CMMS

Chesapeake Microscopy & Microanalysis Society

Quarterly Newsletter
January - March 2020
Volume 2, Number 1

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President's Column

Somehow, another year has slipped away and we now find ourselves in 2020. We had planned to start the year off with many meetings, but alas, the COVID-19 pandemic has put a stop to our meeting in person, and has caused hardship and suffering to our local community, the region, the nation and the world. Our role as microscopists sometimes seems small (no pun intended), but the contributions we have given to science, and the contributions that we will continue to produce, make me proud to be a microscopist at heart. Not only will we use our light microscopy expertise to discover how this particular virus causes destruction in the lungs (pathology studies), ultimately, we will use fluorescence microscopy, confocal microscopy, traditional electron microscopy, immuno electron microscopy, cryo electron microscopy and other microscopical methods to help fully understand the infection mechanism, the complete replication cycle, the cellular transmissibility, and the ultrastructure of this new virus.

I had hoped to write a lively happy introduction to the spring newsletter, with the trees in bloom and flowers everywhere, lauding our accomplishments last year, as all the CMMS meetings and local meetings in 2019 were brilliant successes. The Board of Directors would like to thank Ru-ching Hsia for all she has done for the society in the past, and all that she continues to do. As I take on the helm of CMMS, we want to thank Joe Mowery for stepping into the role of President Elect, and also to welcome Tagide deCarvalho to the board. For 2020, we will start by emphasizing that we want to reach out to members of local colleges, universities, government entities and industry to invite any microscopy-minded persons to strengthen the society. We will continue to spotlight regional microscopists and microscopy related persons in the newsletter. This month, we feature an interview with the Stacie Kirsch, the owner of Electron Microscopy Sciences, and with a local legend in the Frederick Maryland microscopy community, Kunio Nagashima.

While we will not be able to meet this spring, I hope to see many of you at the 2020 MSA/MAS meeting in Milwaukee. Until that time, we will publish as much information as we can about online microscopy resources for training, education and enhancement. As always, please feel free to contact us if you have any suggestions or feedback.

The year started out wonderfully, and when this particular pandemic has passed, I hope to meet as many of you as possible and physically shake your hand. In the meantime, I am sending you best wishes for health and happiness.

Robert K. Pope
President of CMMS, 2020
March 26th, 2020

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Cover Photo

The 2019 Olympus Image of the Year, Americas regional prize was awarded to CMMS board member, Tagide deCarvalho. This colorful tardigrade micrograph was produced via Calcofluor white and Congo red staining and imaged with a 20x objective on a Zeiss LSM 900 confocal microscope.

Current board members from left: Robert Pope, Ru-Ching Hsia, Tagide deCarvalho, Kedar Narayan, Thomas Lam, Emma Bullock and Joseph Mowery.

CMMS Contact Information

Instagram
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Submission Deadline

Submission deadline for the April – June edition of the newsletter is May 15, 2020. Submit all potential articles, photos and information you would like to share with the local microscopy community to the following address.
ChesapeakeMicroscopySociety@gmail.com.

“FOCUS” ON A LOCAL MICROSCOPIST

Kunio Nagashima

Kunio Nagashima is a Scientist at the Electron Microscopy Laboratory (EML) and Center for Molecular Microscopy (CMM) at the Frederick National Laboratory for Cancer Research and National Cancer Institute, NIH. Mr. Nagashima recently completed 45 (yes, 45!) years of service at the EML and has established a reputation for technical excellence and consistency over the years. Remarkably, he still is an active and key member of EML and CMM, and only this year is beginning to scale back his activities at the bench. He continues to advise and mentor younger microscopists, combining lessons from his vast experience with his ready wit. Recently, I caught up with Kunio in the lab to ask him a few questions on behalf of CMMS. Some answers have been edited for space.

CMMS: I think it's fair to say that your reputation and longevity is legendary, but what was your training background, and how did you come to be a microscopist?

KN: It’s funny you say that; in the past, review members in site visits have written, and I quote from the final report: “Kunio’s EM virus diagnosis is almost legendary”. I suppose when I retire or pass away, I’ll become “legendary” and the word “almost” will be removed. I am happy with the work that I have done over the years. My first full time job was at Kyoto University way back in the seventies, where I learned electron microscopy sample preparation and the operation of a JEOL JEM-100.

CMMS: Most people move around during their career; however, you have stayed constant and people have moved around you, what is the secret to your stability and longevity?

