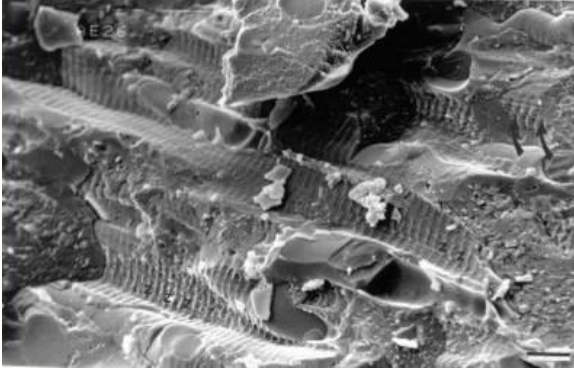


# EMS MICROSCOPY ACADEMY

## CRYO SEM WORKSHOP

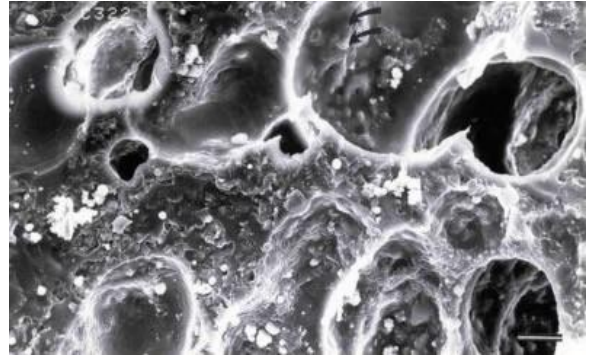
*Examples of the endless possibilities when doing Cryo SEM*

### Vertebrates - Tissues



#### Fractures through the myocardium

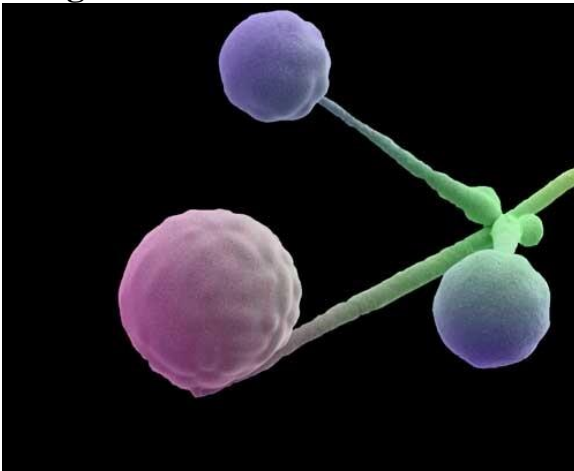
Small pieces of heart have been mixed, washed in buffer then cryo-protected with 30% glycerol. Contracted myofibrils can be seen in longitudinal aspect. The fracture in places has occurred along the sarcolemma and the positions of the Z-lines (marked by 'z') and the T-tubules (marked by arrows) are clearly visible in places. The intimate relationship between the capillaries and the myofibrils can be appreciated from this preparation. The contents of the capillary have a smooth appearance due to the presence of glycerol. Bar: 5µm



#### Frozen hydrated mouse lung

Low-temperature SEM retains all of the cellular and extra-cellular fluids in the lung tissue. Consequently, the micrograph clearly illustrates that the bronchioles are covered with a thin layer of mucus (marked by arrows). None of the alveoli show any collapse. Bar: 5µm

### Fungi



#### Fungal spore sac

Spore sac of a fungus. The sacs tend to burst open as soon as they are exposed to moisture, so the only way to visualise them is to use cryo-SEM. Image courtesy of Miranda Waldron at the Electron Microscope Unit at the University of Cape Town, South Africa

