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Gary Borisy

Gary Borisy takes up the gavel this month as President of the American Society for Cell Biology. He is Chicago born and Chicago educated, from public school straight through his undergraduate and then doctorate degrees at the University of Chicago. He left Chicago for two years in Cambridge, England, and 32 years in Madison, Wisconsin. Now he's back home, a University of Wisconsin emeritus at 59, still working flat-out in the lab as a new research professor at the Northwestern University Medical School downtown. A short walk from his lab, he lives in a high rise overlooking Lake Michigan. "My commute consists of waiting for the elevator," he says.

The Chicago connection is apropos for an ASCB President (who follows another Chicagoan). The Society was heavily Chicagoan, at least in the beginning. The Edgewater Beach Hotel is long gone, but Borisy can stroll past the site where over forty years ago, the ASCB held its first general membership meeting on Chicago's lakefront Gold Coast. Borisy was there in 1961. Still an undergraduate, he went to hear Hans Ris talk on the then-heretical notion of extra-nuclear DNA in cytoplasmic organelles. An amazing 844 scientists attended, 744 of them charter members of the new Society. Borisy found the ballrooms of the Edgewater full of stimulating ideas, confirming his belief that cell biology was a field with ample room for the curious. He recalls, "I'd had this course (at Chicago) in biology where we were shown cells dividing. I was captivated by that process, the dance of the chromosomes, but in asking my professor how this thing worked, it became clear that no one had a clue."

By the time Borisy became a graduate student in the University of Chicago biophysics lab of Edwin Taylor in 1962, he discovered that some Chicagoans had a few clues and a clear objective—the mitotic spindle. The DNA revolution was gathering momentum, but the big excitement for Borisy in those early years was the convergence of biochemical and biophysical approaches to study cell biology. The stunning electron microscopy work of some early ASCB members, such as Keith Porter, made cell structure suddenly visible in tantalizing detail. However, the molecular basis for understanding how these cell structures worked seemed a mystery. As a new grad student in Taylor's biophysics lab, Borisy joined the search for the molecular subunits of one of these elusive organelles, the mitotic spindle.

Taylor had already found a key piece of the puzzle. Using polarized light microscopy, Shinya Inoue had observed that the drug colchicine caused the breakdown of the mitotic spindle in living cells. Working with human cancer cells, Taylor demonstrated that colchicine bound reversibly to some cellular constituent. The next step was to figure out its identity. Borisy's role in the Taylor lab group was to get hold of and characterize the colchicine binding receptor. That receptor turned out to be tubulin, the subunit of microtubules.

Ed Taylor had an incredible lab group, recalls Joel Rosenbaum, who is now at Yale but back in 1964 was freshly arrived at the University of Chicago to work on cilia structure in Frank Child's lab. Rosenbaum knew Taylor's group well. The grad students all had lunch together, at least in warm weather, behind the Zoology Building overlooking Botany Pond. Those brown bag lunches remain vivid in Rosenbaum's mind. There was Michael Shelanski, now at Columbia, who would make an early breakthrough in the microtubule structure of flagella and cilia. Mark Adelman, now at the Armed Forces University for Health Sciences, would become one of the first to isolate non-muscle myosin. Richard Weisenberg, now at Temple, would ultimately discover the conditions for microtubule assembly in the test tube. And then, of course, there was Gary Borisy.

"We'd sit there to eat and discuss our results," Rosenbaum remembers. "One day, Borisy came out all excited, sat down, opened his lunch, and announced, 'I've found a way to use tritiated colchicine to pull out the microtubule proteins.' He was really excited but I just said, 'I hope you're not going to try to get a PhD thesis out of playing around with drugs.' He tried to explain to me why it was important but I turned up my nose. It turned out that by the mid-80s Current Contents put their paper [Borisy and Taylor, The Mechanism of Action of Colchicine, 1967] on its cover as one of the most cited articles in cell biology. That's how important it was and, of course, I'd told him not to spend a lot of time on things like that. Obviously, Gary knew a lot more about it than I did."