KN: That may come from my Japanese background, where “permanent employment”, was a classically accepted way of life. As you know, with the NCI contract (the EML is a contractor-run laboratory), we have little control over the contract changing hands. There indeed have been close calls; once there was a crisis that nearly shut down the EML during a change in contractor. However, I am happy to say many NCI users supported me to keep the lab open with minimum staffing; just myself and one transmission electron microscope. Those were trying times, and it took a long while to rebuild the lab. Fortunately, the EML is much more robust these days. And with time you get used to such ebbs and flows.

CMMS: What are the techniques and instruments that you use in your everyday work?

KN: Every day brings new challenging work because my work depends on users' requests, from legacy EM experiments to more complex and advanced new techniques. The main instruments are ultramicrotome and transmission electron microscope (TEM) for ultrastructural analysis. A few experiments require our scanning electron microscope (SEM) for cell surface analysis. If course there are a whole bunch of supporting instruments and tools.

Kunio receiving the Hildegard H. Crowley Outstanding Technologist Award in 2012. Award presented by then MSA president Janet Woodward.

CMMS: As a long time microscopist, are there "old" techniques that you wish were more widely adopted? Are there others that have died out?

KN: A good example is visualization of DNA and RNA by EM (Kleinschmidt-Zahn technique, 1959). Specifically, DNA heteroduplex analysis can detect homologous and non-homologous regions of two DNA strands. We used this visual detection and accurate measurement by EM to publish the genetic difference between HTLV-I and HTLV-III (now HIV). Of course, this technique has now been replaced by rapid DNA sequencing by machine that is faster and more accurate. Another example is the freeze-replica technique to separate and visualize at high resolution by TEM the bilayer membranes after shadowing over the replica.

CMMS: What do you consider is the high point of your career and the best achievement so far?

KN: Electron Microscopy has contributed to many significant findings in virus characterization and diagnosis. NCI made significant efforts to screen human tumor tissues by EM to find cancer viruses, as there were no other reliable assays. I found many virus-like particles in a human ovarian carcinoma tissue in 1973 by EM, but the tissue could not be established in culture. Years later, first human cancer virus was reported, it was HTLV-I, very similar to my images. Later, when AIDS became a top NCI priority, I screened many samples from the NCI task force and found viruses; these were named HTLV-III, and of course, this is what we call HIV now. More recent, and controversial, was the case of XMRV that was believed to cause chronic fatigue syndrome. I took many EM images of XMRV but the structure was identical as MuLV, which I reported as a possible contamination. The story continues to be unclear…

CMMS: What long-term trends have you seen in the EM community? How do you see it changing in the future?

KN: I'm sure the requirement for EM will continue, and in the future, someone will do what I have been doing all this time. I believe there will be more digital integration and automation, and this will add to the capabilities of EM. And yet, at the end of the day, having skilled human hands is priceless.

CMMS: Do you have any words of advice for the junior members of our EM community?

KN: Enjoy what you're doing, if you don't happen to find joy in operating an EM, there will always be something that you can do that makes you smile.

Announcement of the
2020 Microscopy Society of America
Hildegard H. Crowley Award

Joe Mowery

Joe is a Biologist at the USDA Agricultural Research Service in Beltsville, MD. He is the recipient of the 2020 MSA Hildegard H. Crowley Award, to honor an outstanding technologist in the biological sciences over an extended period of time, who have made significant contributions such as the development of new techniques, which have contributed to the advancement of microscopy and microanalysis.

Joe has developed novel TEM and Cryo-SEM methods for researching predator/prey relationships in situ. In the last four years, he has co-authored over 40 papers on a variety of agricultural plants, pests and pathogens. In 2019, he co-authored a major multi-modality microscopy paper in PNAS, which utilized Cryo-SEM, TEM and Confocal microscopy to reveal that *Varroa* mites feed on the fat body tissue of honey bees, overturning a belief for the past five decades that the mites feed on bee hemolymph. Potentially altering the approaches needed to combat honey bee Colony Collapse Disorder. Joe currently serves on the CMMS Board of Directors and is focusing efforts on growing the local microscopy community.

