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# The MAST e-Rapper

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11.9.09

November 2009

## Editor's Note

It's been a while since our last MAST e-Rapper chat. How have you been? Hopefully, you saw the Pre-Rapper Friday letting you know about the generosity of NIST and the extension of the registration for this week's event. (By the way, you can still email Mary Satterfield today if you want to participate in this incredible evening!) [mary.satterfield@nist.gov](mailto:mary.satterfield@nist.gov) Check out the details on the lab tours starting on page 10!

This is the first issue of the e-Rapper since our conference so I'd like to take this opportunity to welcome all of you who are new members to MAST!! I hope you enjoyed the conference and I also hope you are inspired to action! There are many, many ways to contribute and share. Mary Weller offers a few great suggestions in her President's Message. Please seriously consider submitting a presentation for the 2010 NSTA Regional Meeting. This is our chance to show off Maryland's talented science educators.

There will be some changes this year to the e-Rapper. One substantial change will be the timing of the issues. Starting now, you will have monthly contact with your peers across the state. There will be regular features each month. For example, this

month will include BookMark It! by Jackie Geer (Montgomery County). Her column will provide a review of websites to help you build a toolkit of great ideas to use in your classroom.

Next month, another new column will be added. Gary Fuhrman (Carroll County) provided a presentation at the conference offering ideas for classroom demonstrations to engage students. He has kindly agreed to create a column which will highlight one demonstration per month. (Please read Gary's comments on the MAST October conference)

Another column I'd like to start (anyone interested in coordinating it??) would provide monthly tips. This would be a 'Teacher to Teacher' approach with questions posed and answered by you, MAST members.

There will be other new columns coming and I encourage you to contact me with ideas for items you would like to see or to provide.

Thank you very much for your time, attention and participation.

Donna

Donna Balado, Carroll County  
[dmbalad@carrollk12.org](mailto:dmbalad@carrollk12.org)

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## President's Message

It is with great excitement and satisfaction that I reflect upon the month of October for the Maryland Association of Science Teachers. Thanks to the hard work of many, the annual Conference on Science Education, Access to Excellence, met with huge success at South Carroll High School on October 16.

Formal and informal science educators representing all levels and disciplines came together to network and share some of the best of what's happening in science education in Maryland. Special thanks go to our many partners who supported this endeavor. You will find each identified on the MAST website, [www.emast.org](http://www.emast.org). You will also find many materials used by the 23 presenters of the day available for download on the website. We will continue to collect as many presentation materials as we can for you to access this way. Our intention is to make this a useful resource for everyone.

It is with great anticipation, now, that I look to the future. The MAST Executive Board continues to strive to identify and meet the needs of science teachers through planning continuing education events and communications that link us together constructively. It is exciting to announce that Executive Board meetings now regularly include representation from all parts of the state as we have added a virtual meeting component using Adobe ConnectNow. This link provides Executive Board members with a synchronous connection that includes voice and data links.

Opportunities for your involvement in MAST are many. A unique evening at NIST awaits us on November 12. Final planning for our spring Evening Speaker Event is underway. Also, please remember that the window for submission of presentation proposals for the NSTA Regional Conference on Science Education in Baltimore scheduled for November 11-13, 2010 is currently open. This is your chance to share some of your best ideas with others. To submit your proposal, just go to the NSTA website, [www.nsta.org](http://www.nsta.org), and look under the "Conferences and Institutes" tab. There you will find everything you need to know regarding submission of a proposal as well as the links to upload yours. All submissions are due by January 15, 2010, so don't delay!

Remember, MAST is only as strong as its membership. So, please, help us to make this organization one that meets your professional needs. Never hesitate to contact me with a suggestion or comment. I can be reached at [mcwelle@carrollk12.org](mailto:mcwelle@carrollk12.org). I look forward to hearing from you.

Warm regards,  
Mary  
Mary Weller

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## Conference Commentary

A friend, and member of MAST's Executive Committee, asked me what I thought about the recent MAST Conference held on Oct. 16 at South Carroll High School, as it ended. My reaction was "WOW!" And as I reflected back on the conference days later, I say, "Double WOW!"

As a second career teacher, now in my fifth year of teaching, I can honestly say I don't recall an event where my time was better spent.

Each session I attended provided excellent, "free" resources presented by top notch professionals in their respective fields. The best part was that the material included prepared lesson plans, with relevant activity sheets, labs, visuals, and everything needed for virtually an entire week.

The atmosphere at the conference was totally collegial with free flowing conversation and exchanges of ideas among a highly diverse group of science teachers from around the state and in various age groups.