Borisy did, indeed, get a thesis out of colchicine and a doctorate from Chicago in 1966. For his post-doc, he went to Hugh Huxley's MRC lab in Cambridge, England, to learn more about cell structure. (Borisy returned to Cambridge in 1977-78 for a sabbatical in Sydney Brenner's MRC lab. He asked Brenner if he could think and write but not work on Brenner's famous *c. elegans* worms. Brenner agreed.)

In 1968, Borisy mounted what was then the typical job search for a returning American post-doc—he sent out a few resumes and accepted invitations from six or seven universities to give a seminar and consider a job offer. That was the Golden Age, Borisy says; when he describes his 1968 job search to his current post-docs, they wince.

Borisy accepted an assistant professorship in molecular biology at Wisconsin and rose to become a department chair, tireless committeeman, NIH panelist, and ASCB officer. His 32-year career in Madison was rich in science and in personal life, he says. "It was a wonderful place to raise three children, to grow vegetables, and to learn backyard masonry," he reflects. He also sang on occasion with the Madison Civic Opera Chorus in such productions as *Tosca*, *Pagliacci* and *Cavalleria Rusticana*. "Not that I have a good voice," Borisy adds hastily. "They were desperate for baritones."

Borisy's three children are now grown and he is a grandfather twice over. Felice, his eldest, has a doctorate in neurobiology from Johns Hopkins. Much to Borisy's delight, she's back in Madison and taking time out after her post-doc to devote herself to her two children. Pippa, the middle child, is a conservatory-trained pianist who lives with her clarinetist husband in New York City, where she performs and runs a music school. "She's the mutant," Borisy jokes. "Pippa has no interest in science whatsoever. Sometimes she claims she's adopted." Borisy's son, Alexis, seemed destined for academic science but after his undergrad at Chicago and graduate studies at Harvard, he veered into biotech. Alexis Borisy is now the CEO of CombinatoRx, a Boston-area biotech start-up.

In 2000, Borisy retired from Wisconsin and took an appointment at Northwestern. He says that returning to Chicago with his longterm companion, Sally Casper, was a decision, "to do something else. I enjoyed my 30 years in Madison. I really enjoyed my backyard gardening but this is a very urban setting and now I'm enjoying all this glass, steel and concrete."

Borisy says that he is still motivated by the questions that got him into science in the first place. Indeed, he says that from his first day in Ed Taylor's lab, his work follows a continuous trajectory from Chicago to Cambridge to Madison and back to Chicago. He has always been interested in how a cell organizes its cytoplasm. He has focused on the "supermolecular" level, filling in the gap between cell organization as it is visible through a light microscope and how it works in genetic and molecular terms. The technologies, the methods, and the concepts have certainly changed over the decades, but Borisy says he has remained captivated by how an ensemble of molecules cooperate to execute a behavior such as cell division or cell crawling.

Borisy's former thesis advisor Ed Taylor now works part time in Borisy's Northwestern lab. Says Taylor, "Gary thinks like a cell biologist. He's always thinking about what these proteins are doing in the cell. His recent work on branching and polymerization of actin shows the same approach. He applies good physical and chemical characterization. But he always asks, 'Yes, but how does this work in the cell?' Gary's a real cell biologist and that's why he's going to be a great President of the ASCB."

Becoming Society President of the ASCB 40 years after that first gathering on the Chicago lakefront closes the circle in Borisy's mind. "I've been involved with this Society since its first meeting in 1961. My total professional identity has been with this Society. Becoming ASCB president in the wake of the first use of anthrax as a bioterror weapon casts the honor in a sobering light." FBI profilers say they are looking for an individual possibly with advanced training in research biology. "All knowledge has within it the potential for good and evil," says Borisy. "It always has. The physicists went through this years ago. I think what we are experiencing as biologists now is no different in kind than what physicists went through after the atomic bomb."

Caution may be necessary now but it does not mean the end of open science, Borisy says. "It may mean that we will have to be more careful with the flow of certain information but I think our Society will remain an open one. Our strength is as an open society and knowledge depends on open communication."