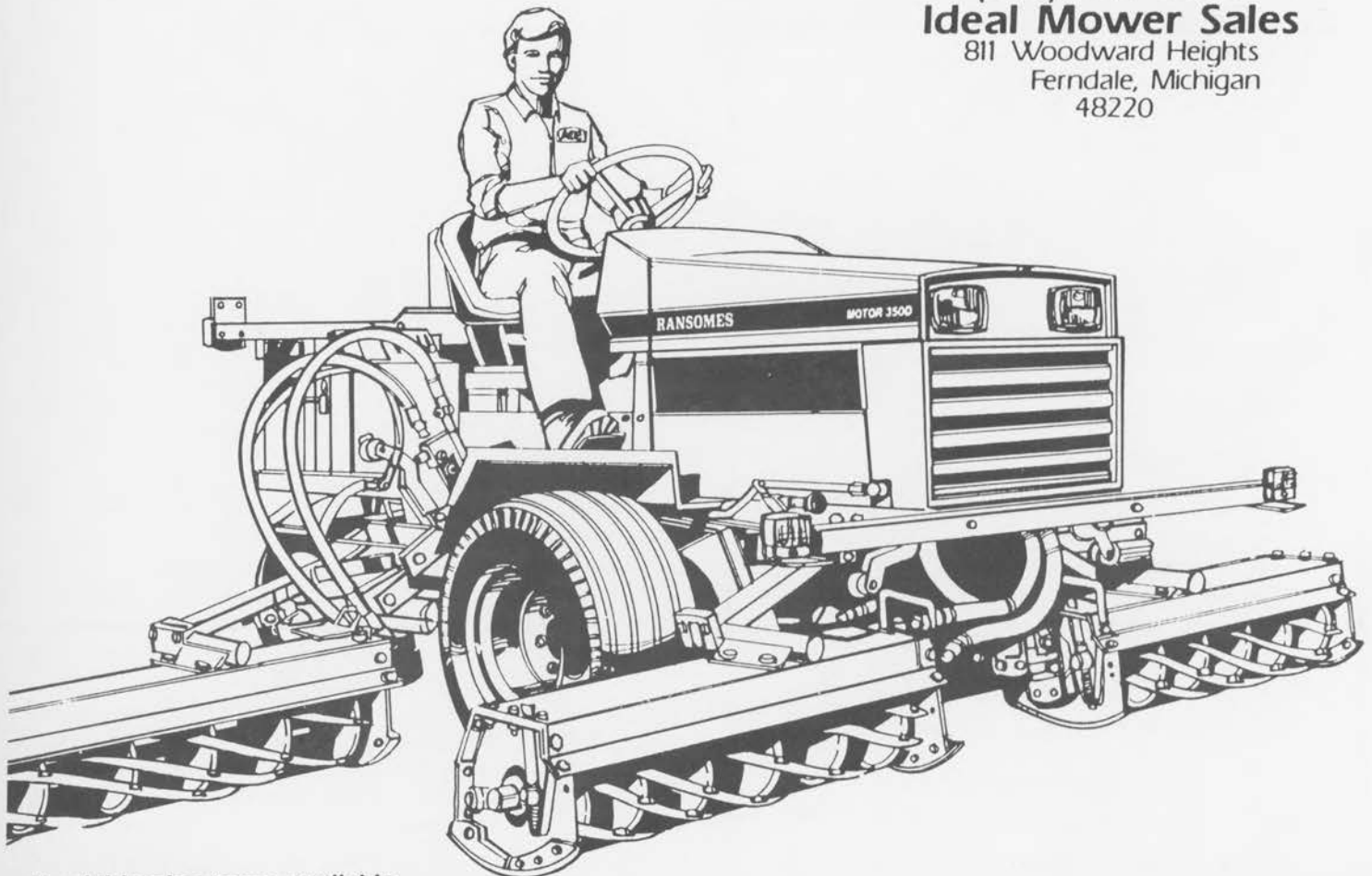
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“CRAWLERS,” CONT.

become pests. In addition, a scientifically based benefit: pest ratio has yet to be determined.