And the exhibit hall, available during lunch, was remarkable. Eighteen different science education organizations set up booths – many with interactive activities – and all with FREE stuff (which we teachers love). The exhibitors included the Baltimore National Aquarium, which provided information on FREE tours for science classes, the Baltimore Zoo, Fisher Educational, and many, many others. It was like gazing through a science supply catalog, and walking away with a bag full of goodies, that didn't cost a cent. Several exhibitors, like the MD BioLab, and the University of Maryland Biotechnology Lab (UMBI) offer loaner lab programs FREE to all Maryland middle and high school teachers.

More than once during the conference I said to myself, "Why haven't I attended these conferences before?" The amount of material and fresh ideas I walked away with are truly energizing.

It's amazing what you can learn and get excited about when you're out of your classroom and in the presence of such positive, motivated professionals.

I plan on making future MAST conferences a top priority.

Gary Fuhrman, Carroll County

## BookMark It!

Each month *e-Rapper* will feature a site for you to bookmark for future use in your instruction.

Our first month's featured site is The United States National Library of Medicine's (NLM) site *ChemIDPlus Advanced*. It is located at <http://chem.sis.nlm.nih.gov/chemidplus/>

This site allows you the teacher to:

- Show the difference between CIS and Trans.
- View 3D models of molecules with the ability to rotate the models. (This is really cool. I know that statement shows how geeky I am!) If students are building models, it allows you another way to show the molecule and they can check to see if they have correctly constructed their model.
- View the molecular formula with 2D models.
- View the names and synonyms.
- Evaluate the toxicity levels of that chemical in humans and other animals.
- Research human health effects related to that chemical.

Once you access the site, simply type in the chemical or molecule and a plethora of information is available to the teacher and the student.

NLM's various sites are student friendly. There are no advertisements or links to advertisements. This is a plus to teachers when you have 32 students in a computer lab!

This site will work for chemistry curriculum, biology and Earth Science. When teaching Earth Science I have used the 3D model when explaining the Carbon, Nitrogen and Water Cycles. It allows students to see *what bonds* are broken. This allows students to grasp how the elements we are studying travel through various stages in the cycles.

Jackie Geer, Montgomery County

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**Educational Opportunity** -Application open for global field courses/Master's degree 2010 scholarships available Contact: Jamie Bearcat Anzano; 513.529.5103; dragonfly@muohio.edu

Miami University's Project Dragonfly is accepting applications now for its 2010 graduate field courses and master's programs offering international field and conservation studies in Africa, Asia and the Americas.

Each accepted applicant is awarded a tuition scholarship covering 2010 field course tuition, equivalent to \$3,100 in-state and \$7,100 out-of-state. Award recipients are responsible for travel and field costs.

The deadline to apply is Thursday, January 28, 2010.

Created by Dragonfly and the Cincinnati Zoo & Botanical Garden, Earth Expeditions graduate courses and the Global Field Program (GFP) Master's degree bring together graduate students, scientists, educators and community leaders at critical conservation field sites in Belize, Costa Rica, Baja, Trinidad, Mongolia, Thailand, Kenya and Namibia. New in 2010 are courses in Borneo and the Amazon.

Earth Expeditions courses and the GFP Master's may be completed part-time from anywhere in the U.S. or abroad and are open to educators and other professionals from all settings and disciplines, regardless of academic focus. For information and to apply, visit:

- Earth Expeditions <http://www.EarthExpeditions.org>
- Global Field Program <http://www.MastersGFP.org>

Interested applicants in the Cincinnati, Chicago and Seattle regions may want to visit <http://www.MyMasters.org> for information on Dragonfly's additional master's degrees, including the community-based Advanced Inquiry Program co-delivered with premier learning institutions in select U.S. cities.

Project Dragonfly reaches millions of people each year through inquiry-driven learning media, public exhibits and graduate programs worldwide. Dragonfly is housed at Miami University, a state university in Oxford, Ohio, established in 1809 and listed as one of the eight original Public Ivies.

Project Dragonfly  
Miami University  
Oxford, Ohio 45056  
513.529.5103

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# Announcements

## **MAST and NSTA Seeks Presenters for Regional NSTA Conference in Baltimore 2010**

The National Science Teachers Association in conjunction with the Maryland Association of Science Teachers has announced the opening for proposals to present at our upcoming regional conference. The NSTA will hold its 2010 Regional Conference at the Baltimore Convention Center in November of 2010.

