

## Microscopy Yesterday, Today and the Future

John A. Reffner, Trace Consulting

With the approach of a new century everyone is getting nostalgic; we just can't resist reflecting on the past and envisioning the future. This struck me with renewed passion on 26 January 1999 when my latest patent (with co-inventor Steven H. Vogel) on a new Confocal Microspectrometer System was issued by the U.S. Patent and Trademark office. What resonated in my mind was the sage advice I received from an admired and distinguished scientist nearly forty years ago. The learned professor opined, "Why do you want to be a microscopist? That's old stuff. No scientific discoveries can be made in microscopy; it is just not a research field. Microscopists never amount to more than glorified technicians". Since then I have seen Professor Dr. J. S. Ploem develop Epi Fluorescence, which revolutionized cytology and expanded the way we think of fluorescence microscopy. I have seen the introduction of the scanning electron microscope, energy dispersive x-ray spectrometers, ESCA, Auger, acoustic microscopes, scanning probe microscopy, confocal microscopy, quantitative image analysis, video-microscopy, FT-IR microspectrometry and many more. Microscopy is a dynamic, exciting and vital scientific field. Well, I am glad I ignored one mentor's advice.

Microscopical observation rides the point of the scientific method - observation, contemplation, speculation, verification. Perhaps, Don Grimes should have a section in *Microscopy Today* where "Unexplained Observations" are published. Microscopy is demanding of mind and body. Too demanding at times, taking us away from family and friends. It is sometimes like that late-night movie, you've seen it before, you know you need your sleep, but you just can not leave until it's over. Peering into the microscopic world is fascinating science. However, my ignored mentor was on target about one thing; often I am viewed only as a technician. I take real pride in the label of technician. It means that I am able to put science into action. A scientist formulates paints - a technician paints masterpieces. We should not let labels block the path to our true contributions.

John Bardeen, Walter Brattain and William Shockley are names we all recognize for their monumental contribution to our science, technology and prosperity. Perhaps not. Perhaps you are spending too much time with your microscope, or like most of us just don't remember what they did. Way back in 1948, these three men discovered the transistor. This truly ranks as a leading discovery of the twentieth century. Identifying and crediting scientists that advanced microscopy is profoundly more difficult. We have a great history, but no historians. Applications of microscopy are better known and documented than are its fundamental developments. We are indebted to ghostly figures secreted in the "Manufacturer's" evil realms. Who are these unknown champions? How can we show them our gratitude? Who is training our future leaders? I only pose the questions; the community of microscopists must find answers. To think and act like a microscopist you need training and experience - to practice microscopy you need a microscope. We should not make holy the microscope; we should respect it and honor those who lead its development.

We need to document our past. In this age of information exchange we can do this. Send the answer to the following questions to HYPERLINK mail to: [jareffner@compuserve.com](mailto:jareffner@compuserve.com)

Who is the person who made the most significant contribution to your area of microscopy?

Where was this work done?

What was the nature of this person's contribution?

How has this work added to your profession?

Can we contact this person?

I will compile the information and report it in a future *Microscopy Today* issue.

Today, microscopy has a real problem. It is a mosaic of specialized instrumentation and techniques. Often, an application is restricted to a single use. Many applications need a concentration of knowledge, like pathology, mineralogy or metallography. Other techniques are common. I chuckle to myself when I hear the evening news reports on the new field of microsurgery. All microscopists know the advantage of removing a splinter with the help of a stereomicroscope. Two forces, their field of specialization and their instrumentation, challenge microscopists. We must face both forces and serve two masters.

What microscopists must do today is to become as dedicated to promoting microscopy as they are to its practice. We must be authors of papers, not be relegated to an acknowledgement. We must make sure that the value of our work is known. I am thrilled when I hear from an infrared spectroscopist that they solved a problem that saved their company many times the cost of their new FT-IR microscope system. I hope their management is hearing the same success story. We must make a conscious effort to market our services. Whether you are working for a university, industry, private or government laboratory, your success depends on how well you keep your management and peers informed about the real value of your work. If your boss is too dumb to understand what you are doing, then you better educate him or her fast. They will have their jobs long after yours is history.