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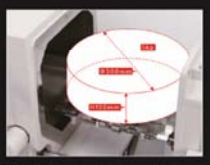

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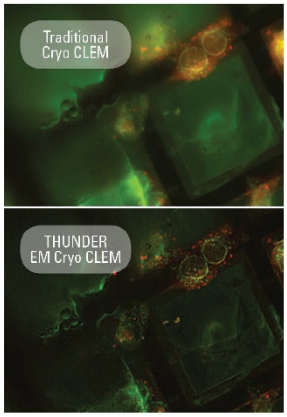

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1:30 PM
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Presenter: Louise Bertrand
Product Performance Manager, Widefield

Guest Speaker: Gleb Shtengel, PhD
Senior Scientist, Janelia Farm Research Campus

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HOSTED BY:

Shigeki Watanabe, PhD
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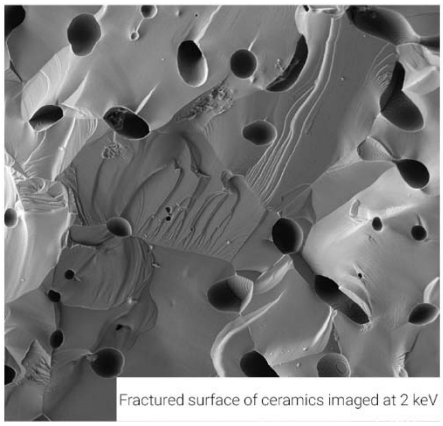

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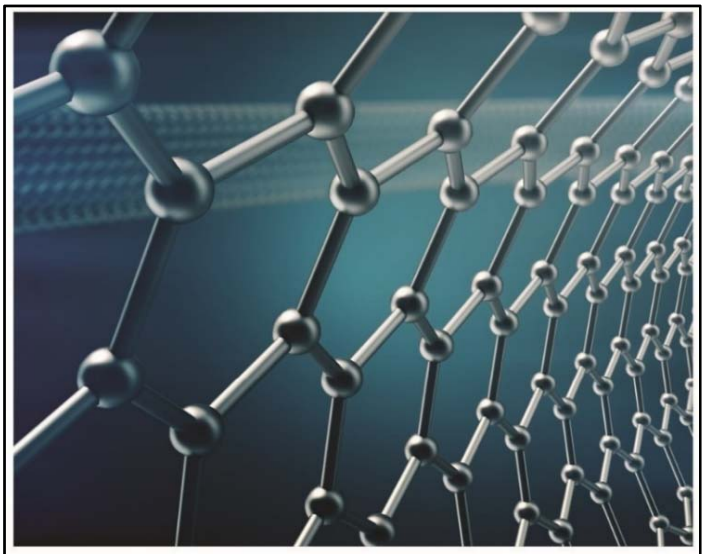

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Position Institute Laboratory	Brief Description	More information
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LEAD RESEARCH SPECIALIST Electron Microscopy Core Imaging Facility University of Maryland Baltimore	Primary responsibilities of this position include SEM/TEM specimen processing, ultramicrotome sectioning, sputter coating, critical point drying, immunolabelling, and examination of specimens using TEM and SEM. Knowledge and skills with advanced EM techniques such as cryo EM sample preparation, cryo EM, CLEM, 3-D EM, etc. will be considered favorably	https://umb.taleo.net/careersection/umb_external_staff/jobdetail.ftl?job=200000A5&lang=en

Upcoming Meetings 2020

Microscopy & Microanalysis 2020
August 2-6 - Milwaukee, WI

American Society for Cell Biology
December 5-9 – Philadelphia, PA

Related Links

Chesapeake Microscopy and Microanalysis Society
www.chesapeakemicroscopy.org

Microscopy Society of America
www.msa.org

Microanalysis Society
www.microbeamanalysis.org

American Microscopical Society
www.amicros.org

AASP – The Palynological Society
www.palynology.org

Geological Society of America
www.geosociety.org

SPOTLIGHT ON A MICROSCOPY COMPANY

Electron Microscopy Sciences
Owned by Stacie Kirsch

Stacie Kirsch

President and CEO of EMS Acquisition Corp; DBA-Electron Microscopy Sciences and Diatome US for over short 32 years. Stacie's career began when she moved to Israel in the late 70's to go to Medical School and moved back to the states for the acquisition of what was then EMS. Under the helm of Stacie, EMS has become a premier supplier and manufacturer for everything from Microscopy Supplies to General Laboratory items. But, more important is that her desire to give back to the Microscopy community led her to develop and open the EMS Microscopy Academy. With her deep appreciation for all EMS has accomplished in partnership with the scientific community EMS believes in the endless possibilities of learning and working together. Therefore, EMS built a dedicated space to offer an ongoing series of workshops and training courses, covering all fields of microscopy, including materials and biological science

CMMS: How long have you been the owner and president of EMS? What was your background and work experience before you became a business owner of a prominent electron microscopy supply company?