Committees are forming to assist the NSTA in putting together an outstanding conference for Science Teachers. This upcoming conference will center on the theme **“Charting the Course to Excellence”**. In September through January NSTA will be open for receiving proposals from local teachers to present at this conference. There will be approximately 300 presentations for attending teachers to select. NSTA and MAST would like to encourage you to make a presentation at this conference so you can share your favorite lessons, activities, and/or teaching experiences with others.

MAST and NSTA have identified three strands for professional development emphasis. We would like to encourage you to use this opportunity to present to fellow science teachers as a way to enhance your resume, share your expertise and contribute to the professional development of our regional science teachers. When you submit your proposal, please indicate the strand in which you wish to be included. The following lists the strands and goals for each. Please also note that it is not necessary to present in a particular strand. Proposals will be accepted at [www.nsta.org](http://www.nsta.org) under the Conferences and Institutes Tab.

### **Strand One: Teaching Science in the 21<sup>st</sup>-Century Classroom**

Today’s student learns differently. The 21<sup>st</sup>-century student deserves and demands an interactive and student-centric approach to learning. This presents many challenges to educators, including meeting the needs of students with diverse learning styles such as English language learners, special needs students, and advanced and below-grade-level readers. The effective science teacher uses innovative, research-based instructional strategies to facilitate achievement in science for *all* students. Differentiation, universal design for learning, project-based learning, and brain-based learning are just a few of these strategies. This strand will increase participants' knowledge of and expertise in the integration of these and other innovative pedagogies for helping students attain high standards.

**Goals:** To provide workshops and presentations focusing on one or more of the following:

- Differentiation and culturally responsive teaching in science classrooms.

- Effectively integrating cutting-edge technology to enhance student learning and support science teacher professional development.
- Teaching practices such as universal design for learning, response to intervention (RTI), or multiple intelligences.
- Implementing cognitive science to enhance learning.
- Inquiry-based instruction and its impact on student learning.

**Criteria:** Proposals will be evaluated on the extent that they:

- Promote the use of teaching strategies to match the learning styles of today’s learners.
- Provide evidence of effective use of innovative teaching strategies.
- Share examples of effective learning/achievement in “21<sup>st</sup>-century” learners.
- Align with one or more strand goals.
- Align with state and national science education standards (NSES and Benchmarks).
- Are based on current and available research and issues in science.
- Involve participants through activities and/or discussion.

**Strand Two: Embracing the World from Our Own Backyard: Environmental Education**

Our environment is threatened, and science educators are a powerful tool for change. Once empowered, our students will be key to achieving this change. In this increasingly interconnected global community, all members must understand the implications of our choices and the impact we can have both globally and locally. This strand will increase participants’ knowledge of effective practices to help students understand, appreciate, protect, and restore our natural environment.

**Goals:** To provide workshops and presentations focusing on one or more of the following:

- Implementing outdoor science experiences and programs that connect children with nature (e.g., No Child Left Inside, Children in Nature).
- Empowering environmental actions, including service learning, and environmental education activities.
- Becoming a certified Green School.
- Exploring the science of green technologies such as recycling, alternative energy resources and energy conservation, and green building techniques.
- Using 21<sup>st</sup>-century skills to protect local ecosystems, such as water monitoring, invasive species eradication, restoration projects, riparian buffers, runoff prevention, and GIS mapping.

**Criteria:** Proposals will be evaluated on the extent that they:

- Focus on student-centered learning opportunities.
- Model successful strategies for incorporating the local ecosystem into instruction.
- Align with one or more strand goals.
- Align with state and national science education standards (NSES and Benchmarks).
- Are based on current and available research and issues in science.
- Involve participants through activities and/or discussion.



**Strand Three: Building Tomorrow’s Workforce: Science, Technology, Engineering, and Mathematics (STEM)**

Imagination, invention, and creativity drive development in our world. In preparing today’s students to be tomorrow’s workforce we must prepare them for all jobs, even some that do not yet exist. Educators must help guide students into careers in science, technology, engineering, and mathematics. This strand will highlight classroom practices that emphasize skills in critical thinking, leadership, problem solving, collaboration, communication, media, and technology in the transdisciplinary context of STEM.

**Goals:** To provide workshops and presentations focusing on one or more of the following:

- Real-life applications of STEM activities that encourage preK–16 students to think like scientists and engineers.
- Using problem solving, innovation, and imagination for development of products and applications.
- Using authentic hands-on/minds-on activities where students work as teams to design, construct, and analyze.
- Giving teachers the tools to integrate aspects of engineering and technology into everyday activities and discussions.
- Providing teachers with information on cultivating and sustaining nurturing, meaningful partnerships within their communities.

