Fly Group Quarantine Journal Club

Reading Suggestions

March, 2020

Note: Let's try to group these together by general category, add things as they come up, and highlight papers that we think are particularly important. Also, I think the goal should be to make the list pretty extensive, so if you see papers that you've already read and are pretty comfortable with, please indicate that as well. Once we have a list of papers to choose from, we can decide how we want to schedule the readings/meetings. That process can begin at the end, where there's space for everyone to rank their top paper choices for the first few rounds.

Key:

[ ] = Papers that seem like good candidates for first few journal club sessions
[ ] = Essentially required reading--we can do these for journal club, but, if not, they should be read anyway
[ ] = Interesting papers that maybe aren't enough for a full journal club
[ ] = Completed papers

Aerodynamics

- Dickinson, M. H., Lehmann, F.-O. O., & Sane, S. P. (1999). Wing Rotation and the Aerodynamic Basis of Insect Flight. Science, 284(5422), 1954–1960. https://doi.org/10.1126/science.284.5422.1954

- Sane, S. P., & Dickinson, M. H. (2002). The aerodynamic effects of wing rotation and a revised quasi-steady model of flapping flight. Journal of Experimental Biology, 205(8), 1087–1096.

- Whitney, J. P., & Wood, R. J. (2010). Aeromechanics of passive rotation in flapping flight. Journal of Fluid Mechanics, 660, 197–220. https://doi.org/10.1017/S002211201000265X

- Chin, D. D., & Lentink, D. (2016). Flapping wing aerodynamics: from insects to vertebrates. The Journal of Experimental Biology, 219(Pt 7), 920–932. https://doi.org/10.1242/jeb.042317

- Bomphrey, R. J., Nakata, T., Phillips, N., & Walker, S. M. (2017). Smart wing rotation and trailing-edge vortices enable high frequency mosquito flight. Nature, 544(7648), 92–95. https://doi.org/10.1038/nature21727

- Walker, S. M., & Taylor, G. K. (2020). A semi-empirical aerodynamic model of insect flight forces. BioRxiv, 2020.01.09.900654. https://doi.org/10.1101/2020.01.09.900654

Stability

- Hedrick, T. L., Cheng, B., & Deng, X. (2009). Wingbeat time and the scaling of passive rotational damping in flapping flight. Science, 324(5924), 252–255.

- Sun, M. (2014). Insect flight dynamics: Stability and control. Rev. Mod. Phys., 86(2), 615–646. https://doi.org/10.1103/RevModPhys.86.615

- Zhu, H. J., Meng, X. G., & Sun, M. (2020). Forward flight stability in a drone-fly. Scientific Reports, 10(1), 1975. https://doi.org/10.1038/s41598-020-58762-5

Robotics

- Karásek, M., Muijres, F. T., De Wagter, C., Remes, B. D. W., & de Croon, G. C. H. E. (2018). A tailless aerial robotic flapper reveals that flies use torque coupling in rapid banked turns. Science (New York, N.Y.), 361(6407), 1089–1094. https://doi.org/10.1126/science.aat0350

- Chen, Y., Zhao, H., Mao, J., Chirarattananon, P., Helbling, E. F., Hyun, N. seung P., … Wood, R. J. (2019). Controlled flight of a microrobot powered by soft artificial muscles. Nature, 575(7782), 324–329. https://doi.org/10.1038/s41586-019-1737-7

Flight muscles/motor neurons

- Fayyazuddin, A., Hummon, A., & Dickinson, M. H. (1993). Comparative anatomy of the basalar motor system in the blowfly, Calliphora. In Soc Neurosci Abstr (p. 1600).

- Heide, G., Götz, K. G., & Gotz, K. G. (1996). Optomotor control of course and altitude in Drosophila melanogaster is correlated with distinct activities of at least three pairs of flight steering muscles. The Journal of Experimental Biology, 199(8), 1711–1726. Retrieved from http://jeb.biologists.org/content/199/8/1711.short

- Dickinson, M. H., & Tu, M. S. (1997). The function of dipteran flight muscle. Comparative Biochemistry and Physiology - A Physiology, 116(3), 223–238. https://doi.org/10.1016/S0300-9629(96)00162-4

- Fayyazuddin, A., & Dickinson, M. H. (1999). Convergent Mechanosensory Input Structures the Firing Phase of a Steering Motor Neuron in the Blowfly, Calliphora. Journal of Neurophysiology, 82(4), 1916–1926. Retrieved from http://jn.physiology.org/content/82/4/1916.full-text.pdf+html

- Balint, C. N., & Dickinson, M. H. (2001). The correlation between wing kinematics and steering muscle activity in the blowfly Calliphora vicina. Journal of Experimental Biology, 204(24), 4213–4226. Retrieved from http://jeb.biologists.org/content/204/24/4213.short

- Gordon, S., & Dickinson, M. H. (2006). Role of calcium in the regulation of mechanical power in insect flight. Proceedings of the National Academy of Sciences of the United States of America, 103(11), 4311–4315. https://doi.org/10.1073/pnas.0510109103

- Shirangi, T. R., Stern, D. L., & Truman, J. W. (2013). Motor control of Drosophila courtship song. Cell Reports, 5(3), 678–686.

