Curriculum Vitae

Alex C. Keene

Associate Professor, Department of Biological Sciences

Co-Director, Neuroscience and Behavior B.S. Program

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**Education**

2002-2006 PhD, Biomedical Sciences

University of Massachusetts Medical School

2000-2002 BS (honors and *Magna Cum Laude*)

University of Massachusetts, Amherst

**Research Experience**

2015-Present **Florida Atlantic University**

Associate Professor

Department of Biological Sciences

Jupiter Life Science Initiative

2011-2015 **University of Nevada, Reno**

Assistant Professor

Department of Biology

2008-2011 **New York University**

Post-Doctoral Research

Justin Blau (Advisor)

2006-2007 **Institute of Molecular Pathology, Vienna**

Post-Doctoral Research

Barry J. Dickson (Advisor)

2002-2006 **University of Massachusetts Medical School**

Dissertation Research:

Scott Waddell (Advisor)

2000-2002 **University of Massachusetts, Amherst**

Undergraduate Research

Eric S. Corp and George N. Wade (Advisors)

**Current Research Support**

NIH R21NS105071 04/2018-03/2020

**Development of genetic tools for functional analysis of sleep in cavefish.** This proposal seeks to develop genetic tools to label sleep circuits and develop a brain atlas in cavefish.

Role: PI $398,000

**NIH** 1R01HL0000 05/2018-04/2022 **Genetic architecture underlying natural variation in sleep loss and obesity**. This award uses Medican cavefish to identify novel genes regulating sleep and obesity.

Role: MPI (with McGaugh and Rohner) $1,800,000 (est)

NSF-IOS 165674 09/2018-09/2021

**The neural mechanisms of sleep loss in Mexican cavefish.** This grant examines the role of Hypocretin in the evolution of cavefish sleep loss.

Role: PI $300,000

NSF IOS-1426265 06/2015-03/2019

**The neural circuitry underlying taste memory.** This grant investigates neural plasticity in dopamine neurons required for taste memory in the fruit fly.

Role: PI $397,896

NIH 1R01 NS085252 06/2014-06/2019

**The role of neural *translin* in metabolic regulation of sleep.** This proposal examines neural mechanisms underlying the integration of sleep and metabolism.

Role: PI $1,407,426

NIH 1R21 NS085252 04/2018-03/2020

Development of genetic tools for functional analysis of sleep in cavefish**.** This proposal will develop genetic tools to examine sleep loss in cavefish.

Role: PI $398,000

NIH 1R01 NS085252 06/2018-05/2022

**Understanding complex trait architecture through populations genomics.** This proposal uses population genomics approaches to identify genes regulating sleep and feeding.

Role: MPI (with Suzanne McGaugh and Nicholas Rohner) TBD

NSF-DEB 06/2014-06/2019

Contributions of albinism to fitness and the evolution of the Mexican cavefish. This proposal examines the relationship between albinism and sleep loss in cavefish.

Role: Co-PI (with Johanna Kowalko) $200,000

**Completed Research Support**

NIH R15 NS080155 05/2013-04/2016

**Dietary and Endocrine regulation of Sleep:** NIH Area Grant. The grant seeks to determine the dietary factors that regulate sleep in *Drosophila*.

Role: PI $368,404

NSF IOS-125762 06/2013-05/2016

**Evolutionary basis for sleep loss in the Mexican Cavefish**: NSF/IOS Grant. This grant investigates the evolutionary and genetic basis for sleep loss in Mexican cavefish.

Role: PI $347,041

NIH P20 GM103650 09/2013-09/2015

**Center for Integrative Neuroscience**: COBRE Program Grant, NIGMS. Target faculty on this program grant. My subproject investigates the relationship between sleep deprivation and stress in fruit flies.

Role: Project Leader/Target Faculty $424,000

NIH P20 GM103513 08/2014-08/2015

**Generating a molecular fingerprint for Drosophila Peptidergic neurons**. This is a pilot grant award for

single-cell analysis that is a component of a COBRE award to Kent Sanders.

Role: Subaward recipient $50,000

NIH 5P20RR016464 07/2011-08/2013

**Nevada IDeA Network of Biomedical Research Excellence**: INBRE Program Grant, NIGMS. Target faculty on this program grant. My subproject investigates the neural basis for memory loss in sleep-deprived fruit flies.

Role: Project fjLeader/Target Faculty $238,000

NIH F32GM086207 09/2008-07/2011

Postdoctoral NRSA with advisor Justin Blau: **Genetic dissection of larval light avoidance**.

This fellowship aimed to identify the neural circuitry regulating circadian rhythms and light avoidance in *Drosophila* larvae.

Role: Trainee/PI

HFSP LT0061 09/2007-08/2008

Postdoctoral Human Frontiers Long-Term Fellowship with advisor Barry Dickson.