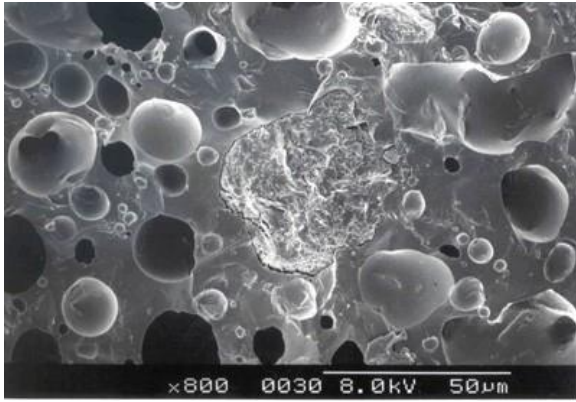
### Carnivorous Plants



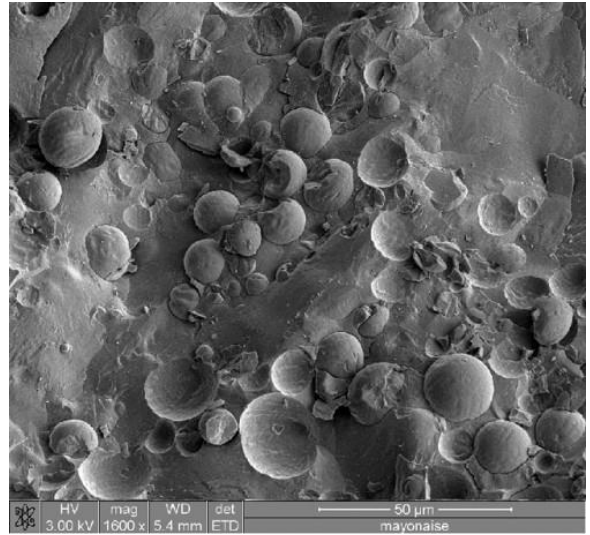
#### Sundew leaf and insect

A small fly trapped on a carnivorous South African sundew plant. The whole plant is about 3cm across and has sticky hairs on its leaves to capture small insects. Image courtesy of Miranda Waldron at the Electron Microscope Unit at the University of Cape Town, South Africa

## Foodstuffs - Various



**Chocolate Bar**



**Mayonnaise – Fractured**

Image courtesy of FEI Company

# **EMS MICROSCOPY ACADEMY**

## **CRYO SEM WORKSHOP**

### **Details**

Tuesday - Thursday  
October 13 - 15, 2020  
8:30 a.m. - 4:30 p.m.  
Hatfield, Pennsylvania, USA

### **Targeted Participants**

Individuals who are new to the field of cryo SEM or desire a technical refresh to maintain current skills or just those that want to see and learn all of the possibilities of the technology.

### **Scope of Class**

This course will cover the process of rapid freezing, fracturing, coating and imaging of a variety of samples.

Many types of samples such as ice cream, pastes, paints, and gels do not lend themselves to routine SEM sample preparation methods such as critical point drying or freeze drying due to the morphologic changes caused by desiccation. To avoid these artifacts it is necessary to image the hydrated or natural state. This requires that the sample be rapidly frozen, to reduce ice crystal damage, and fractured to reveal their physical / functional sub-surface morphology. These samples are applied to the stub, immersed in liquid nitrogen slush loaded into the Cryo fracturing and coating chamber, and finally the SEM. This final preparation takes place in a high vacuum environment thus minimizing the possibility of frost contamination. Within the SEM, while viewing, the sample temperature can be maintained at  $-130^{\circ}$  or warmed slightly to facilitate sublimation of the surface. The selection of accelerating voltage (kV), for surface detail, and spot size for resolution and charging are critical and will be covered in detail.

Parameters such as working distance which affects depth of field (Dfi) and resolution, plus tilt and raster rotate will be examined for proper image collection.

### **The EMS Microscopy Academy**

Located in Hatfield, Pennsylvania, the Academy provides electron microscopy classes, workshops and training sessions for all fields of microscopy, including materials science and biological science.

### **Format**

Lecture, demonstration, and hands-on practice, as well as round table tips and tricks discussions. Participants are encouraged to bring their own samples, if possible.

# EMS MICROSCOPY ACADEMY

## CRYO SEM WORKSHOP

### Main Curriculum

Theory and overview of cryo SEM  
Mounting and adhering  
Freezing, loading and fracturing  
Insitu coating  
Operation of SEM  
Cryo face-off Leica UC 7 Crion  
Specific techniques of Cryo SEM imaging

### Equipment

Hitachi S3500 SEM	Leica UC7 Ultramicrotome	PP3010 Cryo Preparation System
COXEM SEM EM-30N	Leica Crion Cryomicrotome	