**Criteria:** Proposals will be evaluated on the extent that they:

- Integrate a STEM focus within the current curriculum.
- Provide student opportunities for collaboration and 21<sup>st</sup>-century skills development.
- Demonstrate effective application of appropriate technologies.
- Align with one or more strand goals.
- Align state and national science education standards (NSES and Benchmarks).
- Are based on current and available research and issues in science.
- Involve participants through activities and/or discussion.

Please feel free to contact Elizabeth McCook at [elizabethmccook@emast.org](mailto:elizabethmccook@emast.org), Program Chairperson for the NSTA Baltimore 2010 Conference if you have further questions in regard to your proposal. All submissions of proposals will go to the NSTA Office. If you wish to assist the Maryland Association of Science Teachers in working with NSTA on the development of this conference you may also contact her or Conference Chairperson, Mary Weller at [mcwelle@carrollk12.org](mailto:mcwelle@carrollk12.org)

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## MAST NIST Event

### Modern Uses of Spectroscopy and Spectrometry Lab Tours

After an opening talk by Steve Choquette on Modern Uses of Spectroscopy and Spectrometry, teachers will have an opportunity to build a simple hand-held spectrometer, calibrate it, and use it in activities applicable to the classroom OR visit the lab of a scientist using spectroscopy or spectrometry in his/her research.

Teachers may choose to visit one of the following labs OR build a hand-held spectrometer.

#### **1. Vision Science: Accelerating the Development and Commercialization of Solid-State Lighting**

Current photometric and colorimetric standards are not optimized for emerging solid-state lighting. The human visual system reacts differently to the unique spectra of these solid state sources compared to conventional incandescent and fluorescent lighting. To address these limitations, the Division is developing vision-science-based photometric and colorimetric standards appropriate for solid-state lighting, with a current focus on a new metric for the color quality of such light sources. The new standards will promote the development of solid-state lighting by ensuring an optimal balance between energy efficiency and color quality. The Vision Science Laboratory has an experimental lighting booth to establish metrics for quantifying the color performance of present red-green-blue (RGB) solid-state lighting. A new state-of-the-art Color Vision Experimental Facility with spectrally tunable solid-state lighting is being developed to perform visual perception experiments.

*Wendy Davis*

#### **2. Electronic Kilogram**

The goal of this experiment is to replace the last of the artifact standards, the kilogram mass. A super-size force balance counters the force of gravity with electromagnetic forces that can be measured against electronic standards like atomic clock time or laser length. One of the difficult parts of this experiment is in maintaining a balance against a background of difference vibration frequencies that can interfere with the sensitive control programs. The same principles of sorting optical frequencies in spectroscopy can also be applied to search for troublesome low audio range frequencies that are present in mechanical vibrations.

The “interference” here can be very low frequency seismic vibrations from earthquakes, a few 10’s of Hz frequencies from fan motors or construction equipment down the road, or many 10’s of Hz from fluid or rod vibrations within the experiment apparatus. There is always a background of 60 Hz plus multiples from AC power lines. Higher frequency electrical interference can come from the very electronic equipment used to measure the frequency spectra.

*Richard Steiner*

#### **3. Secrets Revealed by X-Ray Fluorescence**

Come and learn what secrets X-ray Fluorescence spectrometry (XRF) can reveal. XRF is used by NIST scientists every day to determine which elements are present in samples. It is able to nondestructively analyze a variety of solid and liquid sample types for almost all elements of the periodic table at the same time. This makes it an attractive method for a variety of applications such as controlling production of materials, environmental regulation, and archeology.

Several projects will be discussed including collaborative work performed with the Consumer Product Safety Commission measuring Lead in children’s toys. Lead has very negative health effects on children if

ingested, yet measurement of Lead in painted children's products at low levels is a difficult proposition due to the sheer number of toys that must be measured and recent regulation making limits stricter. XRF is a spectroscopic method that can be used to quickly analyze toys for Lead, and NIST is helping to develop standard test methods and reference materials for this purpose. Analysis using both laboratory scale and handheld XRF instruments will be demonstrated, giving an idea of how quickly analyses can be performed.

Sample preparation for XRF will also be discussed. Samples sometimes must be mixed, ground, or dissolved in molten glass to produce accurate results. Some of these methods will be demonstrated, showing that much of the work for spectroscopists is preparing samples for analysis.

