Biographical Feature: Paul C. Schreckenberger, Ph.D.

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On a bookshelf in my office, next to the *Manual of Clinical Microbiology*, still sits a dog-eared copy of a pamphlet entitled “Practical Approach to the Identification of Glucose-Nonfermenting Gram-Negative Bacilli, a Guide to Identification,” authored by Paul C. Schreckenberger, Ph.D. (1), who at the time was the director of the microbiology laboratory at Loyola University Medical Center. In the era before matrix-assisted laser desorption ionization–time of flight mass spectrometry (MALDI-TOF MS) made identification of these organisms so much easier, my technologists and I would depend upon the amazing tables in this carefully written and thorough document for advice and guidance on identifying these difficult organisms. Like its author, the document was a wealth of information, and even now the document serves as a wonderful reminder of the outstanding contributions to our discipline made by this distinguished and caring microbiologist.

Paul Charles Schreckenberger was born on 4 October 1947, the second eldest of six children, in Buffalo, NY, where he received his early education. In high school, he was prom king, and in 2009 he was inducted into the Cardinal O'Hara High School Hall of Fame. He attended the Medical Technology Program at Erie Community College, where he received an A.A.S. in medical technology in 1968. It was also at Erie where Paul met Ann Dye, his future wife of 46 years, and the two shared careers as medical laboratory scientists. In 1970, he received a B.S. in medical technology from the State University of New York at Buffalo, and in 1974, he received an M.S. in medical technology from the University of Minnesota after completing a thesis on rapid methods for biochemical testing of anaerobic bacteria under the guidance of Professor Donna J. Blazevec, M.P.H., his thesis advisor. While pursuing his early education, Paul worked part-time as a certified medical laboratory technician and then as a medical technologist. Also during this time, he served 7 years in the U.S. Army National Guard. Paul rose through the ranks of the Department of Laboratories at the University of Illinois in Chicago (UIC), initially as the supervisor of the bacteriology laboratory and eventually as supervisor of the clinical microbiology and immunology laboratories of the same institution. Even in the early years of his career, Paul was an inspirational speaker and educator, who promoted high-quality laboratory standards while making the work challenging and fun. As a supervisor, he began the tradition of making daily laboratory rounds where questions related to laboratory procedures and problems of making definitive microorganism identifications could be given. Violeta Rekasius, B.S., MT(ASCP), currently a technical specialist at Loyola University Medical Center, recalls, "I went to a micro meeting, somewhere in the city, and I cannot even remember the material that was presented, but one thing was for certain, I was mesmerized by the speaker. His name, of course, was Mr. Paul Schreckenberger, supervisor of University of Illinois Hospital microbiology lab. His lecture had the 'wow' factor, and I was all in! I knew that I had to leave my comfort zone and work for the great Mr. Paul. So, in 1981, I took a large cut in pay, lost my seniority, and took public transportation to be employed at UIC. That was a turning point in my micro career, and I never looked back. All of this was due to the magic micro dust that Paul sprinkled across my path during his lecture. I learned so much from him and am eternally grateful. Every day was a great learning experience, a challenge, and we had fun, lots of fun!" Later, when Paul joined the laboratory at Loyola as its microbiology director, Violet and Paul would have the opportunity to work together again, and their partnership, in total, spanned 2 decades.

In 1989, Paul received a Ph.D. in pathology from UIC after defending his thesis on the role of *Mobiluncus* in bacterial vaginosis under the guidance of Leon J. LeBeau, Ph.D. Later that same year, he became the director of the clinical microbiology laboratory at UIC, a position he held until January 2005. During this time, Paul focused on making the laboratory he served of the highest quality, by taking several courses in quality management and total quality leadership. He also became certified by the American Board of Medical Microbiology and maintained that certification. In 2005, Paul left UIC to become the director of the clinical microbiology laboratory at Loyola University Medical Center in Maywood, IL, and more recently, he also served as interim director of the molecular pathology laboratory. His academic title was professor of pathology at the Stritch School of Medicine, Loyola University, Chicago.

