



# Society of Electron Microscope Technology

( [Http://www.semt.org.uk](http://www.semt.org.uk) )

Hon. Secretary:

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## SEM HALF- DAY MEETING

Wednesday 29th October 2003

The School of Pharmacy, 29-39 Brunswick Square, London WC1N 1AX

- 12.30 p.m. **Registration**, including a *Buffet Lunch*.
- 2.00 p.m. **Introduction**: Chair, Heather Davies.
- 2.05 p.m. **Electron Microscopy and other techniques in diagnosis of Soft Tissue Sarcomas**  
*Prof. Cyril Fisher, Pathology Dept. Royal Marsden Hospital, London.*
- 2.40 p.m. **“On the trail of Dinosaurs - with the help of Scanning Electron Microscopy”**  
*Paul Ensom, Head of Curation, Palaeontology Dept. Natural History Museum.*
- 3.15 p.m. Tea, Coffee.
- 3.45 p.m. **Putting Fungi Under Pressure**  
*Sally and John Paul Cassella, Biological Sciences Dept. University of Derby.*
- 4.20 p.m. **Emerging 3-D Dual Beam Imaging and its potential Applications.**  
*Lloyd Peto, FIB Applications Laboratory, FEI company, Bristol.*
- 4.55 p.m. **Annual General Meeting.**
- 5.30 p.m. **Wine Reception.**
- 6.30 p.m. **Conference Dinner.**

For **FREE registration** complete the attached form and send to the Secretary (address above).

**On the Trail of Dinosaurs - with SEM**

Paul Enson

Paleontology Dept., Natural History Museum, London

Dinosaur footprints have been found on the Isle of Purbeck, Dorset, at Lulworth Cove, & Durlston Bay, Swanage. Upland footprints disappear rapidly; lowland footprints may be preserved; coastal ones are washed out.

1986 Sunnydown Farm - 34 tons of limestone were moved; many crocodile teeth and remains of lizard, fish, mammal & dinosaur were found.

Many more species have been discovered recently, with more care in excavation; there are probably more to come! Most Purbeck beds yield fragments of eggshell, even if there are no bones or tracks. The fragments found are very thin (although we would expect them to be thick). Crocodiles are very abundant - shells and teeth.

**Putting Fungi under Pressure**

Sally & John Paul Cassella

Dept. of Biological Sciences, Univ. of Derby

Athlete's foot affects 85% of USA students, 15 - 40% of the population. It can be treated with Mycil or Daktarin, or tea tree oil; systemically with Terbinafine (Lamisil), but this has side effects.

Aspergillus can be difficult to treat, & penetrates deeply; it can be treated with neem leaf oil, and lemon grass (better), as can also Trichophyton.

Many possible oils can be used, varying with the species of fungus, temperature, & concentration of spores / chemical. Molkosan is obtained from cow whey fermentation.

Aspergillus fumigatus - LV SEM shows the chains of spores, which are often lost in conventional methods. Similarly A. niger; with spilanthes treatment, the beginning of the conidiophores is seen but not the mature spores. Fungi grow between the layers of nails.

LV SEM allows images of larger specimens; it is rapid, user-friendly. It gives a "truer" image of delicate specimens; we should re-examine the "accepted ultrastructure" obtained by conventional SEM. Samples can be grown on after being in the LV SEM if they have not been fixed.

They are trying numerous variations on kV, specimen distance, back-scattered / secondary electron images, etc.

**3-D Dual Beam Imaging & its applications**

Lloyd Peto

FIB Applications Laboratory, FEI Co., Bristol

Focussed Ion Beam = scanning ion microscopy

Dual Beam = FIB + EDX etc.

A fast technique; secondary electron, with no back-scatter; ions don't penetrate, so we are getting true surface information. The resolution can be 5 nm; there is strong materials contrast; good direct conductivity information; strong metallic grain info. There is a small inter-active volume, so the true surface.

Secondary electrons & secondary ions = SE and BSE in SEM

The surface can be modified by milling, depositing, etc. Metallic crystal grains can be analysed.

20,000 cu.u of material can be removed to make cross-sections for a vertical plane image in a few minutes (as a staircase). This is done in the microscope, so it is site-specific, giving an immediate image, grain & elemental analysis, without artefacts. Cross-sections can be made fo different layers.

Pollen grains can be cross-sectioned and tilted.

Gun-shot residue particle.

Wood - propeller shaft - had structural damage & fungal infection, shown under low beam current & low magnification. With conventional SEM cryo-fracture, we lose some of the smaple. FIB sections are more like cryo-sections, but we can progevessively slice through - but this destroys the particle.

FIB / Dual Beam foil preparation can be used on many materials - paint, polymers, LED. A foil can be cut out vertically from a slab.

Indium antimonite - indium liquefies under the ebam.

Biological material can be examined only if frozen.

**Name**

David McCarthy  
Barry Dowsett  
Trish Lovell  
Derrick Lovell  
Doug Lock  
Chris Jones  
Paul Enson  
Anne Drewe  
Steve Cham  
Hillary McPhail  
Graham McPhail  
David Khan  
Andy Constanti  
Hvi Gong  
Jie Zhu  
Tony Brain  
Ian Francis  
Paul McGill  
Rosemary Suswillow  
Tania Hopcroft  
Claire Martin  
Brian Kyte  
Heather Davies  
Nicky Morden  
Ann Dewar  
David Robertson  
Terry Cooper  
Jill Lewis  
Cyril Fisher  
Lloyd Peto  
Sally Cassella  
John Paul Cassella  
John Bredl  
Don Ashcroft  
Clive Downing  
Kate Johnson  
Janet Tyas  
Sheila Davis  
Alice Warley  
Chris Walker  
Bill Hanks  
Ken Brady  
Louise Collins  
Theresa Wodehouse  
Andrew Rogers  
Kevin Meade  
Allister McBride  
Edwin Eardley  
Stephen Fuzeland  
Bill Clarke  
Clare Ashton  
Anna Tong  
Jeremy Rees  
Jill Webb  
Sam Stanton

**Organisation**

Sch. Pharmacy  
CAMR  
Royal Marsden Hosp.  
Guy's Hosp.  
PGT  
NHM  
NHM  
London  
Leica  
Sch. Pharmacy  
Barts.  
Sch. Pharmacy  
Sch. Pharmacy  
Royal Brompton Hosp.  
Royal Brompton Hosp.  
Kings College  
GSK  
GSK  
Royal Vet College  
Royal Vet College  
Sch. Pharmacy  
I.S.S. Ltd.  
O.U.  
Eastman Dental Hosp.  
Royal Brompton Hosp.  
Breakthrough Cancer  
Taab Labs. Ltd.  
London  
Royal Brompton Hosp.  
FEI Company, Bristol.  
Derby University.  
Derby University.  
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Kodak Ltd.  
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National Heart & Lung Inst.  
National Heart & Lung Inst.  
Oxford Instruments  
Leo Electron Microscopy  
Leo Electron Microscopy  
Nottingham Trent Univ.  
Agar Scientific  
Royal Vet College  
Royal Vet college  
FEI/Philips UK Ltd.  
Reading Scientific Services Ltd.  
Sch. Of Biological Science, Portsmouth.