Does microscopy have a future? Are you sure that it does? There is promise of a bright, glowing and challenging future, filled with images and information flying around the world. I can hardly wait to see what high definition digital video will become. How fast can personal computers be and what seemingly impossible tasks will they conquer? To make this a reality someone must underwrite the cost of instrument development. As industries cut back and competition soars, instrumentation is under real pricing pressure. Instrument manufactures make their money by selling instruments. This naive statement is a simple fact that goes unrecognized by many microscopists. If you want microscope technology to advance, you must be willing to support its development. I am advocating that you spend your money wisely, and as often as you can. You must compete for the same dollars the rest of your lab is after to support their fields of interest. As you justify the present, you are building a bridge to the future. Microscopists and instrument manufactures have a symbiotic relationship; each depends on the other for existence. Your futures are inter-linked.

Our future is also measured by the talent and training of new microscopists. Where do the future microscopists come from and who will train them? Wow, this is a challenge. The simple answer is that future microscopists are being trained now. I wish I knew where microscopy is being taught and what is being taught. It's time for you to send more answers to HYPERLINK. Mail to: [jareffner@compuserve.com](mailto:jareffner@compuserve.com).

Who taught you microscopy?

What microscopy techniques were you trained in?

When did you receive training (year)?

Where did you get your microscopy training?

Why did you seek training in microscopy?

Again, I will compile this data and report back. This is really important information to share within the microscopy community.

Let me share with you my experience in training related to infrared microspectrometry. During the past 13 years over three thousand infrared microspectrometers have been sold. In units sold, FT-IR microscopy is the fastest growing field in microscopy. This surprises many microscopists. This growth has gone unrecognized by microscopists because it has been largely cloistered in the IR lab down the hall. The prevailing "management" philosophy is that it is easier to teach infrared spectroscopists microscopy, than to teach microscopists spectroscopy.

