Approved by the Regents
May 20, 2021

PROMOTION RECOMMENDATION
THE UNIVERSITY OF MICHIGAN
MEDICAL SCHOOL
DEPARTMENT OF CELL AND DEVELOPMENTAL BIOLOGY

Mara C. Duncan, Ph.D., assistant professor of cell and developmental biology, Department of Cell and Developmental Biology, Medical School, is recommended for promotion to associate professor of cell and developmental biology, with tenure, Department of Cell and Developmental Biology, Medical School.

Academic Degrees:

Ph.D.	2001	University of California, Berkeley
B.S.	1995	University of Washington, Seattle

Professional Record:

2013-Present	Assistant Professor of Cell and Developmental Biology, University of Michigan
2008-2013	Assistant Professor of Biology, University of North Carolina

Summary of Evaluation:

Teaching: Dr. Duncan is an enthusiastic didactic instructor whose professionalism is manifest in lectures, tutorials and mentoring. She has an outstanding record of mentoring 16 undergraduate and five graduate students, three post-doctoral fellows and two visiting scholars in her research laboratory. She has served on 11 dissertation committees. Dr. Duncan is unusual in that she has recruited more than a dozen undergraduate students to her laboratory since arriving at the University of Michigan and has led them through the logic and intricate intersection of disciplines as applied to modern biological laboratory research. She has taught or is teaching in three core graduate courses. In her second year here, Dr. Duncan stepped in as co-director of a graduate developmental genetics course, CDB581, at the last minute, when the original director became unavailable. Concurrently, she took on a large share of teaching in the graduate cell biology course, CDB530, with substantial contributions in terms of lecturing, leading small group discussions, and administering graded assignments. Dr. Duncan is part of a small team of faculty implementing the Department of Cell and Developmental Biology's newest course in quantitative cell biology, CDB560, this year. She has also engaged in the educational mission through running occasional sessions on ethics, PIBS503, and for the Cellular and Molecular Biology program. Dr. Duncan has also contributed to qualifying exams in many departments across campus.

Research: Dr. Duncan has expanded her cutting-edge research program that investigates the role and molecular mechanisms of membrane traffic under normal and stressed conditions, and now has moved into roles in development and human disease. She has published important discoveries about novel proteins involved in traffic, and their roles in glucose starved cells and has recently made a startling discovery, that mitochondrial autophagy, which she renamed mitophagy, may be involved in protecting organisms from death. She has become interested in understanding a set of human disease caused by mutations that disrupt a pathway she has studied

for years; the clathrin adaptor protein complex-1 (AP-1) pathway. Dr. Duncan led a team that established a pluripotent stem cell model to study this complex in human cells and tissues, and early results have revealed ground-breaking effects on mechanotransduction and ciliogenesis. She looks forward to expanding this line of research to explain the suit of human disorders caused by mutations in AP-1. Dr. Duncan has published her work in several of the most highly regarded journals in the field of cell biology, including *Nature Cell Biology*, *Proceedings of the National Academy of Science*, *Molecular Biology of the Cell*, and the *Journal of Biological Chemistry*, with 21 peer-reviewed articles to her credit. Dr. Duncan has also been very successful in securing research funding through the National Institute of Health and Human Development, the National Institute of General Medical Sciences and institutional funding. The impact of her research is reflected by her numerous national and international invitations to present extramural lectures.

Service: Dr. Duncan's service record is exemplary. She has served on the Cellular and Molecular Biology Admissions Committee, a departmental search committee, Curriculum Committee, Undergraduate Advisory Committee, Biological and Biomedical Scholars Committee and the departmental Executive Committee. At present, her primary service responsibility is as the chair of the CDB Diversity, Equity and Inclusion Committee and as our representative to the same Rackham Committee and the Advisory Committee for the renovation of the Museum of Natural History. Dr. Duncan's service responsibilities nationally and internationally have grown considerably since joining the university. She serves annually on federal grant review committees, and is a sought-after peer-reviewer for scientific journals and currently serves as an editor of *Frontiers in Cell and Developmental Biology*.