- Deora, T., Gundiah, N., & Sane, S. P. (2017). Mechanics of the thorax in flies. Journal of Experimental Biology. https://doi.org/10.1242/jeb.128363

- Lindsay, T., Sustar, A., & Dickinson, M. (2017). The Function and Organization of the Motor System Controlling Flight Maneuvers in Flies. Current Biology, 27(3), 345–358. https://doi.org/10.1016/j.cub.2016.12.018

- Bartussek, J., & Lehmann, F. O. (2018). Sensory processing by motoneurons: A numerical model for low-level flight control in flies. Journal of the Royal Society Interface, 15(145), 20180408. https://doi.org/10.1098/rsif.2018.0408

- O'Sullivan, A., Lindsay, T., Prudnikova, A., Erdi, B., Dickinson, M., & von Philipsborn, A. C. (2018). Multifunctional Wing Motor Control of Song and Flight. Current Biology, 28(17), 2705-2717.e4. https://doi.org/10.1016/j.cub.2018.06.038

- Putney, J., Conn, R., & Sponberg, S. (2019). Precise timing is ubiquitous, consistent, and coordinated across a comprehensive, spike-resolved flight motor program. Proceedings of the National Academy of Sciences of the United States of America, 116(52), 26951–26960. https://doi.org/10.1073/pnas.1907513116

- Malingen, S., Asencio, A., Cass, J., Ma, W., Irving, T., & Daniel, T. (2020). In vivo x-ray diffraction and simultaneous EMG reveal the time course of myofilament lattice dilation and filament stretch. BioRxiv, 2020.03.03.970178. https://doi.org/10.1101/2020.03.03.970178

Halteres and mechanosensation

- Nalbach, G. (1994). Extremely non-orthogonal axes in a sense organ for rotation: behavioural analysis of the dipteran haltere system. Neuroscience, 61(1), 149–163.

- Dickinson, M. H. (1999). Haltere-mediated equilibrium reflexes of the fruit fly, Drosophila melanogaster. Philosophical Transactions of the Royal Society of London.Series B: Biological Sciences, 354(1385), 903–916. https://doi.org/10.1098/rstb.1999.0442

- Fox, J. L., Fairhall, A. L., & Daniel, T. L. (2010). Encoding properties of haltere neurons enable motion feature detection in a biological gyroscope. Proceedings of the National Academy of Sciences of the United States of America, 107(8), 3840–3845. https://doi.org/10.1073/pnas.0912548107

- Eberle, A. L., Dickerson, B. H., Reinhall, P. G., & Daniel, T. L. (2015). A new twist on gyroscopic sensing: body rotations lead to torsion in flapping, flexing insect wings. Journal of The Royal Society Interface, 12(104), 20141088. https://doi.org/10.1098/rsif.2014.1088

- Mohren, T. L., Daniel, T. L., Eberle, A. L., Reinhall, P. G., & Fox, J. L. (2019). Coriolis and centrifugal forces drive haltere deformations and influence spike timing. Journal of the Royal Society Interface, 16(153), 20190035. https://doi.org/10.1098/rsif.2019.0035

- Kathman, N. D., & Fox, J. L. (2019). Representation of haltere oscillations and integration with visual inputs in the fly central complex. The Journal of Neuroscience, 39(21), 1707–1718. https://doi.org/10.1523/JNEUROSCI.1707-18.2019

- Dickerson, B. H., de Souza, A. M., Huda, A., & Dickinson, M. H. (2019). Flies Regulate Wing Motion via Active Control of a Dual-Function Gyroscope. Current Biology, 29(20), 3517-3524.e3. https://doi.org/10.1016/j.cub.2019.08.065

Novel *Drosophila* neurobiology (not necessarily flight-related)

EM circuit reconstruction (there was just a release of several papers)

- Maniates-Selvin, J. T., Hildebrand, D. G. C., Graham, B. J., Kuan, A. T., Thomas, L. A., Nguyen, T., … Lee, W.-C. A. (2020). Reconstruction of motor control circuits in adult Drosophila using automated transmission electron microscopy. BioRxiv, 2020.01.10.902478. https://doi.org/10.1101/2020.01.10.902478

- Xu, C. S., Januszewski, M., Lu, Z., Takemura, S., Hayworth, K., Huang, G., … Plaza, S. M. (2020). A Connectome of the Adult Drosophila Central Brain. BioRxiv, 2020.01.21.911859. https://doi.org/10.1101/2020.01.21.911859

- Otto, N., Pleijzier, M. W., Morgan, I. C., Edmondson-Stait, A. J., Heinz, K. J., Stark, I., … Waddell, S. (2020). Input connectivity reveals additional heterogeneity of dopaminergic reinforcement in Drosophila. BioRxiv, 2020.02.19.952648. https://doi.org/10.1101/2020.02.19.952648