SC: Thank you for this opportunity. I have owned EMS for 31 years, going on 32. I actually was working in research with a biology supply company in Jerusalem, Israel, where I lived when EMS came on the market. With the partnership of the owner and founder of Diatome Switzerland (Anton Meyer), we bought EMS and I moved back to the states. The rest, as they say, is history.

CMMS: Is there a particular training or experience that helped you most in your career?

SC: Yes, I studied medicine in Israel and have a strong background in the sciences.

CMMS: How many employees are currently at EMS? What are some of the most difficult hurdles for running a business like EMS?

SC: We currently have a total of 95 employees at EMS. It is a true juggling act running the company. I start my day, every day, Sunday through Friday at 2am. Due to the fact that we are an international company, my day begins at 2am and does not end until 7pm. I work 6 days a week to make EMS what EMS is, a true success.

I decided to open the EMS Academy to offer education to all of our potential customers, as well as current customers. I run the technical team and on a daily basis everyone asks us where can they go to further their education. So finally I decided to build and customize the Academy, which offers anyone the ability to further their knowledge on all aspects of Microscopy.

CMMS: Do you think there is a special character trait, or type of personality that helps you as an entrepreneur?

SC: Yes, stubborn; go getter; never give up; never take no for an answer; compassion & understanding and never let them see you sweat!

CMMS: What made you decide to start the Electron Microscopy Academy?

SC: I answered that in #3. I wanted to help current and future microscopists; I wanted to give back.

CMMS: Out of curiosity, is there one particular EMS item that is most frequently ordered?

SC: Yes, our Paraformaldehyde (15710) and our Glutaraldehyde (16300 series), which, for your information, we manufacture in bulk and supply worldwide.

CMMS: From many communications in the past, we cannot help but notice that sometimes your emails were sent out as early as 3am to 4am. Can you describe a typical work day?

SC: Yes, this is true. I work six days a week from 2am to 7pm. I have done this for over 30 years and by the way, I found time to raise four adopted children who are now 30, 25 and two 16 year olds.

From 2am-7am is my time, for doing my own work. 7am to 5pm I deal with all of our employees and customers, addressing all of their needs. 5pm to 7pm is my time again.

CMMS: Do you have any advice for members of our community who are considering entrepreneurship as a career path?

SC: Yes… it is a wonderful career path. You have to be willing to put your company first. The commitment is like a marriage. In no way is it a 9 to 5 job, so if that is what you want this path is not for you.

CMMS: Electron Microscopy Sciences has generously sponsored CMMS in the past. We could like to take this opportunity to thank you. Have there been any major changes in the electron microscopy field that have required changes in the functioning of EMS?

SC: Yes, the field of microscopy grows daily by leaps and bounds, and EMS has had its finger on the pulse of the community. EMS is constantly changing and evolving to be able to address the changes taking place in the field.

Classics Corner

Robert K. Pope took this photo in 2005 of a 1969 Siemens Elmiskop 101 at the CNRS CEPE in Strasbourg France.

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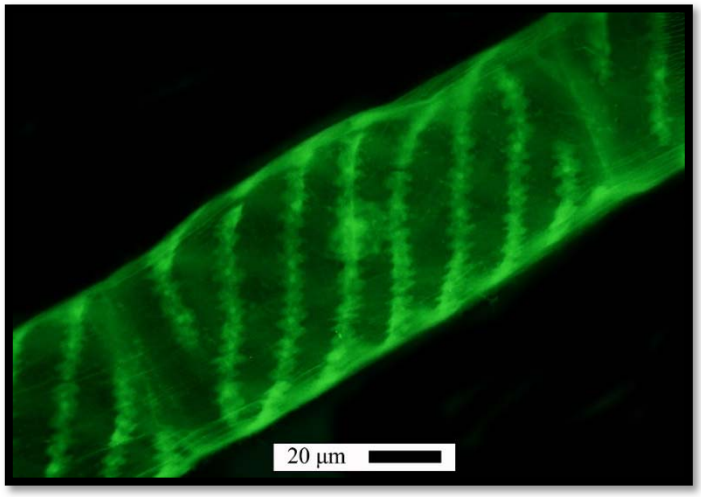
Fundamentals of Digital Image and Video Processing	Northwestern University	https://www.coursera.org/learn/digital
Microscopy Series on iBiology	iBiology	https://www.ibiology.org/online-biology-courses/microscopy-series/
Image Processing and Analysis for Life Scientists	Swiss Federal Institute of Technology Lausanne	https://www.edx.org/course/image-processing-and-analysis-for-life-scientists
MyScope Microscopy Training	Microscopy Australia	https://myscope.training/
Image Analysis with Fiji	University of Liverpool	http://pcwww.liv.ac.uk/~cci/reveal_ia/ImageAnalysisWithFiji.html