Five Recent Significant Publications:

Buelto D, Hung CW, Aoh QL, Lahiri S, Duncan MC: Plasma membrane to vacuole traffic induced by glucose starvation requires Gga2-dependent sorting at the trans-Golgi network. *Biol Cell* (Special issue on endocytosis in stress) Online ahead of print: 10.1111/boc.202000058, 2020. PMID32761633

Zysnarski CJ, Lahiri S, Javed FT, Martínez-Márquez JY, Trowbridge JW, Duncan MC: Adaptor protein complex-1 (AP-1) is recruited by the HEATR5 protein Laa1 and its co-factor Laa2 in yeast. *Journal of Biological Chemistry* 294(4): 1410-1419, 2019. PMID30523155/PMCID6349100

Hung CW, Duncan MC: Clathrin binding by the adaptor Ent5 promotes late stages of clathrin coat maturation. *Molecular Biology of the Cell* 27: 1143-53, 2016. PMID26842894/PMCID4814221

Lang MJ, Martínez-Márquez JY, Prosser DC, Ganser LR, Buelto D, Wendland B, Duncan MC: Glucose starvation inhibits autophagy via vacuolar hydrolysis and induces plasma membrane internalization by down-regulating recycling. *Journal of Biological Chemistry* 289(24): 16736-16747, 2014. PMID24753258/PMCID3596253

Aoh QL, Hung CW, Duncan MC: Energy metabolism regulates clathrin adaptors at the trans-Golgi network and endosomes. *Molecular Biology of the Cell* 24(6): 832-47, 2013. PMID23345590/PMCID3596253

External Reviewers:

Reviewer A: "Mara's contributions to teaching and training at Michigan (and previously) have been exemplary…Mara's research, funding and teaching contributions would have definitely earned promotion to Associate Professor with tenure in my former department at [my former institution]. She would be equivalently promoted at my current institution…In sum, I am enthusiastically supportive of this promotion and think it is well deserved."

Reviewer B: "Dr. Duncan's work is characterized by its innovation, high rigor, as well as elegant execution and conception…I consider her work visionary and experimentally courageous as she has been a trailblazer."

Reviewer C: "Her approach has led to novel discoveries that challenge the dogmatic view that sets autophagy as the answer to all nutrient stresses. Coupled with her discovery of a novel protein complex needed for vesicle formation at the TGN, Mara and her research program are set for long-term paths to discovery…Dr. Duncan has played active roles as session chair and discussion leader at multiple Gordon Research Conferences, which is a further indication of her standing in the trafficking community. Our field is dominated by senior scientists that typically serve in these positions at GRCs to the extent that junior faculty like Mara are included only when they are exceptional. Another thing that stands out about Dr. Duncan's service is the high number of undergraduate researchers that she has trained, with one even being a first author on a JBC paper!...if Dr. Duncan were a candidate for promotion in my department, her dossier would pass through unanimously."

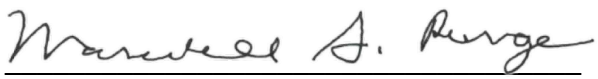
Reviewer D: "…it was striking how sophisticated she is about a field that my group is just beginning to wrap our heads around. It is a treat to discuss science with someone so smart and knowledgeable and friendly. Dr. Duncan is a wonderful colleague…from what I have seen, she remains fully committed to cutting-edge research, and everything is moving in the right direction. She has continued to publish novel discoveries, and she once again has robust grant support that includes an R01. Dr. Duncan is an engaged participant at scientific meetings. Her contributions are being increasingly acknowledged in the form of speaking invitations. She seems to be very active in teaching, intramural and extramural service, and peer review. Perhaps the strongest indication of her positive trajectory is that she is expanding her research program through collaborative studies of membrane traffic in stem cells, which undergo fascinating morphogenetic changes."

Reviewer E: "I think Dr. Duncan is an outstanding scholar who has carved out a fascinating research niche at the intersection of cellular metabolism and protein trafficking in the secretory and endocytic pathways using the budding yeast system…In summary, my opinion is that the quantity and quality of Dr. Duncan's scholarly output has been very good and comfortably meets the bar for promotion. Her studies have significantly impacted my own research and I think the overall impact of her discoveries will grow as more people become interested in metabolic regulation of membrane systems. Dr. Duncan has maintained a steady stream of publications

and I am very impressed that the move from UNC to Michigan did not cause any significant gap in her publication record."

Reviewer F: "As a scientist, Mara is versatile and takes multifaceted approaches to scientific problems…Mara established a highly novel area in the field studying how membrane traffic responds to starvation. Her seminal work demonstrated that acute glucose starvation causes rapid phosphorylation of endosomal clathrin adaptors and their dissociation from the membrane…She is a dedicated teacher and mentor…She is also committed to and has led initiatives to promote diversity & inclusion in admissions and for all trainees, bringing cultural and racial awareness to the department and broader university community."

Summary of Recommendation:
Dr. Duncan is internationally recognized for her research. She is a yeast molecular biologist who has made important contributions to our understanding of endosomal trafficking of proteins in yeast and who pioneered important work on mitophagy in yeast. Her research is well funded and she provides excellent service nationally and internationally. I am pleased to recommend Mara Duncan, Ph.D. for promotion to associate professor of cell and developmental biology, with tenure, Department of Cell and Developmental Biology, Medical School.



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Dean, Medical School

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