
PREFACE

As an undergraduate at SUNY Albany, I took a course in cell biology with Bob Allen as my professor. I recall, vaguely, at the time Bob impressing upon us the importance of live cell imaging by the then relatively new technique of differential interference contrast (DIC) microscopy. Being the late 1960s, however, I had other things to occupy my mind. A few years later in graduate school at Rensselaer Polytechnic Institute, one of my first courses was Graduate Cytology, taught by Roland Walker. During our first lab session, in which we observed various cells, Prof. Walker chastised me for getting up to leave (at about 6 PM) after only five hours of viewing the cells with the light microscope. He asked me if I had seen everything, to which I answered yes. Then he asked again, did you see *everything*?

It was not until I was an assistant professor at Dartmouth (with Bob Allen now my department chair) that I began to understand Prof. Walker's point of some 10 years before. Bob and I would give graduate students, on whose oral exam committees we sat, his copy of E. B. Wilson's *The Cell in Development and Heredity*. We would ask the students to read the text in the area related to their thesis research and then be prepared to comment during the oral exam on how their area of cell biology had progressed over the past 50 years. This was my first encounter with Wilson's book, and I recall being stunned by the drawings depicting mitosis and cell division, which were about as detailed as the photographic images of isolated mitotic apparatuses my students and I were obtaining with our new DIC microscope; such optics were of course unavailable to Wilson and his contemporaries. For amazing examples of the powers of observation possessed by these early workers, be sure to read Bob Bloodgood's extremely thorough and scholarly review of research on the primary cilium in Chapter 1 in this volume. As with the observations on mitosis cited in Wilson's book, the initial observations of the primary cilium and the speculations about its functions were a century or more ahead of their time.

Widespread interest in the primary cilium, however, dates to relatively recently, in fact, only to about the beginning of this century. The foundation of this interest was laid perhaps 16 years ago when Joel Rosenbaum and his student, Keith Kozminski, first observed intraflagellar transport (IFT) in *Chlamydomonas* using Paul Forscher's video-enhanced DIC microscope. By studying IFT in this model organism, connections between it and the primary cilium of mammalian cells were soon made. The pages of this volume, generously contributed by my colleagues, report contemporary observations of, and the methods used to study, the primary cilium. Such methods include not only microscopic techniques but also those from the fields of biochemistry,

genetics, and molecular biology. All of these approaches are of course essential components of the modern cell biologist's tool box, and combined they allow investigators to "see" the primary cilium as never before. Professors Allen and Walker would be thrilled to read this volume.

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