

PROMOTION RECOMMENDATION
The University of Michigan
College of Literature, Science, and the Arts

Ann L. Miller, associate professor of molecular, cellular, and developmental biology, with tenure, College of Literature, Science, and the Arts, is recommended for promotion to professor of molecular, cellular, and developmental biology, with tenure, College of Literature, Science, and the Arts.

Academic Degrees:

Ph.D.	2004	Yale University
B.A.	1999	Gustavus Adolphus College

Professional Record:

2018–present	Associate Professor, Department of Molecular, Cellular, and Developmental Biology, University of Michigan
2011–2018	Assistant Professor, Department of Molecular, Cellular, and Developmental Biology, University of Michigan
2005–2011	Post-doctoral Fellow, University of Wisconsin-Madison

Summary of Evaluation:

Teaching: Professor Miller is an outstanding, innovative educator who has positively impacted Molecular, Cellular, and Developmental Biology's (MCDB) undergraduate and graduate-level educational missions. While in rank, she has taught in five courses, most prominently in Fundamentals of Cell Biology (BIOLOGY 272). This is a course she co-created to fill an important gap in MCDB's curriculum. The popularity of this new course has steadily increased, to an average enrollment of more than 155 students per term. She is a recipient of the Class of 1923 Memorial Teaching Award, recognizing her contributions to undergraduate education. Professor Miller has also participated in four graduate-level courses: MCDB 528: Experimental Cell Biology; Cytokinesis and Cell Junctions (MCDB 600); Model Organisms (MCDB 614) and PIBS 503 (Responsible Conduct in Research). Professor Miller has introduced several techniques into her classes to make them more interactive and spends considerable time with students outside of class. She is a dedicated mentor, helping her post-doctoral fellows obtain independent positions, and her doctoral trainees have had unusually high success in obtaining fellowships under her guidance. Professor Miller has also provided transformative research opportunities for many undergraduates.

Research: Professor Miller is a cell biologist studying how epithelial cells maintain their structure and permeability during physiological and environmental stress. Her research program incorporates state-of-the-art quantitative live imaging with innovative genetic approaches to examine how epithelial cells in amphibian embryos sense and repair damage to cellular junctions. Her group has also examined the compensatory mechanisms that occur when epithelial cells divide, while still maintaining their adherence to their cell neighbors in the epithelial sheet. Professor Miller's group has also provided new information on how a variety of cytoskeletal regulators contribute to junctional remodeling and repair in epithelial cells and has even recapitulated key aspects of this regulation in a cell-free system. While in rank, Professor

Miller has published many papers on these topics, has given many talks at national and international meetings, and was honored by being selected by her peers to chair a recent Gordon Research Conference on cellular junctions. Her research program is well funded by several large grants from extramural agencies, and she has performed important service for her field as an editor for a top journal and peer reviewer for numerous journals.

Recent and Significant Publications:

- Chumki, S.A., van den Goor, L.M., Hall, B.N., and Miller, A.L. (2022). p115RhoGEF activates RhoA to support tight junction maintenance and remodeling. *Molecular Biology of the Cell*, 33(14): ar136.
- Varadarajan, S., Chumki, S.A., Stephenson, R.E., Misterovich, E.R., Wu, J.L., Dudley, C.E., Erofeev, I.S., Goryachev, A.B., and Miller, A.L. (2022). Mechanosensitive calcium flashes promote sustained RhoA activation during tight junction remodeling. *Journal of Cell Biology*, 221: e202105107.
- Landino, J., Leda, M. Michaud, A., Swider, ZT, Prom, M. Field, C.M., Bement, W.M., Vecchiarelli, A.G., Goryachev, A.B., and Miller, A.L. (2021). Rho and F-actin self-organize within an artificial cell cortex. *Current Biology*, 31(24): 5613-5621.
- Stephenson, R.E., Higashi, T., Erofeev, I.S., Arnold, T.R., Leda, M. Goryachev, A.B., and Miller, A.L. (2019). Rho flares repair local tight junction leaks. *Developmental Cell*, 48(4): 445-459.

Service: Professor Miller is an outstanding citizen within MCDB and the university. She has served on MCDB's graduate studies and admissions committees and was an elected member of its executive committee. Professor Miller has also served as a mentor for MCDB junior faculty and is a member of MCDB's aquatics steering committee. Her leadership in steering MCDB's Horizons Summer Internship Program deserves special note: this program provides an intensive research experience for UM undergraduates from disadvantaged or URM backgrounds. Her work with Horizons provides structure, ensuring the sustainability of this important program. At the university level, she has leadership roles in the Cell and Molecular Biology Graduate Program as well as the Tissue Barrier Group, a collection of UM researchers studying epithelia. Her colleagues note that Professor Miller's service is always of the highest quality and her positive contributions to MCDB and university culture are widely recognized.

External Reviewers:

Reviewer (A): "[Professor Miller's] lab's work has revealed important new insights into how cell-cell junctions remodel dynamically as cells divide. In particular, her demonstration that cell-cell junctions are dynamic signaling and mechanotransduction centers has transformed our understanding of how epithelial cell division is orchestrated while maintaining barrier function of the tissue. I do not know of any other labs pursuing this question using mechanistic and quantitative approaches with such great success."

Reviewer (B): "...[Professor Miller] is highly regarded by the scientific community and I am happy to recommend her without reservation for promotion. I believe that she will continue to be successful and productive, and I look forward to reading new, insightful papers from her laboratory over the coming years."

Reviewer (C): “Dr. Miller’s work on cell division and how cells interact with each other during cell division again illustrates her lab’s creativity and ability to push the boundaries of what is possible in a vertebrate embryo.”

Reviewer (D): “I have been very impressed with the outstanding impact [Professor Miller] has had on our understanding of several key scientific questions, including how cell-cell junctions are dynamically remodeled to maintain adhesion and barrier function as epithelial cells change shape. She is truly a world-leader in our field.”

Reviewer (E): “Lamenting recently to one of my mentors that I didn’t have time to read enough papers, he said, ‘Oh God, I don’t read anything anymore. Except papers by Ann Miller. I read all of those.’ That describes me, too.”

Reviewer (F): “Briefly, [Professor Miller] is one of the leaders of her generation; and I am confident that the upward trajectory of her career will continue for a long time into the future.”

Summary of Recommendation:

Professor Miller has established herself as a world leader in the field maintenance of epithelial integrity. She has a well-funded research program and is a remarkably effective mentor for her trainees, which include research staff, post-doctoral fellows, graduate, and undergraduate students. Her excellent research productivity and ability to develop new experimental tools ensure that she will continue to make impactful discoveries on the cellular systems that remodel and repair cellular junctions during such events as cell division. Professor Miller is also an outstanding instructor in her undergraduate and graduate courses and has performed important service in MCDB’s efforts to make the life sciences more inclusive. Her leadership in various programs across the university’s research community is also noteworthy and helps to maintain the success of our scientific enterprise. The Executive Committee of the College of Literature, Science, and the Arts and I recommend that Associate Professor Ann L. Miller be promoted to the rank of professor of molecular, cellular, and developmental biology, with tenure, College of Literature, Science, and the Arts.



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