Quarterly Featured Photo



This is an uncoated SEM image of a Spirogyra species (stained with Iodine and freeze-dried). The sample was imaged at 30KV in an ElectroScan Type II Environmental Scanning Electron Microscope at 1.0 torr using the Environmental Secondary Electron Detector. The iodine stains the starch granules inside the spiral chloroplasts, which contain enough iron containing chlorophyll to induce electron contrast. Image by Robert Pope at the University of Southern Mississippi and colorized in Adobe Photoshop.

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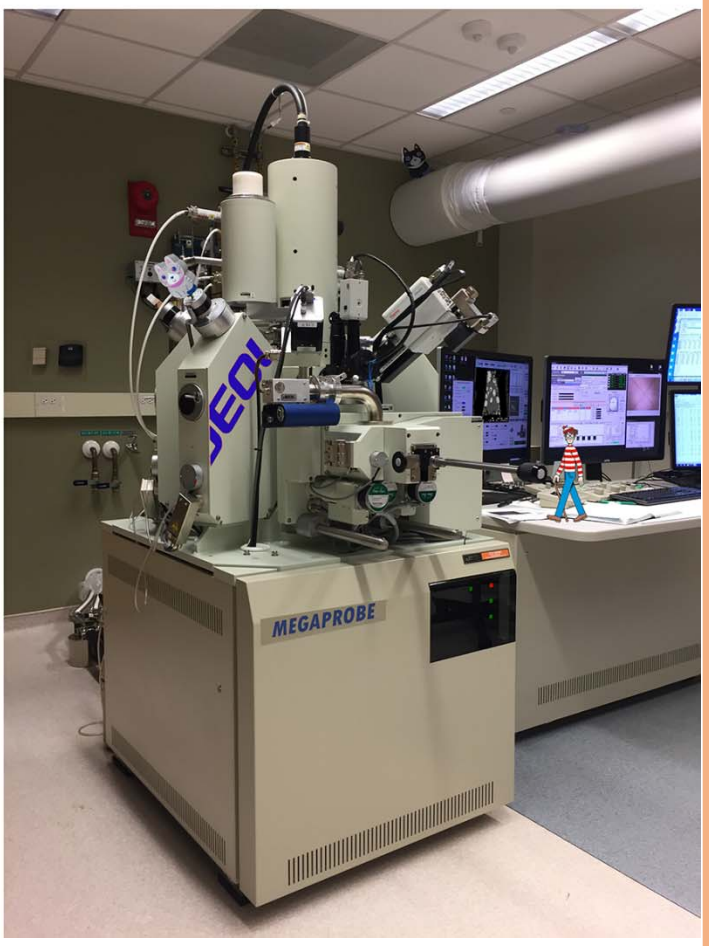
Quarterly Microscopy Puzzle

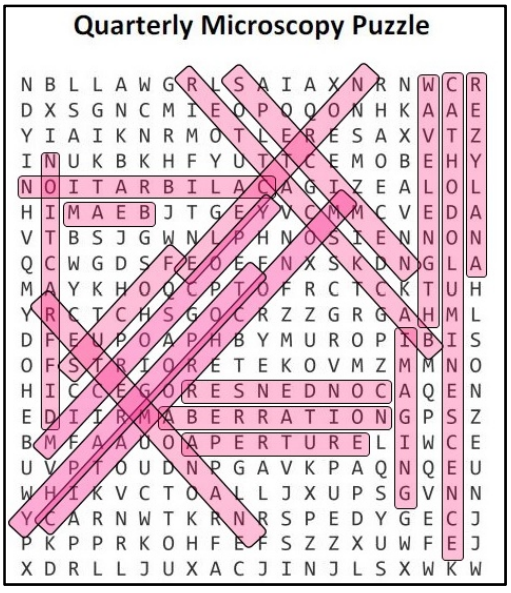
Spot the Difference for Electron Microscopists

Spot the 10 differences in the Carnegie Electron Probe lab!

