

Lineberger Comprehensive Cancer Center University of North Carolina

The electron microscope facility at the Lineberger Comprehensive Cancer Center (LCCC), at the University of North Carolina, is a world leader in the analysis and visualization of DNA- and RNA-protein complexes. Established by Dr. Jack Griffith in 1978, the facility houses the only laboratory in the U.S. specifically dedicated to visualizing DNA- and RNA-protein interactions and is frequently called upon by research institutions and organizations to provide breakthrough scientific findings. For instance, Dr. Griffith, in collaboration with Dr. Paul Englund at John Hopkins University, was the first to visualize DNA molecules with unusual curvatures; and, working with Dr. Mark Ptashne and Dr. Tom Maniatis at Harvard, was the first to visualize the looping of DNA and splicesomes. Presently, the lab is working with Nobel Prize winner Dr. Arthur Kornberg at Stanford University to understand how DNA replicates.

According to Dr. Griffith, LCCC's electron microscopy system is part of a unique scientific approach to studying DNA- and RNA-protein complexes. The approach integrates electron microscopy with conventional molecular biologic and biochemical research methods.

The LCCC's EM system consists of a high-resolution Philips EM 400 electron microscope equipped with two film cameras, a Gatan video imaging system, and a data acquisition and display system.

The Gatan video imaging system includes an image intensifier and goniometer stage that provides up to +/- 40 degree tilting of the sample for stereo imaging. The facility then incorporates a pair of high-resolution video cassette recorders for sample monitoring. With this capability for video output and recording, it is possible to share DNA-protein complexes as they appear in the microscope, in real time, with distant collaborators.

The facility used both 35 mm and sheet film photographic prints to record images but, with an average of 500 prints necessary for a study, the

total costs in time and materials became extremely expensive. And it was very difficult to obtain publication quality prints with appropriate levels of contrast.

As a solution to this major problem, a MacIntosh data acquisition and display system was installed. It utilizes software based on the National Institutes of Health IMAGE and DIGITAL DARKROOM™ programs - as modified by Dr. Griffith and his staff. With this technology, the lab can enhance sample edges, provide false coloring, combine multiple images, and invert contrast which is crucial in freeze-etch applications. It also utilizes a Lasertechnics DIR/Direct Drive Gray Scale Printer which conveniently allows the production of publication quality prints, and crucial photographic-quality images, in seconds.

According to Dr. Griffith, "This system allows us to answer the questions other physical methods have failed to....and because of its incredible time-saving features, it has allowed us to nearly double the number of our projects. Now we can help more people find answers to the questions about DNA replication, repair and recombination that are so crucial to cancer research." ■

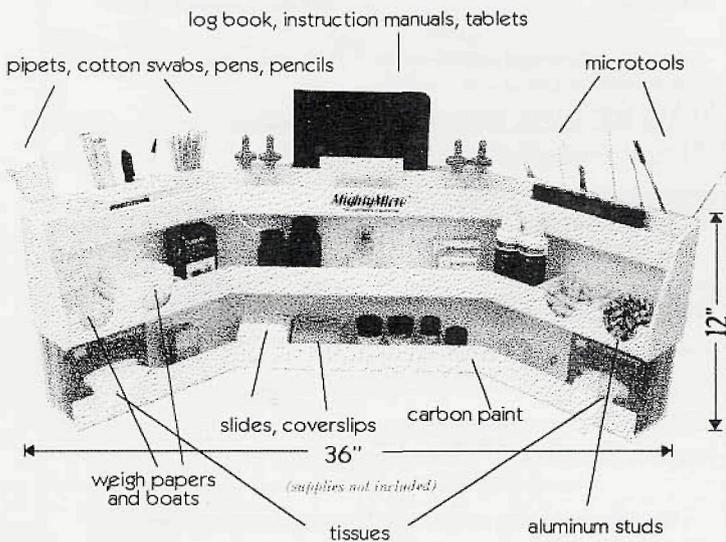
The (E)MSA Rhapsody

Written, with apologies to the Wiffenpoof Song, by John H. L. Watson, October 1955, at Pennsylvania State College for singing that night at the EMSA Society's annual banquet. It has also been sung at many other Society functions since, including the President's reception at the Harvard Club in Boston in August 1992, during the 50th annual meeting of the Society. The author was willing to drop the original "E" from EMSA as follows -- in appreciation of the expanding interests of the Society.

*From the lattices of Robley,
To the Hall where Cecil dwells,
To the freeze-dried bugs
That Andy loves so well,
See the Msans all assembled
With their artifacts displayed.
Their evaporator shadows cast a spell.
Carbonaceous, replicateous, Bradburgundians
et al
Fixed in osmium, sometimes in alcohol,
We'll contaminate our substrates
Long as free electrons last
To resolve the hydro' atom last of all.
We're all little electron microscopists*
With fields astray, M-Sa-Sa,
Crystal analyzers of the beta ray, M-Sa-Sa,
Thin-sectioned, cross-sectioned, diffracted and
stained
Radiated, duplicated, striated and strained,
Siemensed, Philip'd and R.C.A.'d!
M-Sa-Sa!*

* "little electron microscopists" is sung on a single beat.

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- 1) House number and street name.
- 2) Post Office Box number.
- 3) Rural Route (RR) and Box number.
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The reason for the "interest" portion of the questionnaire is to provide potential advertisers with a breakdown of our readership . . . to hopefully encourage their advertising. Without such advertising, we could not continue to provide the newsletter at no cost.

Thank you for your help!

. . . The Editor

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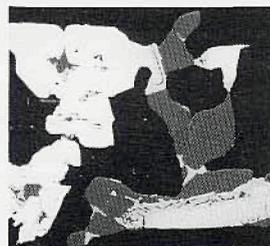
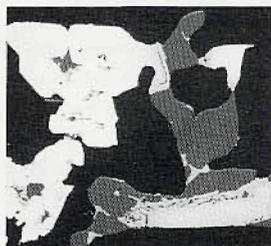
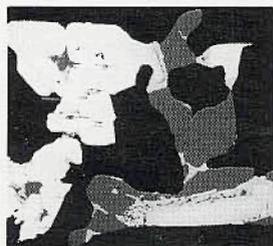
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