**Identification of courtship song-specific fruitless neurons in *Drosophila.***

This fellowship aimed to establish a high-throughput assay for acquisition and analysis of courtship song.

Role: Trainee/PI

NIH F31MH073311 09/2004-09/2007

Predoctoral NRSA with advisor Scott Waddell: **The role of acetylcholine in *Drosophila* memory**.

The grant investigated the role of acetylcholine release from extrinsic mushroom body neurons in memory consolidation.

Role: Trainee/PI

**Publications**

1. Chin JSR, Gassant CE, Amaral P, Lloyd E, Stahl BA, Jaggard JB, **Keene AC**, and Duboue ER. Convergence on reduced stress in the Mexican Blind Cavefish. ***Dev Biol****.* (2018). *in press.*

2. Lloyd E, Olive C, Stahl BA, Jaggard JB, Amaral P, Duboue ER, and **Keene AC.** Evolutionary shift towards lateral line dependent prey-capture behavior in the blind Mexican cavefish. ***Dev Biol****.* (2018). *in press.*

3. Duboue ER and **Keene AC.** The evolution of sleep in emergent model systems. ***J Exp. Biol****.* (2018). *in press.*

4. Yurgel ME and **Keene AC**. Sleep: Helicon Cells Charge the Circuit. *Current Biology.* (2018). 28 (7) R317-319.

5. Jaggard JB, Stahl BA, Lloyd E, Prober DA, Duboue ER and **Keene AC**. Hypocretin underlies the evolution of sleep loss in the Mexican cavefish. (2017) ***eLife****,* 10 (1101) 122903.

6. Brown E, Torres J, Bennick RA, Rozzo V, Kerbs A, DiAngelo JR and **Keene AC.** Geographic variation in sleep and metabolic function is associated with latitude and temperature. (2017) ***Ecology and Evolution*** 10(1101) 182790.

7. Tauber JM, Brown E, Li Y, Yurgel ME, Masek P and **Keene AC.** A subset of sweet-sensing neurons identified by Ir56d are necessary and sufficient for fatty acid taste. (2017) ***Plos Genetics*.** *In Press.*

8. Stahl BA and **Keene AC**. To rebound or not to rebound. (2017) **Elife**, 6, e31646.

9. Stahl BA, Slocumb ME, Chaitin H, DiAngelo JR and **Keene AC**. Sleep-Dependent Modulation of Metabolic Rate in *Drosophila.* (2017) ***Sleep****.* 40(8) zsx084.

10. Jaggard JB, Robinson B, Stahl BA, Oh I, Masek P, Yoshizawa M, and **Keene AC**. The lateral line confers evolutionarily derived sleep loss in the Mexican cavefish. ***J. Experimental Biology*.** 220(2)284-93.

11.Murphy KR, Deshpande SA, Yurgel ME, Quinn JP, Weissbach JL, **Keene AC**, Dawson-Scully K, Huber R, Tomchik SM, Ja WW (2016). Postprandial Sleep Mechanics in Drosophila. (2016). ***Elife***5. pii: e19334.

12. Masek P and **Keene AC.** Gustatory processing and taste memory in Drosophila. (2016). ***J. Neurogenetics.***30(2) 112-21.

13. Murakami K, Yurgel ME, Stahl BA, Masek P, Mehta A, Heidker R, Bollinger W, Gingras RM, Kim YJ, Ja WW, Suter B, DiAngelo JR, **Keene AC**. *translin* is required for metabolic regulation of sleep (2016). ***Current Biology***. 26(7):972-80.

14.Arble DM, Bass J, Behn CD, Butler MP, Challet E, Czeisler C, Depner CM, Elmquist J, Franken P, Grandner MA, Hanlon EC, **Keene AC**, Joyner MJ, Karatsoreos I, Kern PA, Klein S, Morris CJ, Pack AI, Panda S, Ptacek LJ, Punjabi NM, Sassone-Corsi P, Scheer FA, Saxena R, Seaquest ER, Thimgan MS, Van Cauter E, Wright KP. Impact of sleep and circadian disruption on energy balance and diabetes: A summary of workshop discussions (2015) ***Sleep*.** 38(12):1849-60.

15. Garbe DS, Bollinger WL, Vigderman A, Masek P, Gertowski J, Sehgal A and **Keene AC.** Context specific comparison of sleep acquisition system in *Drosophila* (2015). ***Biology open*.** *In press.*

16. Seidner G, Robinson JE, Wu M, Worden K, Masek P, Roberts SW, **Keene AC** and Joiner WJ. Identification of privileged neurons with a privileged role in sleep homeostasis in *Drosophila melanogaster* (2015). ***Current Biology*.** *In press.*

17. Slocumb ME, Regalado JM, Yoshizawa M, Neely GG, Masek P, Gibbs AG, and **Keene AC.** Enhanced sleep in an evolutionarily adaptive response to starvation stress in *Drosophila* (2015). ***Plos One*.** 10(7)eo131275.