Alternative management options need to be devised and the feasibility of such options evaluated. Chemical compounds can be developed specifically for earthworm control, but they may have greater adverse effect on non-target organisms than pesticides registered for insect or pathogen control. All of these issues should be addressed and research carried out to answer the many questions that have arisen over the understanding of earthworm ecology.

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Acknowledgements

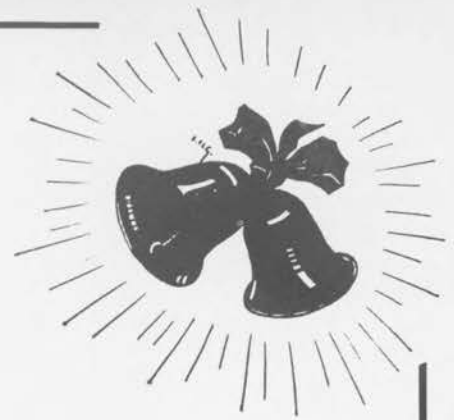
I wish to thank Richard Moen for his editorial assistance in the writing of this article.

Karen Delahaut is a graduate student at the University of Wisconsin-Madison where she is studying for a master's degree in IPM.

Preceding article from,  
**The Grass Roots**,  
November/December, 1989

TABLE 1  
Relative Toxicities to Earthworms of Some Common Pesticides.

PESTICIDE	TOXICITY LEVEL	PESTICIDE	TOXICITY LEVEL
<b>I. Vermicides</b>			
Ammonium sulfate	Very toxic on acid soils only		
Mowrah meal	Toxic with low environmental hazards		
<b>II. Fumigants</b>			
Chloropicrin	Very toxic at normal rates		
Methyl bromide	Very toxic at normal rates		
Metham sodium	Very toxic at normal rates		
Dichloropropane/			
Dichloropropene	Very toxic at normal rates		
<b>III. Insecticides &amp; Acaracides</b>			
<i>Organochlorines:</i>			
Chlordane	Very toxic, used for earthworm control		
Toxaphene	Very toxic, used for earthworm control		
Heptachlor	Very toxic, used for earthworm control		
Aldrin	Toxic at high rates only		
Dieldrin	Toxic at high rates only		
Endrin	Variable toxicity at dose rate		
Isobenzan	Variable toxicity		
<i>Organophosphates:</i>			
Ethoprop	Very toxic at normal rates		
Fensulfothion	Very toxic to some species		
Phorate	Very toxic at normal rates		
Fonofos	Moderately toxic at normal rates		
Karathion	Moderately toxic		
Methyl parathion	Moderately toxic		
<b>III. Insecticides &amp; Acaracides (continued)</b>			
Thiomazin	Moderately toxic		
Isofos	Slightly toxic at normal rates		
Disulfoton	Slightly toxic at normal rates		
Fenamiphos	Slightly toxic at normal rates		
Chlorpyrifos	Relatively non-toxic at normal rates		
Isofenphos	Relatively non-toxic		
Malathion	Relatively non-toxic		
Menazon	Relatively non-toxic		
Phosalone	Relatively non-toxic		
Terbufos	Relatively non-toxic		
Trichlorfon	Relatively non-toxic		
<i>Carbamates:</i>			
Aldicarb	Very toxic at normal rates		
Bufencarb	Very toxic at normal rates		
Carbaryl	Very toxic, used for earthworm control		
Carbofuran	Very toxic		
Dithiocarbamate	Highly toxic at normal dose rates		
Methomyl	Highly toxic at normal dose rates		
Oxamyl	Highly toxic at normal dose rates		
Tirpate	Highly toxic at normal dose rates		
<b>IV. Fungicides</b>			
Benomyl	Very toxic at normal rates		
Carbenzadim	Very toxic at normal rates		
Thiophanate methyl	Very toxic at normal rates		
<b>V. Herbicides</b>			
All are relatively non-toxic at normal rates but some may be toxic at rates used to completely suppress plant growth.			