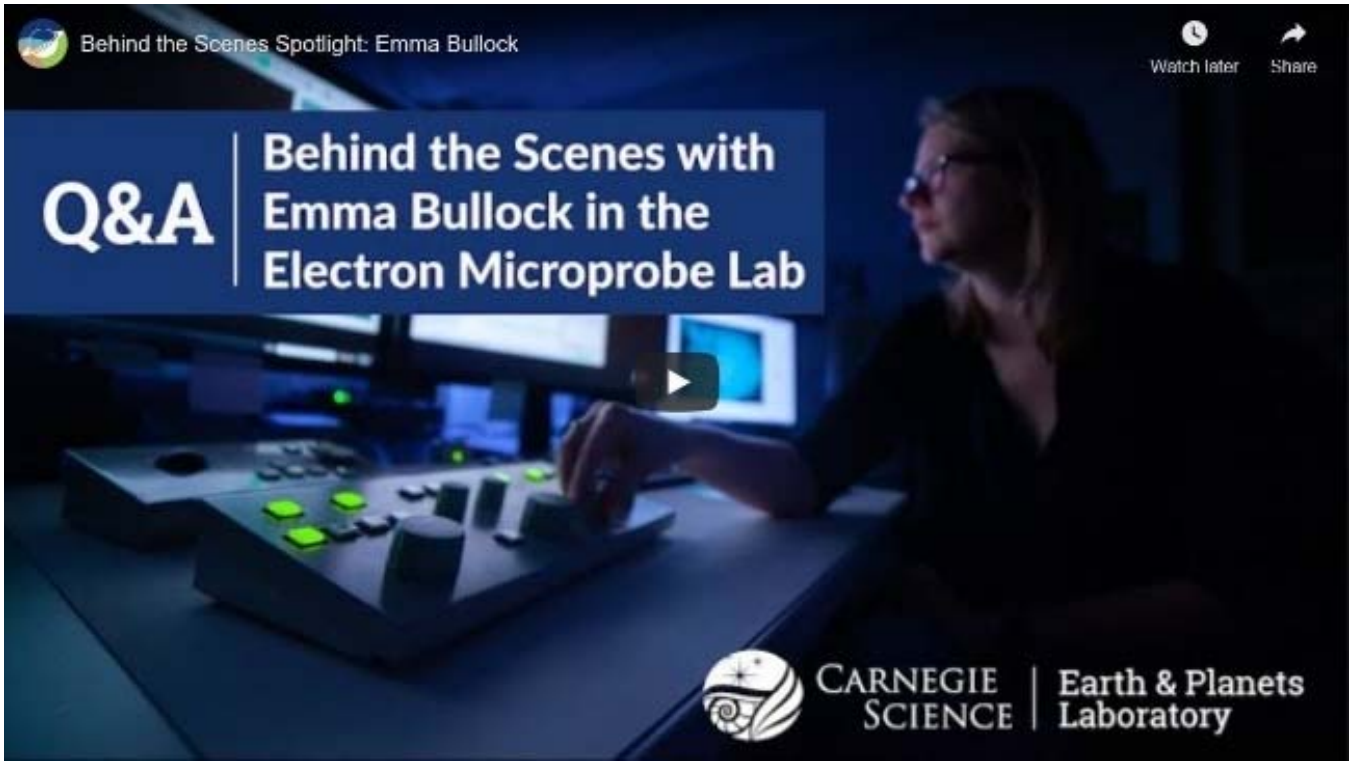


Hint: there are 10 differences.

Answer to the word search puzzle in the last issue.



Behind the Scenes with CMMS Board Member Emma Bullock at the Carnegie Institute



"Emma Bullock is the electron probe laboratory manager at the Carnegie Science Earth and Planets Laboratory. The instrument she runs is a JEOL 8530F Field Emission electron microprobe, and is used by geologists and material scientists to study the chemistry of their solid samples. In this interview, she discusses the instrument, her career, and the types of projects she has been involved.