18. Masek P, Worden K, Aso Y, Rubin GM, and **Keene AC.** A dopamine-modulated neural circuit regulating aversive taste memory in *Drosophila* (2015) ***Current Biology*.** 25(11):1535-41.

19. **Keene AC** and Joiner WJ. Neurodegeneration: paying it off with sleep. ***Current Biology.*** (2015). 25(6):R234-6.

20. Yoshizawa M, Robinson BG, Duboue ER, Masek P, Jaggard, JB, O’Quin KE, Borowsky RL, Jeffery WR and **Keene AC**. Distinct genetic architecture underlies the emergence of foraging traits in the Mexican cavefish (2015) ***BMC Biology*** 20 (13):15.

21. Yurgel ME, Masek P, DiAngelo JR and **Keene AC**. Genetic dissection of sleep-metabolism interactions (2014) ***J Comp Physiol A*.** 201 (9):869-77.

22. McGaugh SE, Gross JB, Aken B,, Blin M, Borowsky RB, Chalopin C, Hinaux H, Jeffery WR, **Keene AC,** Ma L, Minx P, Murphy D, O’Quin KE, Retaux S, Rohner N, Searle SM, Stah BA, Tabin C, Volf JN, Yoshizawa M, and Warren WC. The cavefish genome reveals candidate genes for eye loss. (2014) ***Nature Communications*.** 20(5):5307.

23. Murakami M and **Keene AC**. Development: Better sleep on it, children. (2014) ***Current Biology*.** 24(12):R569-71*.*

24. Masek P, Reynolds L, Bollinger WL, Moody C, Mehta A, Yoshizawa M, Gibbs A, and **Keene AC.** Altered sleep and feeding contribute to starvation resistance in *Drosophila*. (2014) ***J. Exp. Biol***. 1(217):3122-32.

25. Masek, P and **Keene AC.** *Drosophila* Fatty Acid Taste Signals through the PLC Pathway in Sugar-Sensing Neurons (2013). ***Plos Genetics***. 9(9): e1003710.

26. Robertson M and **Keene AC**. Molecular Mechanisms of Age-Related Sleep Loss. (2013) ***Gerontology*.** 9(4):334-9.

27. Sassu ED, McDermott JE, Keys BJ, Esmaeilli M, Keene AC, Birnbaum MJ, and Diangelo JR. Mio/dChREBP coordinately increasees fat mass by regulation lipid synthesis and feeding behavior in Drosophila. (2012) ***Biochem Biophys Res Commun***. 426 (1):42-8.

28. Masek, P and **Keene AC**. Dopamine: On the threshold of sleep. (2012) ***Current Biology***. 11(22):R949-51.

29. Duboue ER, Borowsky RB, and **Keene AC.** ß-adrenergic signaling regulates evolutionarily derived sleep loss in the Mexican Cavefish. (2012) ***Brain, Behavior, Evolution*.** 21(80):233-43.

30. **Keene AC** and Masek P. Optogenetic induction of aversive taste memory. (2012) ***Neuroscience*. 11(**222):173-80.

31. **Keene AC** and Sprecher SG. Seeing the light: Photobehavior in fruit fly larvae. (2011) ***Trends in Neuroscience*.** 35(2):104-110.

32. Neely, GG\*, **Keene AC\***, Duchek P, Chang EC, Wang QP, Aksoy YA, Rosenzweig M, Costigan M, Garrity P, and Penninger JM. TRPA1 regulates thermal nociception in *Drosophila.*  (2011) ***Plos One,*** 6(8);e24343.

33. Dus M, Min SH, Lee GY, **Keene AC**, and Suh GB. Taste-independent detection of the caloric content of sugar in *Drosophila*.(2011) ***Proc. Natl. Acad. Sci. USA***. 108(28);11644-9.

34. **Keene AC,** Mazzocchi EO, Blau J, Desplan C and Sprecher SG. Distinct photoreceptor neurons mediate *Drosophila* light avoidance and circadian clock entrainment. (2011) ***J.* Neuroscience.** 31(17):6527-34.

35. Duboue ER, **Keene AC**, and Borowsky RB. Evolutionary convergence on sleep loss in cavefish populations. (2011) ***Current Biology*** 8; 671-76.

36. McDonald DM and **Keene AC**. The sleep-feeding conflict: Understanding behavioral integration through genetic analysis in Drosophila. (2010) ***Aging***, 2(8):1-4.