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## SHORT WRAP- UP, CONT.

several different heights of cut, but with the same general maintenance procedures throughout. That includes vertical mowing or brushing to minimize the tee toward the green grain which comes from golf car use of fairways. This applies to both bentgrass and bluegrass. Banning golf cars from the fairways usually destroys the intermediate roughs, so unless these vehicles are limited to roadways, be prepared for higher maintenance costs or lower quality playing conditions. Golf cars are like taxes - we do not like them but we do like the revenue they generate.

Speaking of golf car traffic, have you noticed the damage being done by the concentrated traffic of maintenance equipment? Some of the wear is in non-play areas, but certainly not all of it.

The traffic problem continues to mount on practice tees, where few golf operations have adequate space. Even fewer can do anything about it except recycle the available area they have. This brings ryegrass to the forefront even though it is no more than temporary turf that will be destroyed in a very short time. The best results have been attained by "using up" strips of turf across the width of the trees before moving play to another strip. The damaged strip is then double aerated and the cores broken up, followed by heavy (15-20 lbs. per 1,000 sq. ft.) seeding and topdressing or just mixing the seed with the soil from the cores. Rolling and fertilizing finish the job. Fungicide treated seed minimize the danger of damping off until a systemic fungicide can be applied — at about the time of the first mowing.

If you want to turn green with envy, just see the creation at St. Andrews Golf Course in Chicago, under the care of John Lapp. Acres of bentgrass and ryegrass/bluegrass plus a 39-mat slab for night use. Real greens for targets and real sand in the bunkers. Or look at the Hinsdale Golf Club's handbox practice area which provides such a wide variety of shots you won't miss using a driver. Bob Maibusch is rightly proud of this unique installation. There are other fine practice ranges throughout the Great Lakes Region but these are tops in their size classes.

A closing thought: If we are to keep bureaucratic regulations off our back, we must make them unnecessary. The way to do this is to stay ahead of the game through safe storage and application of chemicals, employee training and protection and a close look at our own operation as if we were an inspector who had never seen the place before and had not issued enough citations recently.

From **The Grass Roots**,  
November/December, 1989

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Be sure not to let people know your problems: Half of them don't want to know and the other half are glad you're getting what's coming to you.

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## SUPERINTENDENTS TO ELECT LEADERS IN ORLANDO

Gerald L. Faubel, CGCS, has been nominated for the presidency of the Golf Course Superintendents Association of America (GCSAA) for 1990-91. Faubel, superintendent at Saginaw Country Club, Saginaw, Michigan, currently serves as vice president of the professional association.

The organization's officers and directors will be elected during its annual meeting at the 1990 GCSAA International Golf Course Conference and Show in Orlando, Florida on February 26.

Vice presidential candidates are Stephen G. Cadenelli, CGCS, of the Metedeconk National Golf Club in Jackson, New Jersey, and William R. Roberts, CGCS, of the Lochmoor Club in Grosse Pointe Woods, Michigan.

Three candidates for director will be elected for two-year terms. Nominees for director are Joseph G. Baidy, CGCS of Acacia Country Club in Lyndhurst, Ohio; Charles A. Clark, CGCS Broadmoor Golf Course in Colorado Springs, Colorado; Cecil C. Johnston, CGCS Avila Golf & Country Club in Lutz, Florida; Charles T. Passios, CGCS Hyannisport Club in Hyannisport, Massachusetts; and Randall P. Zidlik, CGCS Rolling Hills Country Club in McMurray, Pennsylvania.

GCSAA's current president, Dennis D. Lyon, CGCS, City of Aurora Golf Division, Aurora, Colorado, will continue to serve on the board of directors as immediate past president.



**GERALD FAUBEL, CGCS**  
Vice President



**BILL ROBERTS, CGCS**

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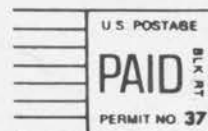
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