Paul immersed himself in all aspects of laboratory medicine—service, teaching, and clinical research—and he developed many friendships. Early in his career, in one of his writings related to evidence-based medicine, Dr. Elmer Koneman, professor emeritus at the University of Colorado School of Medicine, noted, "Paul once stated, 'Laboratory technologists should begin acting as consultants, not just someone who provides a service. We are doctoral scientists, microbiologists, technologists, not just laboratory people.' Paul was among the leaders in establishing the current practice of allowing technologists to include postanalytical written comments on laboratory reports on what the physician should consider." Never hesitant to express his opinion, Paul was an avid consultant for local hospitals and pharmaceutical and diagnostics companies, an active participant on editorial boards and professional societies, and an avid and

accomplished teacher at the undergraduate, graduate, and postgraduate levels. It is impossible in the brief space here to cover the expansive list of his many accomplishments; therefore, only highlights will be presented.

In terms of service to the institutions he served, it is clear that Paul's commitment was exemplary and legendary among trainees. Aside from ensuring that his laboratories functioned at the highest level of quality, using modern technologies and procedures to advance patient care, Paul did not hesitate to serve on hospital committees such as infection control committees, antibiotic subcommittees, and various task forces to examine everything from Ebola virus and fecal transplantation to laboratory utilization, integration, operations, and quality improvement. I include myself among the throngs of laboratorians who frequently sought his sage advice on laboratory improvements that could save personnel time in the era of shrinking resources. Perhaps the highlight for those he served was his daily rounds in the laboratory. Paul would visit each of the laboratory's benches, review plates, tackle difficult diagnostic dilemmas, and discuss unusual cases. Medical students, residents, fellows, and faculty from a variety of departments would attend. Several of Paul's trainees and even his son, Adam, fondly recall these opportunities to be with the "master of microbiology." During these discussions, he would often challenge his team by saying "What does the evidence say?", notes Christina Kwong, M.D., Ph.D., a fourth-year pathology resident and one of Paul's mentees, who plans to pursue a fellowship in microbiology next year. La'Tonzia Adams, M.D., currently staff microbiologist and pathologist director of microbiology and molecular microbiology, Department of Pathology and Laboratory Medicine, VA Portland Health Care System, counts herself lucky to have done an elective in microbiology with Paul in 2013. "I always had a fondness for microbiology, but it was that rotation that truly resurrected my love and passion for the field. During that rotation, I learned more than microbiology, I learned how to be a great director. He was a shining example of how to treat your staff, teach others, stand firm in what you believe, and overall how to be a great human being. After that rotation, we kept in touch; he continued to mentor and guide me to my current position." Adam Schreckenberger, Ph.D., Paul's son, recalls, "One of the interesting things about my relationship with my dad was the fact that I was often welcomed into his lab. It was far from uncommon for me to head down to UIC when I was little to see the sights. In a lot of ways, this was the seed of my career in physics, but I would say that the best part was that, eventually, I worked with him. We got to combine our talents to do some pretty cool things, including the development of online-based identification. It's one of the things I really cherish." Paul was a formal mentor of at least 10 graduate students and over the years likely touched the lives of hundreds of residents, fellows, and medical students.

He touched the lives of his peers as well. Tom Thomson, Ph.D., sums up his admiration for Paul and shares an amusing anecdote that is representative of many of our experiences. "I learned so much from Paul through our professional interactions spanning 30 years. He was kind and supportive of everyone. He was an advocate, especially for technologists, having been one himself. He encouraged students at all levels and was challenging of his peers. I can still hear him say, with a laugh, to a large crowd after presenting his own data refuting something I had presented, 'Tom, how can you be so stupid?' He was dedicated to the truth and challenged us all to keep looking. On the other hand, he could change his mind, at least he did once. Leaning over to me after we both presented antimicrobial testing lectures, knowing that I was a lifelong disk diffusion advocate, he whispered 'If I were to start over again, I would be doing disk diffusion too.' A key word here is 'whispered.' I am not sure he shared this conviction with many others." More often, though, many of us were recipients of the "Schreckenberger grin" or perhaps a bear hug when he encountered us at a professional meeting or after we gave him feedback on a contribution or a job well done.

