



The MMS Scope

Minnesota Microscopy Society

Local affiliate of the Microscopy Society of America
and the Microanalysis Society

September 2022

In This Issue:

Fall Meeting

Kick off a new academic season beginning with our fall meeting on **Oct. 13** in Duluth at **The College of St. Scholastica**. UMD professor emeritus Dr. Randall Hicks will examine steel corrosion due to microbial influence. Register soon and plan a trip to beautiful Duluth to participate.

New Officers Named

View results of the election for board officers held at the Spring Symposium.

MMS Member Dues

Please remember to submit your 2022 calendar year membership dues.

Message from the President

MMS President Jeff Salisbury shares his thoughts on the growth of tools for scientific examination, the nature of a microscopist, his early connections to the field, and key learnings from Spring Symposium presentations.

Past Events

Past-president Gail Celio reports back from M&M 2022 held this summer in Portland, OR.

MMS FALL MEETING (hybrid event)

Thursday, October 13, 2022



TOPIC

Microbe Wars: The Corrosion Phantom Menace



SPEAKER

Dr. Randall Hicks

Professor Emeritus
Swenson College of Science and Engineering
University of Minnesota Duluth



COST

Free
(does not include dinner afterward)



MAPS/ ROUTE

The College of St. Scholastica
Science Building, 2nd Floor
Duluth, MN 55811



Refreshments and tour will begin in the Benedictine Commons and the presentation will be held in the Science Auditorium.



1200 Kenwood Ave.
Duluth, MN 55811

NOTE:

Park in **Lot 7** and enter **Building 10** -- see campus map at the link below and building map on the next page.

- [Scholastica campus map](#)
- [Google Maps directions](#)



REGISTER

Go to mnmicroscopy.org/events to register.
(Remote attendees: Find Zoom link on the registration page.)
Please register so we have an accurate head count for in-person seating and refreshments!