*John Molloy*

#### **4. Spectroscopy and Spectrometry for Food and Nutraceuticals Analysis**

NIST researchers are working to develop and maintain a number of food and nutraceutical standard reference materials (SRMs) to assist the FDA in enforcement of label claims. Some of these SRMs include peanut butter, baking chocolate, infant formula, green tea, multivitamins, and cranberries. Part of the challenge in analysis of complex food and nutraceuticals is in isolation of active ingredients, and spectroscopic or spectrometric techniques are important scientific tools toward this effort. This tour will focus on the coupling of absorbance and fluorescence spectroscopies as well as mass spectrometry with liquid chromatography for the analysis of food and nutraceutical SRMs. We will also take a look at some real data to compare the use of the various types of spectroscopy and spectrometry for analysis of vitamins in milk powder, antioxidants in cranberries, and active ingredients in St. John's Wort supplements.

*Melissa Phillips*

#### **5. Electrospray Quadrupole Time-of-Flight Mass Spectrometry (ESI-qTOF-MS)**

This laboratory tour will present a highly-customized research mass spectrometer that is used to study the syntheses of ultra-small gold nanoparticles. The mass spectrometer comprises an electrospray ion source, a quadrupole mass spectrometer, collision chamber, and a time-of-flight mass spectrometer, which allows the scientists to determine the composition and molecular structure(s). The deductive processes used to determine molecular structures are similar to those employed during the reconstruction of an airplane from the debris removed from a crash site.

*Jeffrey Hudgens*

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# Maryland Association of Science Teachers

**Door Prizes!**

Invites you to a Continuing Education Event at  
**The National Institute of  
Standards and Technology (NIST):  
Modern Uses of Spectroscopy**  
Gaithersburg, MD  
**Thursday, November 12, 2009**  
**5:00 to 8:00 P.M.**

5:00-6:00 Enjoy a light supper with your colleagues.

6:00-7:00 Listen to a lecture on the science of spectroscopy and uses of spectroscopy at NIST and elsewhere, given by NIST chemist, Steve Choquette, Ph.D.

7:00-8:00 Build a simple hand-held spectrometer, calibrate it, and use it in activities applicable to the classroom **OR** tour a NIST spectroscopy lab with a NIST scientist – several choices will be available including

- *Accelerating the Development and Commercialization of Solid-State Lighting*
- *X-Ray Fluorescence for Detection of Heavy Metals in Toys*
- *Spectroscopy and Spectrometry for Food and Nutraceuticals Analysis*

Costs: **Free for MAST members**; \$10 for guests, or \$15 to include this event & a 1-year MAST membership (regularly \$15).

Light supper included.

Due to security concerns this event is restricted to US citizens or permanent residents - RSVP by ~~November 1, 2009~~. **Deadline extended to Nov 9!**

To RSVP please send an email including your citizenship status to <mary.satterfield@nist.gov>

**Check for updates on this event at <<http://www.emast.org>>**.

Payment at the door for guests & new members.

**Did you attend the MAST Fall Conference? If you did, then this meeting is free for you!**



# Maryland Association of Science Teachers

## MEMBERSHIP FORM

**Welcome to MAST! Please print, complete, and mail this form to the address below.**

**Type of Membership – Please check one space in each column.**

- |  |                                  |
|--|----------------------------------|
| <input type="checkbox"/> 1 year – \$15.00          | <input type="checkbox"/> New     |
| <input type="checkbox"/> 3 year – \$40.00          | <input type="checkbox"/> Renewal |
| <input type="checkbox"/> Student – \$5.00 (1 year) |                                  |

**Member Information – Please fill this out completely!**

Last Name		First Name		Level – please check all that apply:  <input type="checkbox"/> Pre-K <input type="checkbox"/> Elementary <input type="checkbox"/> Student <input type="checkbox"/> Supervisory <input type="checkbox"/> Middle/Jr. High <input type="checkbox"/> High School <input type="checkbox"/> College/University <input type="checkbox"/> Organization (please specify)  <input type="checkbox"/> Other (please specify)
Street Address				
City		State	Zip	
Local School System		School		
Home Phone	Work Phone		Cell Phone	
Email Address		Alternate Email Address		

I would like to donate \$ \_\_\_\_\_ to support:

- the MAST Awards for Excellence in Science Education Program  
 the MAST Mini-Grants Program

Please make your check payable to the Maryland Association of Science Teachers (MAST) and send it with this completed application to:

MAST  
 P.O. Box 368  
 Finksburg, MD 21048

For Office Use: Date Received \_\_\_\_\_ Amt Paid \_\_\_\_\_ Membership to: \_\_\_\_\_

Cash \_\_\_\_\_ Check Number \_\_\_\_\_ Check date \_\_\_\_\_ MER 11.09

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