### Faculty

1. **Al Coritz** has been doing Electron Microscopy for 38 years, beginning at the Yale School of Medicine and ending up on the commercial side with several key EM companies. His specialty is Cryo-techniques and Thin Film Technology: i.e. Freeze Fracture/Rotary Shadowing, High Pressure Freezing, and more He is currently with Electron Microscopy Sciences where he has been the Technical Director for over 20 years.
2. **Michael Kostrna** was the program director of the Electron Microscopy Technician program at Madison Area Technical College and has more than more than 35 years in EM technical education and research experience. He has been training EM students for 29 years and has developed curricula and lab exercises for TEM, SEM, OLM, lab safety, introductory and advanced biological EM, EM, maintenance, and x-Ray microanalysis. He has worked with companies such as SC Johnson Polymer, Dow Chemicals, Io Genetics, Virent Technologies, ABS Global, NanoOnocology, and Microscopy Innovations, and in the process gained insight to the various applications of EM.

# **EMS MICROSCOPY ACADEMY**

## **CRYO SEM WORKSHOP**

### **Schedule**

*Tuesday, October 13, 2020*

8:30-9:00	Introductions of staff and participants
9:00-10:15	SEM theory
10:15-10:30	Coffee break
10:30-12:00	Demonstration of Hitachi S3500 SEM operation
12:00-12:30	Provided lunch
12:30-1:30	Cryo theory
1:30-4:30	Demonstration of cryo fracturing, coating and imaging
6:00	Hosted dinner

*Wednesday, October 14, 2020*

8:30-9:00	Debriefing of previous day's activities
9:00-9:30	Participant's sample assessment
9:30-12:15	PP3010T cryo fracturing/coating to Hitachi S3500 SEM
12:15-12:45	Provided lunch
12:45-4:45	P3010

*Thursday, October 15, 2020*

8:30-9:00	Debriefing of previous day's activities
9:00-12:30	Hands-on cryo prep, fracturing, coating and SEM operation and evaluation
12:30-1:00	Provided lunch
1:30-4:30	Hands-on coating and SEM observation of cryo faced off samples and workshop assessment

*Schedule subject to change*

# **EMS MICROSCOPY ACADEMY**

## **CRYO SEM WORKSHOP**

### **Registration Fee: \$1,200.00 Includes**

- Workshop syllabus
- All supplies
- Reagents and solutions
- Lunches
- Coffee
- Tea
- Dinner on the first evening of the workshop

### **Lodging**

Participants are responsible for making their own hotel reservations.

The following hotel has been designated as the host hotel:

#### **Homewood Suites**

1200 Pennbrook Parkway

Lansdale, PA 19446

Phone: 215-362-6400

The special rate is \$119.00 per night (plus tax) which includes a hot breakfast and a light dinner in the evening.

Please make your reservations and mention you are participating in the EMS Workshop.

GROUP CODE: EMS WORKSHOP

Everyone should plan to arrive the night before class begins.

### **Enrollment Note**

Registration will be limited to a maximum of 15 participants.

EMS will provide samples to those who prefer not to bring their own.

**EMS MICROSCOPY ACADEMY**  
**CRYO SEM WORKSHOP**

**Printable Registration Form**

\_\_\_\_\_ M / F  
Name / Title

\_\_\_\_\_  
Institution

\_\_\_\_\_  
Department

\_\_\_\_\_  
Mailing address

\_\_\_\_\_  
City / Zip

\_\_\_\_\_  
Country

\_\_\_\_\_  
Telephone / Fax

\_\_\_\_\_  
Email:

Will you bring your own specimens? Yes\_\_\_ / No\_\_\_ (See Note on prior page)  
What Samples are you bringing and most interested in?  
\_\_\_\_\_

All registrations must include payment.  
Rate \$1,200.00 per Person  
Number of Participants \_\_\_\_\_  
Total \$\_\_\_\_\_

Pay by check: make payable to EMS and reference "Cryo SEM Workshop Oct20".  
Pay by credit card: Credit Card Type \_\_\_\_\_  
Credit Card Number \_\_\_\_\_  
Expiration Date \_\_\_\_\_ 3 Digit Code \_\_\_\_\_

\_\_\_\_\_  
Signature / Date

Return your registration to:  
Stacie Kirsch  
1560 Industry Road  
Hatfield, PA 19440 USA  
Phone: 215-412-8402  
E-Mail: [info@emsdiasum.com](mailto:info@emsdiasum.com) or Fax: 215-412-8452

**TO REGISTER ONLINE, CLICK [HERE](#).**