

# Preface

*"I have no special talents. I am only passionately curious."*

Albert Einstein

Having recently graduated from Western Maryland College with a baccalaureate degree in premed, I was looking for employment. An ad in the Baltimore Sun newspaper caught my eye. Someone was looking for a person with experience in a variety of biological subjects. I wrote to the box number provided, telling the unidentified source that I had coursework in the advertised areas but no job experience. To shorten a long story, the prospective employer turned out to be Dr. John K. Frost in the Division of Cytopathology of The Johns Hopkins Hospital. The advertised position had been filled internally, but he had a School of Cytotechnology, and there were student stipends available that would cover the cost. Would I be interested in enrolling?

That was 1963, and the rest—as is often said—is history. Confucius was right: find a job you love and you'll never work a day in your life. By pure dumb luck, I had stumbled onto a profession and career path that fuelled the passion that resulted in my writing this book. After graduating on October 9, 1964, with a certificate in "Medical Cytotechnology" from The Johns Hopkins Hospital, I remained employed there until January 16, 1987.

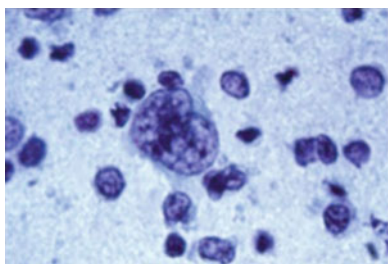
Parenthetically, the formal name of the institution is The Johns Hopkins Hospital. The word "The" is capitalized, and Johns Hopkins is the name of the Quaker philanthropist who donated \$7 million to construct the hospital in 1875 and several other famous

Baltimore-based institutions that bear his name. Johns is a family name; it is not John and is not followed by apostrophes (i.e., not John's or Johns' and not Hopkin's or Hopkins'). He died Christmas Eve 1873 at age 78.

The first research project in which I participated was circulating cancer cells in the blood. Nine years earlier, Engell had published a review about the subject that sparked enormous interest.<sup>1</sup> Note that the year was 1955. We didn't know then what we didn't know.

Our small research team's initial charge was to gather from the published medical literature papers about processing peripheral blood, evaluate each method, identify the most promising one, improve it as needed, and apply it to real-life specimens. One thing above all became abundantly clear: we didn't know what we were doing. Among other things, for example, we couldn't get erythrocytes or leukocytes to stick to glass slides when wet-fixed (i.e., plunged into alcohol). We learned that normal saline—contrary to expectation—destroys cells *in vitro*. We also learned that the Pap stain was not standardized. In short, almost everything we had been taught about cytopreparation was insufficiently reliable to be useful. No one was to blame. After all, it was the 1960s.

Since we were unable to get blood cells to stick to glass slides that were wet-fixed for cytology, instead of having been air-dried for hematology, we began collecting them on Millipore filters. I observed that cells near the boundary of the cell collection area of one preparation in particular were well preserved, while neighboring cells were not. One of our early "successes" is pictured in this photomicrograph of what we believed to be megakaryocyte. Megakaryocytes ordinarily don't circulate in peripheral blood.



That one observation made me think that if we could identify the contributing factors responsible for this isolated success, we could take the guesswork out of making filter preparations of well-preserved cells. Thus began the unending questions and answers that are embodied in this book.

Readers will note that most of the cited references are in journals unrelated to cytology as we know it, and they're *old*. Many were published in the first half of the twentieth century and, occasionally, the seventeenth century. These reflect the fact that I had questions, and they had answers. I had no recourse but to visit the musty dusty stacks of the Welch Medical Library of The Johns Hopkins Medical Institutions. In those days, now nearly 50 years ago, there was no easy way to research topics of interest. PubMed and Google were far into the future. Volumes and volumes of Index Medicus on tables and tables in the library's reading room do not inspire serious scholarship. To facilitate focused searches, I learned that reading the lists of references in published papers that were useful to me often revealed titles of articles of likely interest and the names of journals outside those commonly associated with diagnostic cytopathology. I would often go to the non-air-conditioned stacks, select the last issue of these unfamiliar journals for each year, and read the titles of articles published for the entire year. The library's policy allowed me to check out the journals and copy the articles, which I still have.

This volume can be used to teach cytopreparation and help students:

- *Understand the principles that underlie the various procedures and practices*
- *Appreciate that everything done to a specimen makes a microscopically appreciable difference*
- *Encourage observations that may elicit suggestions for improvements*
- *Discourage potential shortcuts that cost more than they gain*
- *Promote curiosity (e.g, How do you know that? Are you sure? Show me the citation.)*

These lectures are needed because cytopreparation for technicians is not taught anywhere as a formal program. While part of

every cytotechnologist's education, it is a relatively small part and often not taught well. Nationwide, the need for high-quality cytopreparation is great.

This book covers the entire range of processes that contribute to a useful cytologic preparation, from specimen collection through microscopy. Since "the Pap test is cytopathology," I have also included an approach to screening Pap tests and data analysis. I have tried to provide sufficient details throughout the book so that others outside this country may benefit.

I want to acknowledge with gratitude my first teachers in cytopathology: Dr. John K. Frost, Arline K. Howdon, and Sue T. Shutt. Their unbridled enthusiasm was infectious; their encouragement, unflagging. Pre-everything regulatory, nothing slowed my researches or dampened my curiosity. Others at Hopkins I want to acknowledge include the following: Dr. Yener S. Erozan, Dr. Prabodh K. Gupta, Dr. William M. Howdon, and Dr. Norman J. Pressman; cytotechnologists Fran Burroughs, Sue Ermatinger, Gene Ford, Deirdre Kelly, Jack Kirby, Ellen Patz, and Karen Plowden; cytopreparatory technicians Dianna Farrar, Villa Gardner, Darlene Ratajczak, and Linda Reynolds; and Secretary Shirley Long. The named individuals were the core staff during my 23-year tenure. I remember them all fondly.

Lastly, I want to thank Dr. Dorothy Rosenthal, Series Editor of *Essentials in Cytopathology*, for inviting me to write this book. She also spearheaded the November 7, 2011 dedication in my name of the Cytopreparatory Laboratory in the Pathology Building of The Johns Hopkins Hospital. The dedication recognizes the fundamental soundness of my contributions to cytopreparation, which have stood the test of time since my 1987 departure.

Will there always be a place for cytopreparation in a world of molecular medicine? I think so as long as humans are curious to see things otherwise invisible. On the other hand, however, "prediction is very difficult, especially about the future"—Neils Bohr.

In the 1981 movie *On Golden Pond*, Henry Fonda portrays Norman Thayer, an 80-year old curmudgeon who is celebrating his 80th birthday. When presented with a cake ablaze with 80 candles, he says: "I've been trying all day to draw some...

profound conclusions about living fourscore years. Haven't thought of anything. Surprised it got here so fast." It's the latter statement I remember and a sentiment I now understand.

## *Reference*

1. Engell HC. Cancer cells in the circulating blood; a clinical study on the occurrence of cancer cells in the peripheral blood and in venous blood draining the tumour area at operation. Acta Chir Scand Suppl. 1955;201:1–70.

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