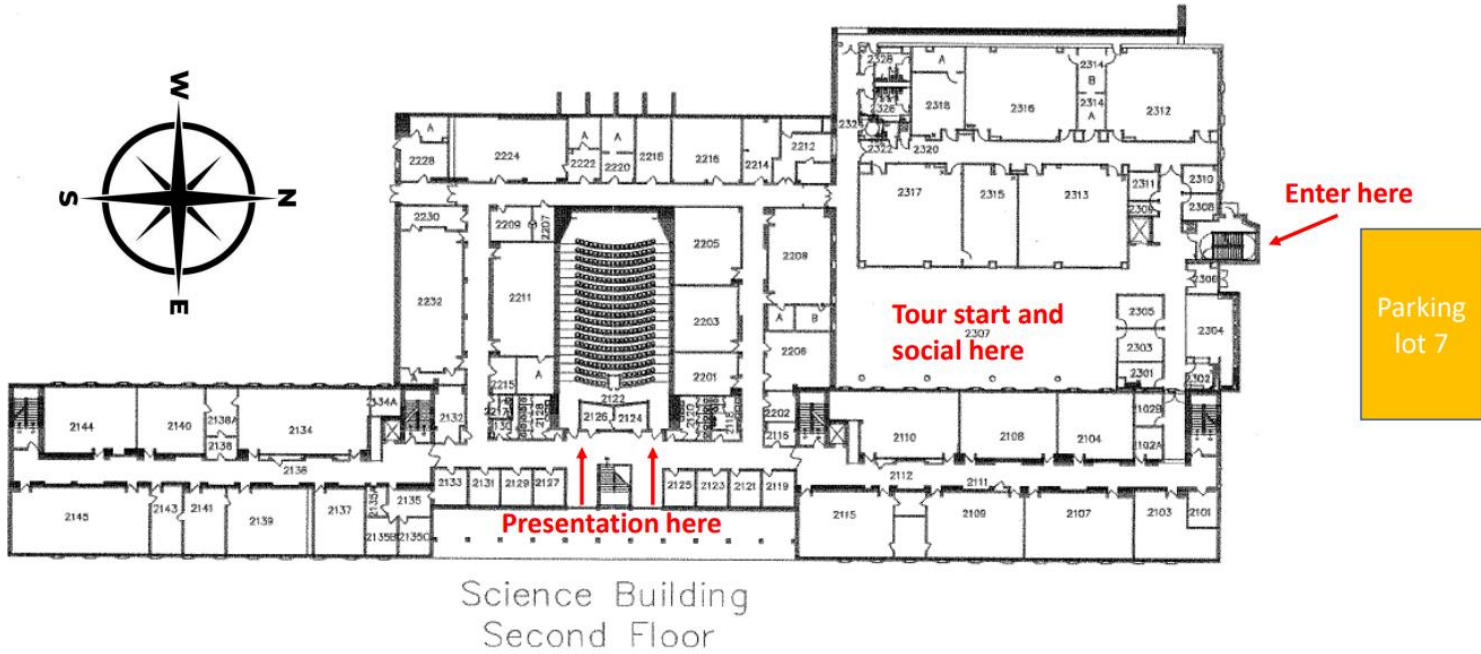


SCHEDULE

3:45 – 4:15 pm *Tour of Science Building (optional)*
4:30 – 5:00 pm *Check-in, refreshments, socializing*
5:00 – 6:00 pm *Presentation by Dr. Randall Hicks*
6:00 – 6:30 pm *Socializing and discussion*
6:30 – 8:30 pm *Dinner at [Tavern on the Hill](#) (cost not included)*

Fall Meeting | 2022
"Microbe Wars" | College of St. Scholastica
continued

 EVENT LOCATION



St. Scholastica Science Building

Fall Meeting | 2022

"Microbe Wars" | College of St. Scholastica
continued



SPEAKER BIO

Dr. Randall E. Hicks is Professor Emeritus in the Department of Biology at the University of Minnesota Duluth. During his 34-year tenure at UMD, he was the Biology Department head for eight years, Director of the Center for Freshwater Research and Policy, Director of the UM-EPA Cooperative Training Program, and a Co-Director of Graduate Studies for the Water Resources Science Graduate Program. He completed a B.S. degree in zoology at the University of Oklahoma, a Ph.D. in ecology at the University of Georgia, and did postdoctoral work at Woods Hole Oceanographic Institution and the Illinois Natural History Survey before joining the UMD faculty. Dr. Hicks is an environmental microbiologist who studies the diversity and productivity of aquatic microbial communities, their role in the degradation and transformation of organic compounds, and the survival of pathogenic microbes in these communities. This work took him to the bottom of different great lakes using a manned submersible, to Russian and African great lakes, and various oceans, but other research efforts in his lab were focused on studying microorganisms in the North American Great Lakes. Recent research topics in his lab included evaluating biocorrosion observed in the Duluth-Superior Harbor, if ballast water discharge introduces invasive microbes, evaluating the abundance and diversity of planktonic archaea in great lakes, and investigating the sources of indicator bacteria at beaches.



Dr. Randall Hicks

Dr. Hicks is the author or coauthor of more than 40 scientific journal articles and book chapters and has trained 40 undergraduate researchers, 26 graduate students, and two postdoctoral investigators. Much of the research conducted in his laboratory was supported by the Sea Grant College Program, the National Science Foundation, and the U.S. EPA, as well as the LCCMR (Legislative-Citizen Commission on Minnesota Resources) and the UM MnDRIVE Initiative. He instructed numerous students at UMD in general microbiology, microbial ecology, microbial diversity, evolution, northern stream ecosystems, and research ethics courses. Dr. Hicks is a member of several professional organizations including the American Society for Microbiology, Association for the Sciences of Limnology and Oceanography, Ecological Society of America, International Association for Great Lakes Research, and the International Society of Limnology (SIL).



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Fall Meeting | 2022

“Microbe Wars” | College of St. Scholastica
continued



ABSTRACT

Microbe Wars: The Corrosion Phantom Menace

Corrosion of steel structures in the Duluth-Superior Harbor (DSH) is a severe problem for the maritime transportation industry. About 20 kilometers of steel sheet piling used to construct docks appear to be affected, which may cost more than \$200 million to replace. Initially, several hypotheses were proposed to explain this severe corrosion. Our research focused on two of these hypotheses, water quality and the influence of microbes. Water chemistry alone does not appear to be the direct cause of this corrosion. Corroding steel surfaces in the DSH are covered by complex microbial biofilms and tubercles contain distinct assemblages of bacteria, some of which are responsible for corrosion of steel in other environments. Bacterial activity, either directly or indirectly, appears responsible for accelerating this corrosion process. More recently, we have investigated the effects of several antifouling coatings on corrosion and to manipulate attached bacterial communities. Quorum quenching enzymes or surfactin in coatings altered bacterial community composition on steel coupons and reduced corrosion by 50%-60% in both lab and field experiments, even after the coatings were scratched. The relative abundance of DNA sequences from bacterial orders containing sulfate-reducing bacteria were initially very low compared with bacterial orders containing iron oxidizers. After 8 months in the field, members of the *Burkholderiales* (15%), *Nitrospirales* (15%), *Gallionellales* (11%) and *Nitrosomonadales* (10%) were the dominant bacterial orders found on all coupons. Members of the *Burkholderiales* decreased in relative abundance but increased or decreased in richness in the lab and field, respectively. Members of the *Rhodocyclales* and *Nitrosomonadales* increased in relative abundance in lab and field experiments. The relative abundance of several orders of iron-oxidizing bacteria and sulfate-reducing bacteria were correlated with the number of tubercles found on coupons. Concurrent reductions in tubercle formation and changes in bacterial community composition on treated coupons indicates that bacterial communities may accelerate the corrosion of steel infrastructure and that this corrosion can be altered by modifying attached bacterial communities.