Where do these spectroscopists get training? The manufactures of the

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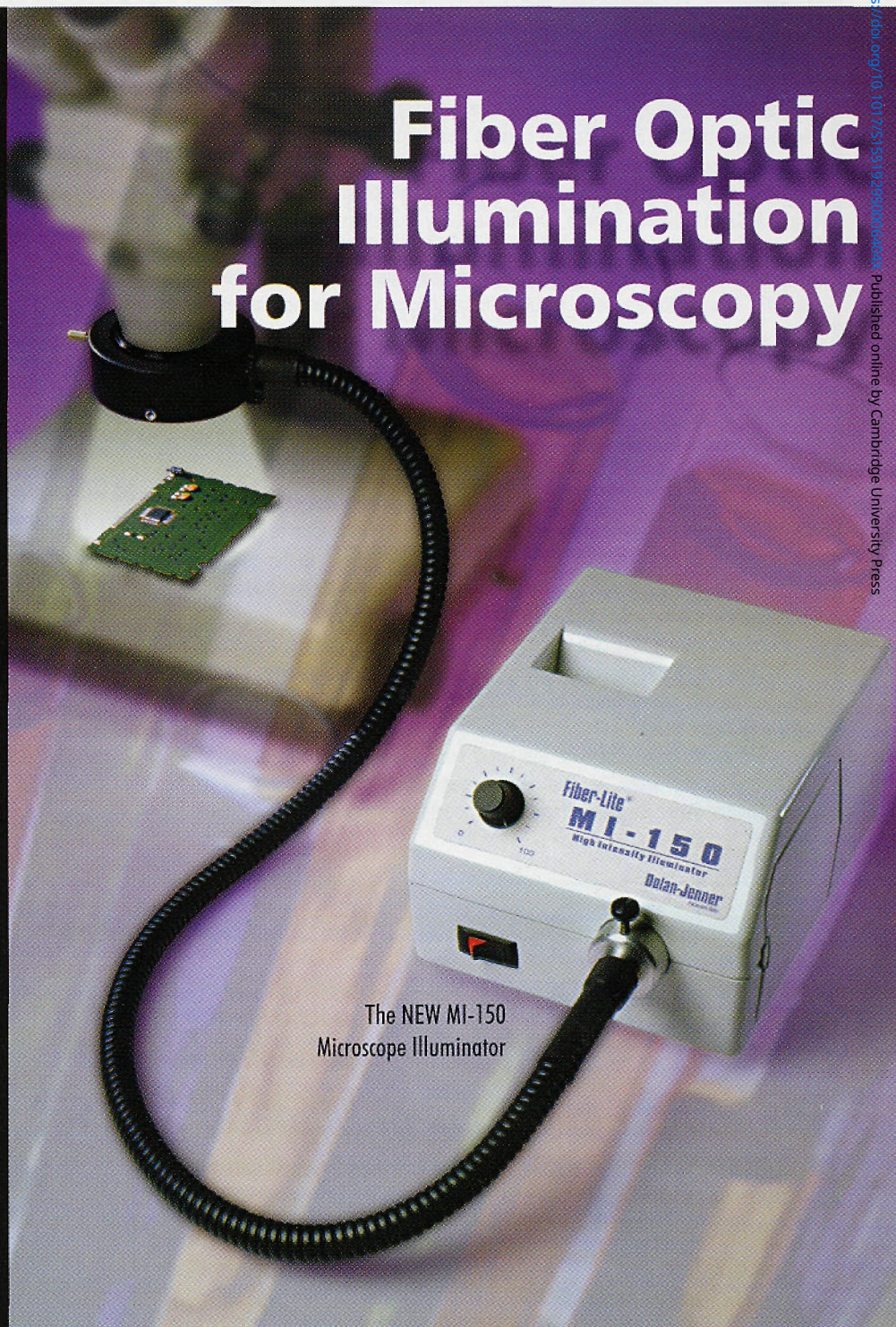
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## Microscopy Today: Today and the Future

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microscopes and the spectrometers are a primary source. Spectra-Tech and Nicolet regularly have 3-day training classes and conduct at-site training as a service activity. Perkin Elmer and BioRad provide training at installations and have held some training classes. The Molecular Microspectroscopy Laboratory at Miami University, Athens, OH has a 5-day workshop each June. Dr. Andre J. Sommers leads this program and teaches along with several invited guest lecturers. This workshop covers infrared and Raman micro spectroscopy. Dr. Edward Bartick holds regular infrared microscopy training classes at the FBI Academy, but this training is limited to agency and public safety personnel. The McCrone Research Institute, Chicago, IL has a 5-day class titled Advanced Infrared Microspectrometry (scheduled this year in April and September). Since it stresses microscopy, this is a very successful course. Many spectroscopists are discovering that simple microscopical procedures improve their infrared spectral analysis.

This is not a lot of training activity. There were a few 1-day workshops held at the Eastern Analytical Symposia and regional forensic science societies, but those were more informational than instructional. Back to the question, where does one get training? I don't know. What about the other training in microscopy? I need your help. Please respond to the questions above.

The information age is a real opportunity for microscopists to join together. We can share successes, broadcast our images and even look through another's microscope. If Nester Zaluzec, at Argonne National Laboratories, and Larry Allard, at Oak Ridge National Laboratories, are successful, then we may all have access to the latest and greatest in high-resolution microscopy on our cable TV. The microscopist's life is great now and can only get better. When we all work together, good things happen. ■

