Approved by the Regents
May 16, 2024

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

Sara J. Aton, 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.	2006	Washington University, St. Louis, MO
B.S.	2001	University of Michigan

Professional Record:

2019-present	Associate Professor, Department of Molecular, Cellular and Developmental Biology, University of Michigan
2012-2019	Assistant Professor, Department of Molecular, Cellular, and Developmental Biology, University of Michigan
2006-2012	Post-doctoral Fellow, University of Pennsylvania

Summary of Evaluation:

Teaching: Professor Aton is an exceptionally dedicated educator both in and out of the classroom. While in rank, she has taught in eight courses, including the large-enrollment course of Principles of Cellular and Molecular Neuroscience (BIO 222), an essential course for neuroscience majors which she was instrumental in revamping into MCDB 322 (Cellular and Molecular Neuroscience). Professor Aton also continues to teach an upper-level elective course she created (MCDB 459: Brain States and Behavior) which is one of the most popular specialty courses for neuroscience and MCDB majors and is also a regular contributor to several graduate courses (Neuroscience 611: Neurochemistry and Neuropharmacology; Neuroscience 612: Developmental Neuroscience; Neuroscience 615: Behavioral Neuroscience; Ophthalmology 733: Specialized Topics in Vision Research). Her participation in these courses has been essential to the success of the interdepartmental Neuroscience Graduate Program. In addition, she has also taught in PIBS 503: Responsible Conduct in Research. Professor Aton's versatility, along with her approachable teaching style, has greatly benefitted both our undergraduate and graduate educational missions. In her laboratory, she is a supportive and successful mentor for her post-doctoral fellows, graduate students, and undergraduate trainees, and is also a member of an exceptionally large number of thesis committees for students outside of her group.

Research: Professor Aton is a neurobiologist investigating the relationship between sleep and memory. Her research, along with others, has established that disruption of sleep impedes learning and memory. Using a mouse model her laboratory developed to study this phenomena, Professor Aton has used sophisticated genetic tools to identify some of the circuits in the brain that promote memory consolidation during sleep. In addition, her group has utilized molecular techniques to characterize the molecular changes in protein expression that occur in these sleep/memory neurons. This research, published in a half dozen papers while in rank, lays the foundation for a mechanistic view of sleep-dependent memory consolidation and how sleep disruption inhibits this process. Professor Aton has also published many collaborative papers that use computational modeling to understand the relationship between sleep and memory and has written several influential reviews on

the subject. She has also developed a mouse model for amblyopia (lazy eye) and has found that binocular visual experiences, combined with uninterrupted sleep, have superior recovery of the vision of the weak eye. To support this innovative research, Professor Aton has received several large grants from funding agencies, including fellowships for her trainees. Her prominence in her field is marked by the large number of talks she has given at conferences and universities.

Recent and Significant Publications:

Martinez, J.D., Donnelly, M.J., Popke, D.S., Torres, D., Wilson, L.G., Brancaleone, W.P., Sheskey, S., Clawson, B.C., Jiang, S., and Aton, S.J. (2023). Enriched binocular experience followed by sleep optimally restores binocular visual cortical responses in a mouse model of amblyopia. *Commun Biology*, *6*(1), 408.

Delorme, J., Wang, L., Kodoth, V., Wang, Y., Ma, J., Jiang, S., and Aton, S.J. (2021). Hippocampal neurons' cytosolic and membrane-bound ribosomal transcript profiles are differentially regulated by learning and subsequent sleep. *Proceedings of the National Academy of Sciences*, *118*(48), e2108534118.

Delorme, J., Wang, L., Kodoth, V., Wang, Y., Ma, J., Martinez, J., Raven, F., Toth, B.A., Balendran, V., Vega, Medina A., Jiang, S., and Aton, S.J. (2021). Sleep loss drives acetylcholine- and somatostatin interneuron-mediated gating of hippocampal activity, to inhibit memory consolidation. *Proceedings of the National Academy of Sciences*, *118*(32), e2019318118.

Clawson, B.C., Pickup, E.J., Enseng, A., Geneseo, L., Shaver, J., Gonzalez-Amoretti, J., Zhao, M., York, K., Kuhn, F.R., Swift, K., Martinez, J.D., Wang, L., Jiang, S., and Aton, S.J. (2021). Causal role for sleep-dependent reactivation of learning-activated sensory ensembles for fear memory consolidation. *Nature Communications*, *12*(1), 1200.

Service: Professor Aton has an outstanding record of service within MCDB and at the university level. She has co-chaired the MCDB faculty search committee three years running, served on MCDB's graduate admissions committees, and was an elected member of the executive committee. Professor Aton is the co-director of the Neuroscience Graduate Program and Ophthalmology's Vision Research Training Program and has played a key role in maintaining the extramurally funded training grants that support these organizations. She also has leadership positions in the Center of RNA Biomedicine and has served on several grant panels and is editor for several journals.

External Reviewers:

Reviewer (A): "[Professor Aton] contributions to the field of neural circuit plasticity have been nothing short of extraordinary. She occupies a very special niche that combines expertise in mechanisms of synaptic and circuit plasticity in neocortex and hippocampus with the neurobiology of sleep, one of the great mysteries in neuroscience. In my opinion, she stands out as a clear leader in this area."

Reviewer (B): "Dr. Aton is an exceptional scientist who has contributed important scientific advancements to the field of sleep and memory, based on her particular expertise in vision research."

Reviewer (C): "Dr. Aton is a highly accomplished and influential neuroscientist with an excellent national and international reputation. She has demonstrated her tremendous capabilities as a pioneer in research on the mechanisms for consolidation of memory during sleep."

Reviewer (D): "There are several unique attributes of Dr. Aton's work that contribute to her developing prominence in the field. Whereas most of the previous work on relationships between

sleep and memory processes have focused on correlations between place cell firing patterns and local brain oscillations,
Dr. Aton has gone beyond place cells and beyond correlations."

Reviewer (E): "I can state with confidence that Dr. Aton is one of the leading contributors to her field, indeed one of its two or three most important figures. She has clearly established a research program of real distinction."

Reviewer (F): "In addition to her scholarship, Dr. Aton has been highly successful at garnering grant support for her research. She is consistently asked to present her work at national and international conferences. She has served in a number of capacities in the International Society of Sleep Researchers, including as secretary."

Summary of Recommendation:
Professor Aton has established herself as a world leader in the area of sleep and memory consolidation. She has a well-funded research program and a proven track record as a mentor for her trainees, from post-doctoral fellows to graduate and undergraduate students. Her exceptional record of productivity and the strong collaborations ensure that she will continue to make foundational findings on sleep, memory, and neuronal plasticity in the mammalian brain. This outstanding record of scholarship is matched by her dedication in the classroom, both for undergraduate and graduate courses. She is also an exceptionally generous citizen at the departmental, university, and national level. The Executive Committee of the College of Literature, Science, and the Arts and I recommend that Associate Professor Sara J. Aton be promoted to the rank of professor of molecular, cellular, and developmental biology, with tenure, in the College of Literature, Science, and the Arts.

Anne Curzan, Dean
Geneva Smitherman Collegiate Professor of
English Language and Literature, Linguistics,
and Education
Arthur F. Thurnau Professor
College of Literature, Science, and the Arts

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