NEW MMS OFFICERS

Results of the spring election yielded the following board [officer](#) recommendations:

- **President-elect:** Dan Westholm
- **Secretary:** Patti Sanft
- **Treasurer:** Dave Burleson



MEMBER DUES

If you haven't yet, please remember to submit your 2022 calendar year membership dues.

Thank you!



PROJECT MICRO

No updates: Project Micro is on hold.



FROM THE PRESIDENT: A View Through the Lens of the MMS President

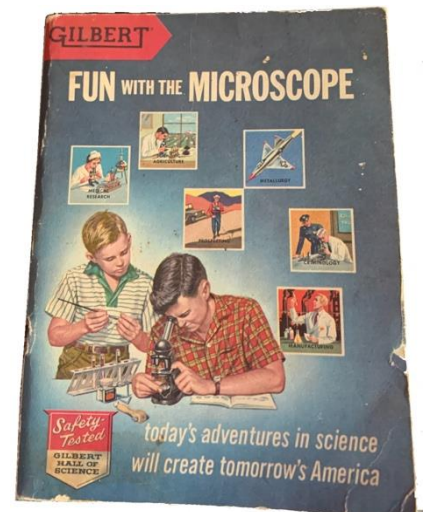
By **Jeffrey L. Salisbury, Ph.D.**

I've been thinking a lot lately about just how the human mind has produced tools to examine both the most distant reaches of the Universe and the very smallest of structures that make up the reality that surrounds us. For most of history, people had only their basic senses to detect relatively local stimuli. Early advances in extending or amplifying the basic senses progressed incrementally – for example, from the cupped hand to the ear trumpet for hearing. The next leap came with simple then compound glass lenses for correcting vision and magnifying objects both near and far. More recently, with the advent of electronic and digital technologies, significant advances were made to augment and expand the detection range of signal sensitivity, wavelength, frequency, and intensity.



With these developments, microscopists could finally exploit new technologies for materials and biological structural and compositional analyses. However, well beyond these technical developments, the skill of an accomplished microscopist is a product of that exceptional combination of perception, academic training, dedication, experience, and a fascination with that unseen by the unaided eye. Certain of these qualities are innate, others are learned, none are given. We all have known individuals who see nothing when they look through the oculars of a microscope – they become biochemists or mechanics. On the other hand, the skilled microscopist can not only see and analyze what they view through the microscope, but their vision can make other people appreciate and understand the unseen.

I trace my own history with the microscope back to the early 1960s to two memorable events. The first was a middle school science teacher who, without admonishment corrected my misspelling of [sells] to [cells] on a biology quiz, and the second, when I inherited a Gilbert microscope kit from a cousin. The Gilbert Company was best known for kits designed to stimulate youth to explore areas of magic, science, and engineering. The Erector Set and American Flyer train were also Gilbert products. The Gilbert compound microscope kit came with a manual that explained the workings of the microscope and instructions for preparing specimens from a wide variety of easily accessible materials. I still have my copy of the Gilbert manual, that I occasionally refer to for both enjoyment and ideas.



Vintage Gilbert Company paperback, "Fun with the Microscope."

The [MMS Annual Spring Symposium](#), held recently at the Minnesota Science Museum in St. Paul, exemplified the Gilbert motto: "Today's Adventures in Science will Create Tomorrow's America." Symposium speakers illustrated each of the professional careers depicted on the Gilbert manual cover. **Katie Igowsky**, from the Minnesota Bureau of Criminal Apprehension, gave a fascinating presentation on how microscopic analyses of trace materials are used to evaluate and inform serious to unexpected solutions from crime scenes.