Paul's excellent record of service extended beyond the institutions that he served to the community and to professional societies. His contributions to the community include an appointment by then Illinois Governor Jim Edgar to serve on the State of Illinois Clinical Laboratory and Blood Bank Advisory Board in October 1996. Paul was on

the editorial board or served as an *ad hoc* reviewer for 18 national and international journals of microbiology, pathology, and infectious diseases. Several prestigious professional societies were fortunate to have him as an active member and in some cases serve as their president or chair, a symposium or meeting organizer, and an author of position papers and guidelines. These societies include the Chicago Society for Medical Technology, the American Society for Microbiology, the Clinical and Laboratory Standards Institute, the Illinois Society for Microbiology, the South Central Association for Clinical Microbiology, and the College of American Pathology, to name just a few. Paul also participated on the advisory boards of a variety of companies, and having served with him on a few of these, I noted that he was not shy about expressing opinions, even when they were in the minority. Jeanne Mumford, MT, pathology manager, point-of-care testing, Johns Hopkins Medicine, who met Paul for the first time when serving with him on the American Academy of Microbiology Colloquium on Changing Diagnostic Paradigms for Microbiology in October 2016, wrote, "I just started reviewing the colloquium draft and noticed that there was a note to add a memorial for Dr. Schreckenberger. I was so surprised to learn that he passed away on November 29. I loved how everyone stated in the colloquium, 'That won't pass the Schreckenberger standards' or 'Let's see what Schreckenberger says first.'" Patrick Murray, Ph.D., adds to this sentiment, "Paul was an outstanding clinical microbiologist, who never hesitated to share his knowledge through his publications, lectures, and casual conversations. More importantly, he was an equally outstanding individual who will be missed by all his friends. When I heard of his death, I was traveling in South America, and the fact [that] so many of the microbiologists I met expressed their sadness attested to his global impact."

It should be no surprise, then, that Paul, because of his high standards and numerous accomplishments, was elected a fellow in the American Academy of Microbiology and also received numerous awards and honors. He has received certificates of appreciation, outstanding-service awards, and member recognition awards from the societies he served, such as the Award for Outstanding Contribution to Clinical Microbiology from SCACM, the Tanner Shaughnessy Merit Award, and, more recently, the highly prestigious Pasteur Award from the Illinois Society for Microbiology. He is the only faculty member to have received the Loyola Pathology Residents Teacher of the Year Award multiple times.

Although clearly very committed to service and teaching, Paul found time to publish and maintain an active research program. He applied his same excellent standards to publications, oral presentations, and other scholarly works. His long history of scholarly contributions began when he was a supervisor. Dr. Elmer Koneman joined the faculty as director of the clinical laboratory at UIC, where Paul was a supervisor, and Dr. Koneman notes, "It soon became obvious that, with many workshop presentations and as author of additional scientific papers, he had much to contribute to the *Color Atlas of Diagnostic Microbiology*, first published in 1979. At that time, I was serving as editor of the 4th edition, to be published in 1992. Dr. Schreckenberger contributed as author of the chapters '*Enterobacteriaceae*' and '*Non-Fermentative Gram Negative Bacilli*,' continuing through the following editions, culminating with the current, 2016, 7th edition. It was my honor to have been invited to make a presentation, 'The Making of a Textbook,' at the 2010 Illinois Society for Microbiology Pasteur Award ceremony, in honor of Dr. Schreckenberger, who was the designated recipient. This was a prelude to other citations and awards he received during his exemplary career in diagnostic microbiology. His friendly persona remains at the top of the list."