The web link to the interview

https://dtm.carnegiescience.edu/news/behind-scenes-spotlight-qa-emma-bullock. "

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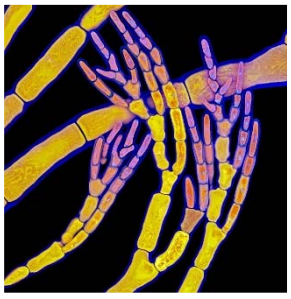
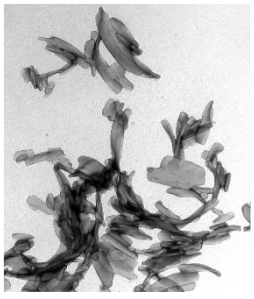
Past CMMS Newsletters - Featured Images

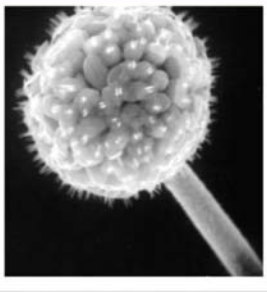
CMMS Volume 1 Issue 1, Joe Mowery



CMMS Volum1 Issue 2, Tagide deCarvalho



CMMS Volume 1 Issue 3, Ru-ching Hsia



CMMS Volume 1 Issue 4, Robert Pope

My EMS Academy Biological TEM Workshop Training Experience

By Mary Beth Friss

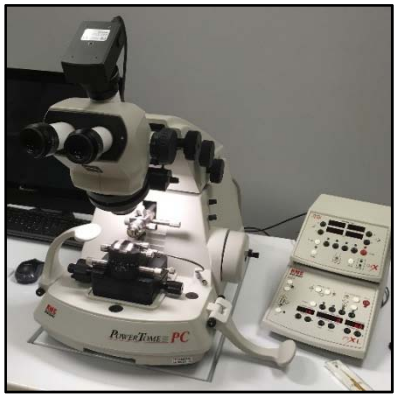
Recently, I attended EMS Academy's "Biological TEM Workshop: A Complete Picture" at their facility in Hatfield, PA. It was a three day course with emphasis on the chemical processing and sectioning of biological samples for TEM.

First, let me say that I am lucky to work for a company (Battelle National Biodefense Institute) that believes in professional development and can afford to provide this opportunity to its employees.

I have worked in the fields of clinical and forensic Bacteriology for all of my rather lengthy career (hint- I am old!). So when asked who would be interested in cross-training (training in a different discipline from one's normal profession) in Electron Microscopy I volunteered thinking "sure, I like light microscopes. I have done Gram stain, capsule stain, Wright-Giemsa stain, and Gimenez stains in the past. How different could this electron microscopy be?" Well how about 2000X magnification versus 200,000X magnification? Not to mention the difference in electron beams, vacuums and KV. Suffice it to say, I was initially a bit out of my comfort zone (although I am learning rapidly).

I went to the TEM workshop to reinforce what I had already learned about TEM in the past year, to hopefully become a little more adept at trimming and sectioning my blocks. These were the tasks that I seemed to have the most problems mastering.

There was lecture in the morning followed by a catered lunch and lab work in the afternoon. Transportation was provided to and from the host hotel, and a very nice dinner on day 1 at a nearby restaurant, compliments of EMS. We were cared for very well!



We trained on two different ultramicrotomes, one I was familiar with (a Leica UC6), and this one (RMC PowerTome) that was different, but the principles were the same.

We trained on microwaves for sample embedding and other equipment.

I found this workshop to be very informative. Luckily for me- although maybe not so lucky for EMS- there was only one other student besides myself enrolled. She had vast experience in electron microscopy, but in materials science, not biological science. And I had very minimal experience in EM, all in biologicals. Since there were only the two of us, our instructor was able to cater to each of our needs.

With only two of us in the class, we basically had our own personal short course. Our instructor took the time to stress important topics specific to each of our needs. It was fortunate for me that one of the ultramicrotomes at the academy was the same one used at my place of work so I was able to practice on it exclusively to hone my skills.

Michael, our instructor, a previous director of the EM program at Madison Area Technical College, was very knowledgeable as well as personable and it was a pleasure working with him. He spent a lot of time with each of us. He did not lose his patience, even when he repeatedly had to demonstrate how to properly trim my block with a razor blade!

At the course, I picked up different techniques and pointers that will prove useful in preparing samples for the TEM. For me personally, the three days were well worth the trip, learning the TEM and operating the ultramicrotome in order to produce optimal sections for staining and imaging.