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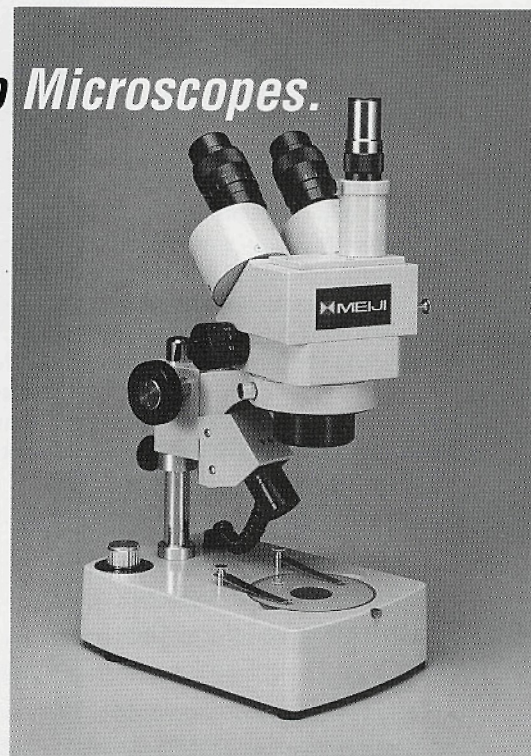
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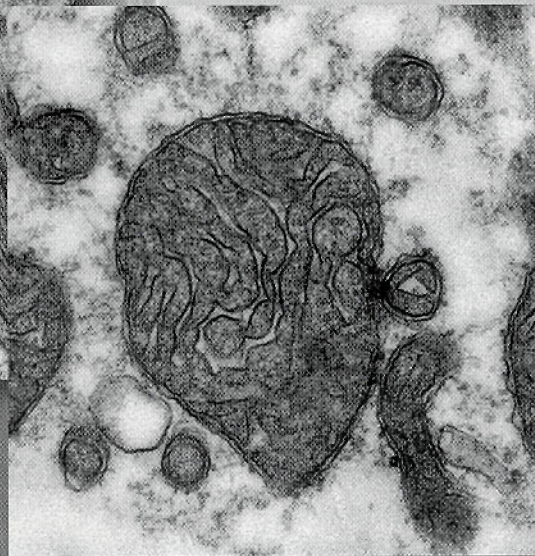
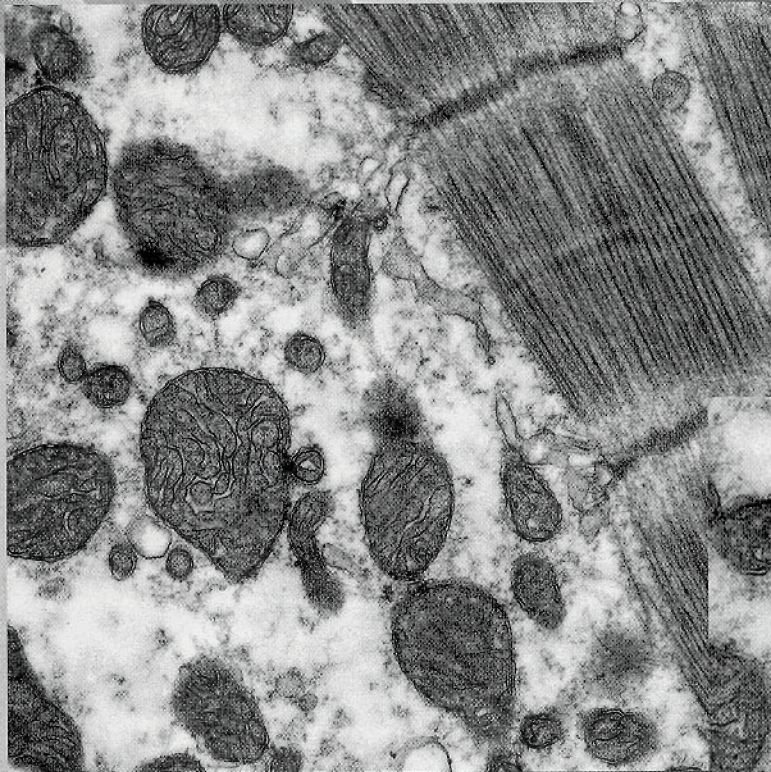
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