We all re-learned an especially important understanding from **Vern Robertson's** (JEOL) talk of how meticulous detail in sample preparation techniques is key to valid outcomes in microanalyses. **Mary Buckett** (3M Company) helped us recall the value of fine technical detail and microtomy in sample preparation and reminded us of the many and varied uses of eyelash tools. And lastly, **Shiba Dandpat** (Lumicks) demonstrated how materials handling and biophysics

MMS President Message continued

come together through the optical tweezer technique for real-time imaging of dynamic single-molecule interactions and cellular mechanics.

Symposium attendees expressed their enthusiasm through probing questions and comments throughout the day, with the 3M table particularly represented by keenly focused queries. We all benefitted from the collegial and scholastic atmosphere as well as from Vendor and Corporate Sponsors demonstrating new products and techniques.

MMS election results were revealed at the Symposium's conclusion, with the unanimous approval of **David Burleson** to continue as Treasurer, and **Patricia Sanft** as Secretary – they, along with the active Board members, serve as both memory and inspiration for the society. **Dan Westholm** (Biology Department, St. Scholastica) was welcomed as President-Elect of the MMS. Dan brings a strong academic background and promises to enrich recruitment activism for the society. **Gail Celio**'s exceptional leadership and guidance during a turbulent year in world affairs was recognized and greatly appreciated by all, as she passed the gavel and magnifying glass to me. I will do my very best to carry forward the professional efforts of the society standing on the shoulders of those that have come before.



PAST EVENT: Highlights from M&M 2022 in Portland

After three years, people gathered together again for the [annual Microscopy & Microanalysis Conference](#) in Portland, Oregon. For me there was a bit of déjà vu, as M&M 2019 was held at the same site. It was nice already knowing the lay of the land, along with the places to get tasty donuts. You're awesome, Voodoo and Blue Star, but Pip's Original owns my heart.



Attendance was understandably down a bit from previous years (~2,500), but enthusiasm was high. Both plenary speakers gave engaging presentations the first morning. **James Rea** from the Alan Alda Center of Communicating Science imparted good advice about conveying the importance of and enthusiasm for our work, and even managed some audience participation from his remote live streaming location. **Dr. Wendy Garrett** from the Harvard T.H. Chan School of Public Health explored the microbiota within humans and shared her research on the associations between oral biofilms and colon cancer.

Even while enjoying the presentations and meet-ups this year, part of my mind was on next year's meeting. M&M 2023 will be held in Minneapolis July 23-27 at the Convention Center. To get a leg up on advertisement, some MMS members distributed fun badge ribbons to attendees throughout the event to promote our society. We're looking forward to highlighting the technological and educational resources available in the city, not to mention those in recreational, cultural, and culinary categories. Stay tuned for opportunities to help welcome folks to M&M 2023!



—Gail Celio
MMS Past President (2021)





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Corporate Sponsors are the backbone of financial support for the Society. These members make it possible for the Society to support Project Micro and to cover many expenses of the regular meetings and the Spring Symposium. MMS gratefully acknowledges the corporate sponsorships provided by the following companies. To become a Corporate Sponsor, complete and return the MMS membership form at the end of the newsletter.

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The Minnesota Microscopy Society would like to express sincere thanks to our Sustaining and Patron Members. These members provide financial support to the organization above the standard membership fee. This additional support makes it possible for MMS to maintain its financial well being. To become a Patron or Sustaining Member, complete and return the MMS membership form at the end of the newsletter.

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Past-president: Gail Celio, University Imaging Centers, Univ. of Minnesota, 35 Snyder Hall, 1475 Gortner Ave., St. Paul, MN 55108, celio001@umn.edu

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Treasurer: David Burleson, Ecolab, 655 Lone Oak Dr., ESC F64, Eagan, MN 55121; (651) 795-5887; david.burleson@ecolab.com

Student Representative: open

MSA Representative: Gail Celio, University Imaging Centers, Univ. of Minnesota, 35 Snyder Hall, 1475 Gortner Ave., St. Paul, MN 55108, celio001@umn.edu

Project MICRO Director: Jeff Payne, 3M Center, Bldg. 201-BS-03, St. Paul, MN 55144-1000; (651) 733-2352; jjpayne@mmm.com

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MINNESOTA MICROSCOPY SOCIETY | MEMBER INFORMATION FORM

All microscopists are urged to support their Society at one of the membership levels offered below. Often, supervisors will support MMS memberships out of their project budget because they recognize that it is a very inexpensive way to maintain and increase the skills of their microscopists. If you have been a member over the years and recognize the value of MMS to the community of microscopists it serves, consider upgrading your membership this year to the Patron or Sustaining level. Thank you.

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