37. **Keene AC,** Duboue ER, McDonald DM, Dus, M, Suh GB, Waddell, S and Blau J. Clock and cycle limit starvation-induced sleep loss in *Drosophila*. (2010) ***Current Biology*,** 20(13)**:**1209-15.

38. Neely GG, Hess A, Costigan M, **Keene AC**, Goulas S, Langeslag M, Griffith RS, Belfer I, Smith, SB, Gupta V, Xia X, Aman S, Arora S, Sarangi R, Debasis D, Novatchkova M, Pospisilik JA, Rosenzwig M, Truong D, Elling U, Schramek D, Angjeli B, Zoranovic T, Cronin S, Dietzl G, , Subramaniam S, Garrity PA, Bellen HJ Woolf CJ and Penninger JM et al. A genome wide *Drosophila* screen for heat nociception identifies A2D3 as an evolutionarily-conserved pain gene. **(2010)**Cell. **1**43 (4);628-38.

39. Neely GG, Kuba K, Amann S, Isobe K, Zhang L, Cammarato A, Elmen L, Gupta V, Arora S, Srangi R, Dan D, Fuijisawa S, Usami T, Xia C, **Keene AC**, Pospisilik A, Elling U, Berger C, Novatchkova M, Koglgruber R, Isobe M, Imai Y, Subramaniam S, Kimura A, Bodmer R, and Penninger JM. A global *in vivo* Drosophila RNAi screen identifies NOT3 as a key regulator of heart function. (2010) ***Cell.*** 14 (1): 142-153.

40. **Keene AC** and Waddell S. *Drosophila* olfactory memory: single genes to complex neural circuits. (2007) ***Nature Neuroscience Reviews*.** 8(5):341-54.

41. Krashes MJ\*, **Keene AC\***, Leung B, Armstrong JD, and Waddell S. Sequential use of mushroom body neuron subsets during *Drosophila* odor memory processing. (2007) ***Neuron*** 53(1):103-15.

42. [**Keene AC\***, Krashes MJ\*, Leung B, Bernard JA, and Waddell S.](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=pubmed&cmd=Retrieve&dopt=AbstractPlus&list_uids=16890528&query_hl=1&itool=pubmed_docsum) *Drosophila* Dorsal Paired Medial neurons provide a general mechanism for memory consolidation. (2006) ***Current Biology***. 16(15):1524-30.

43. Yu D, **Keene AC**, Srivatsan A, Waddell S and Davis RL. *Drosophila* DPM neurons form a delayed and branch-specific memory trace after olfactory classical conditioning. (2005) ***Cell*** 123 (5): 945-57.

44. **Keene AC** and Waddell S.  *Drosophila* olfactory memory: Dopamine signals punishment? (2005) ***Current Biology***. 15(22):R932-4.

45. **Keene AC**, Stratmann M, Keller A, Perrat PN, Vosshall LB, and Waddell, S. A benzaldehyde odor memory in *Drosophila* requires uniquely timed Dorsal Paired Medial neuron output. (2004) ***Neuron*** 44(3):521-33.

46. Ding H, Schwartz DS, **Keene A**, Affar E, Fenton L, Shi Y, Zamore PD, and Xu Z. Selective silencing by RNAi of a dominant allele that causes amytrophic lateral sclerosis. *(*2003)***Aging Cell***2(4):209-17.

47**. Keene AC**, Jones JE, Wade GN, and Corp ES. Forebrain sites of NPY action on estrous behavior in Syrian hamsters. (2003) ***Physiology and Behavior*** 78(4-5):711-6.

48. Jones JE, Pick RR, Davenport MD, **Keene AC**, Corp ES, and Wade GN. Disinhibition of female sexual behavior by a CRH receptor antagonist in Syrian hamsters. (2002) ***American Journal of Physiology- Regulatory, Integrative and Comparative Physiology*** 283(3):R591-7.

**Books and Book Chapters**

1. Duboue ER and **Keene, AC**. “Investigating the evolution of sleep in the Mexican cavefish.**” *The Biology and Evolution of the Mexican cavefish*** (2015).1st edition. San Diego. Academic Press/Elsevier, pp. 291-304.
2. Keene AC, Yoshizawa, M and McGaugh SE (2015). Biology and evolution of the Mexican cavefish. 1st edition, San Diego. Academic Press/Elsevier.

**Awards and Honors**

2018 FAU College of Science Teaching Award

2016 International Behavioral and Neurogenetics Society (IBANGS) Young Investigator Award

2015 Sleep Research Society Young Investigator NIDDK/NIH Travel Award

2014 Gordon Research Conference, Chronobiology, Junior Investigator Presentation Award

2006 Dean’s Award for Outstanding Doctoral Thesis, UMass Medical School

2005 Dean’s Award for Outstanding Research Achievement, UMass Medical School