

Sheron Lear: 50 years of service to histology

Much has changed in histology over the last 50 years, and one person has seen it all. This year Sheron Lear celebrated half a century in the laboratory, and Leica Microsystems recently had the honor to spend time with her discussing the enormous advancements she has been part of.

Meeting scientific challenges is something that has driven Sheron throughout her long career. Sheron was among the first in the US to be certified as a Histotechnologist (HTL) and the Qualification in Immunohistochemistry (QHC). She is a Charter Member of the National Society of Histotechnology (NSH), and early-on served on several committees, has presented lectures and co-presented workshops and posters. She was also co-founder of the Kentucky State Society for Histotechnology and has served on committees, held the offices of President and Vice President, and through the years given multiple presentations and workshops, including a presentation on the history of the KSH.

An exciting experience

"November 7, 1960 was my first day in the profession ... I'm old enough to know I do not know it all," Sheron laughs. One of Sheron's first jobs was hand-sharpening microtome knives, a job she cheerfully describes as an "exciting experience". This, of course, was before automation. Really sharp knives were kept sharp by hand honing using Pike Oil, three grades of stone, and stropping with linen or fine-leather strops. Paraffin for embedding was melted over a Bunsen burner and filtered through cotton balls. "It was quite different than today where you have very nice sharp disposable knives and great microtomes," exclaims Sheron. "I became very good at hand sharpening knives – as a new student I had the opportunity to sharpen knives for everybody in the lab. When I began my training at the Veterans Hospital in Louisville, Kentucky, the lab was over three hundred autopsies and brains in arrears, with 40 to 80 blocks per case number and no two tissues could be embedded in a single block. The only tissue processor was the



'black spider' with only one processing basket that had to be used for surgicals. I learned very quickly how to process tissues by hand in glass dishes, to observe the chemical changes that took place on each organ when it was chalky white from being thoroughly dehydrated, clear or shiny translucent from the xylenes, and also properly infiltrated with paraffin. I also learned how to embed in large pans and cut the paraffin away and, using an open flame, melt the blocks onto metal object holders to fit into the microtome clamps."

Incredible skill

It's a testament to the skill of technicians like Sheron that they could cut incredibly thin sections. "As a student I was trained to cut at 7 μ and then ... I began cutting at 5 μ and then was very proud to cut paraffin sections at 4 μ and 3 μ and sometimes 2 and 1 μ sections. It was just a challenge for me. I also liked to section bone marrow biopsies and clots at 3 microns. The nuclear structures were so much more visible and diagnostic. Now this is routine."

Great improvements in safety

Sheron says laboratory practice has changed in the last 50 years, especially the many dangerous techniques that were once commonplace. From mouth pipetting toxic solutions to

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cutting frozen sections or conducting autopsies without gloves, Sheron has seen a lot in this half a century. "Prior to the Right to Know Law, you were told to mouth pipette poisonous chemicals and told it would not hurt you. I mouth pipetted potassium ferrocyanate until a doctor walked into the lab and asked what I was doing and what the chemical was. When I told her it was potassium ferrocyanate, she grabbed me and took me to a forensics book and said, 'Look what happens to people who do this.' Then she made the director of the lab buy us pipette fillers. They were less than a dollar each at the time but the lab couldn't afford them."

Sheron recalls another common practice was to handle fresh surgical tissue for grossing or perform frozen sections (aerolysing, before cryostats) and to conduct autopsies with ungloved hands. "Unless you were going to eviscerate an infectious autopsy you did not wear gloves. Gloves were too expensive to 'waste'". As for handling carcinogenic dyes, Sheron recalls the attitude of the day. "If you inhaled the dyes, well that was because you were breathing instead of not breathing while you weighed out the dyes and mixed them with the solvent. We were always told to hold our breath when weighing dry dyes. When I look back on the many unsafe practices of the times, it is amazing to have survived to be able to work 50 years!!"

Pioneering IHC work

Sheron's early fascination with special stains lead her to her pioneering work in immunohistochemistry in the 1970's. "I used to love special stains, the more difficult and tedious a special stain was, the more I loved the challenge." When a pathologist offered her the chance to work on a research project that required immunohistochemistry (IHC) she jumped at the chance. "I came in at nights and weekends to learn and stain the research immunohistochemistry. I was fortunate to be able to learn and work with immunohistochemistry back in the '70s. It was so new that it was difficult to buy 2 antibodies from the same company". When Sheron started her IHC work, most of the staining was performed using the peroxidase-antiperoxidase (PAP) technique and later alkaline phosphatase. The only methods of 'unmasking the antigens' were the use of enzymes and keeping the tissue on the slides was challenging because plus and charged glass slides were not being used.

"In 1981 I was hired by the Department of Pathology at the University of Louisville to set up a specialty lab doing enzyme histochemistry on muscle biopsies, plastic embedding for thin sections and IHC. A good part of my work at that point was

immunohistochemistry. I expanded the IHC list from one to well over two hundred and fifty [antibodies] before leaving that position twenty seven and a half years later."

From ABC to compact polymers

The number of antibodies and techniques that worked was much different than today. "Heat induced epitope retrieval and plus slides had not been discovered/invented yet. We only knew about using an enzyme and unfortunately with the lack of good adhesion methods to keep tissue on the slides, a lot of the tissues would start falling off." Sheron started experimenting with heat induced epitope retrieval around 1992-93. Early on the PAP system was replaced by the avidin-biotin complex (ABC) (early 1980's) and finally streptavidin immunostaining techniques. She is now impressed with the polymers and considers them, particularly the smaller, compact ones as "the most awesome".

Dedicated to improving histology

Even after 50 years, Sheron's commitment to improving histology has not abated. "I see all tissues as another opportunity for research. That is why I never get my work done." Sheron continues to pioneer cytology and various techniques in immunohistochemistry much like the past when experimenting heavily with manual staining, automated strainers, autoclaves, microwaves, pressure cookers in microwaves, "you name it."

"One of my real joys now is working with several of the young student histotechnologists. I love to explain the special stains and IHC and look at the results with them; share the little techniques that makes microtomy easier and improves the quality of the sections; teach them to manually stain slides; diluting an antibody, running serial dilutions; making up tests to help them pass the HTL and/or the QIHC; sharing information on a workshop I have attended and more."

A love for histology

As Sheron reaches her 50th year in histology, she continues to pursue scientific excellence and to improve the practice of histology. As Sheron admits, "the field has changed, I have changed" but she continues to search for improvements to the practice simply because, "I love it".

In March Sheron received an award for 50 Years in the profession from the KSH at the Awards luncheon and was recently presented with an engraved silver clock for 50 years from her employer of 22 months where she is the Manager of IHC. She holds both as treasures.