While contributing to such a successful and important microbiology textbook for so many years might in itself be considered sufficient for some, it clearly was not for Paul. In total, he authored 86 peer-reviewed scientific publications, seven books, and 10 chapters in premier microbiology textbooks, including multiple editions of *Manual of Clinical Microbiology* and *Clinical Microbiology Procedures Handbook*. As stated above, the focus of these was usually difficult-to-identify Gram-negative bacteria. It is an

understatement to write that he was nationally and internationally recognized for his expertise in Gram-negative-bacterium identification.

Paul embraced new technology and novel approaches to microbiology and infectious-disease diagnosis, especially those likely to improve patient care. To that end, in the few years before he left us, he collaborated with urogynecologist Dean Linda Brubaker, M.D. (currently at University of California, San Diego), and Alan Wolfe, Ph.D., a professor of microbiology and immunology, to understand the human microbiome of the urinary tract and how disruptions of the urinary microbiome are related to health and disease states. Dr. Wolfe comments, "LUEREC (Loyola Urinary Education and Research Collaborative), the team that showed that the female urinary bladder is not sterile, would not have been successful without Paul. While Dr. Linda Brubaker and I founded LUEREC, we could not have succeeded without our first major recruit, Paul. It was his clinical microbiology expertise and his willingness to put his knowledge, his resources, and his excitement behind the work that made it truly successful. My students enjoyed going to clinical microbiology conferences with Paul. He would introduce them (and me) to his colleagues. He would laud their work (mine too). But the fun was watching the clinical microbiology community respond to Paul. He was highly respected for lots of reasons. In my head, I keep seeing the old Merrill Lynch commercials, except it goes, 'When Paul speaks, people listen.' My students described it as follows: 'It was like watching Moses at the Red Sea—the waters just parted.' A little over the top, but it gets the point across."

Dr. Wolfe continues, "We've lost a friend, a mentor, and collaborator. But most important, we have lost our voice to the clinical microbiology community, and this is a real problem because the work that he helped to initiate could have a tremendous impact on the health of and quality of life for many women. His death only makes it harder to disseminate our new knowledge and its potential for positive change. It's truly a shame, because he was having so much fun with our research. He was really looking forward to spending more time on the research side of things, as he handed management of the clinical laboratory over to Amanda Harrington." Dr. Brubaker echoes those wonderful comments in her remarks. "Paul engaged in research inquiry with a strong connection to clinical relevance. During his time in our research group, he made many important contributions in his observations, insights, comments, and, above all, his mentoring of trainees and his team members. He was well respected and much admired. He took great pride in advancing the state of knowledge in his field. He is sorely missed by our research group and his colleagues within the worldwide community."

Although tremendously busy with his professional responsibilities and career, Paul clearly knew how to enjoy life, to give back, and, as so many have pointed out in their remarks thus far, to have fun. He was an avid Buffalo Bills fan and a huge fan of the Chicago Cubs. The World Series win in 2016 by the latter was a very big highlight for him. He was a musician, a guitar player, and a member of the Loyola Voices.

Although Paul and his wife, Ann, were lucky to have traveled internationally, as Paul's notoriety extended beyond the United States to many countries, such as Brazil, Israel, and New Zealand, among others, the couple especially enjoyed relaxing and hosting family reunions at their "favorite place on earth," their beach house in Union Pier, MI. This was their retreat, a place to connect with family and friends and with each other.

Finally, it is impossible to catalogue the huge sense of loss experienced by Paul's family, colleagues, mentees, microbiologists, and students and all who knew of him from his scientific publications and presentations, upon his sudden departure. His legacy lives on in those he trained and in the abundant works he left behind. Perhaps his greatest legacy will be the fact that he will always be remembered as someone who "pursued the evidence" to improve the lives of others and who was, as John Biemer, M.D., PGY-4, notes, "just a really good man" (2).

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