- Bates, A. S., Schlegel, P., Roberts, R. J. V., Drummond, N., Tamimi, I. F. M., Turnbull, R. G., … Jefferis, G. S. X. E. (2020). Complete connectomic reconstruction of olfactory projection neurons in the fly brain. BioRxiv, 2020.01.19.911453. https://doi.org/10.1101/2020.01.19.911453

- Marin, E. C., Roberts, R. J. V., Büld, L., Theiss, M., Pleijzier, M. W., Sarkissian, T., … Jefferis, G. S. X. E. (2020). Connectomics analysis reveals first, second, and third order thermosensory and hygrosensory neurons in the adult Drosophila brain. BioRxiv, (249), 2020.01.20.912709. https://doi.org/10.1101/2020.01.20.912709

New(ish) genetic techniques

- Isaacman-Beck, J., Paik, K. C., Wienecke, C. F. R., Yang, H. H., Fisher, Y. E., Wang, I. E., … Clandinin, T. R. (2019). SPARC: a method to genetically manipulate precise proportions of cells. BioRxiv, 788679. https://doi.org/10.1101/788679

- Dana, H., Sun, Y., Mohar, B., Hulse, B. K., Kerlin, A. M., Hasseman, J. P., … Kim, D. S. (2019). High-performance calcium sensors for imaging activity in neuronal populations and microcompartments. Nature Methods, 16(7), 649–657. https://doi.org/10.1038/s41592-019-0435-6

- Cachero, S., Gkantia, M., Bates, A. S., Frechter, S., Blackie, L., Mccarthy, A., … Jefferis, G. S. X. E. (2020). BAcTrace a new tool for retrograde tracing of neuronal circuits. BioRxiv, 2020.01.24.918656. https://doi.org/10.1101/2020.01.24.918656

Courtship/mating

- Ding, Y., Lillvis, J. L., Cande, J., Berman, G. J., Arthur, B. J., Long, X., … Stern, D. L. (2019). Neural Evolution of Context-Dependent Fly Song. Current Biology, 29(7), 1089-1099.e7. https://doi.org/10.1016/j.cub.2019.02.019

- Wang, F., Wang, K., Forknall, N., Patrick, C., Yang, T., Parekh, R., … Dickson, B. J. (2020). Neural circuitry linking mating and egg laying in Drosophila females. Nature, 1–5. https://doi.org/10.1038/s41586-020-2055-9

- Kerwin, P., Yuan, J., & von Philipsborn, A. C. (2020). Female copulation song is modulated by seminal fluid. Nature Communications, 11(1), 1430. https://doi.org/10.1038/s41467-020-15260-6

Navigation

- Kim, S. S., Rouault, H., Druckmann, S., & Jayaraman, V. (2017). Ring attractor dynamics in the Drosophila central brain. Science, 356(6340), 849–853. https://doi.org/10.1126/science.aal4835

- Ferris, B. D., Green, J., & Maimon, G. (2018). Abolishment of Spontaneous Flight Turns in Visually Responsive Drosophila. Current Biology, 28(2), 170-180.e5. https://doi.org/10.1016/j.cub.2017.12.008

- Giraldo, Y. M., Leitch, K. J., Ros, I. G., Warren, T. L., Weir, P. T., & Dickinson, M. H. (2018). Sun Navigation Requires Compass Neurons in Drosophila. Current Biology, 28(17), 2845-2852.e4. https://doi.org/10.1016/j.cub.2018.07.002

- Kim, S. S., Hermundstad, A. M., Romani, S., Abbott, L. F., & Jayaraman, V. (2019). Generation of stable heading representations in diverse visual scenes. Nature, 1–6. https://doi.org/10.1038/s41586-019-1767-1

- Turner-Evans, D. B., Jensen, K., Ali, S., Paterson, T., Sheridan, A., Ray, R. P., … Jayaraman, V. (2019). The neuroanatomical ultrastructure and function of a biological ring attractor. BioRxiv, 847152. https://doi.org/10.1101/847152

Walking

- Mamiya, A., Gurung, P., & Tuthill, J. C. (2018). Neural Coding of Leg Proprioception in Drosophila. Neuron, 100(3), 636-650.e6. https://doi.org/10.1016/j.neuron.2018.09.009

- Azevedo, A. W., Gurung, P., Venkatasubramanian, L., Mann, R., & Tuthill, J. C. (2019). A size principle for leg motor control in Drosophila. BioRxiv, 730218. https://doi.org/10.1101/730218

- DeAngelis, Brian D., Jacob A. Zavatone-Veth, and Damon A. Clark. "The manifold structure of limb coordination in walking Drosophila." *eLife* 8 (2019). https://elifesciences.org/articles/46409

Grooming

- Zhang, N., Guo, L., & Simpson, J. H. (2020). Spatial Comparisons of Mechanosensory Information Govern the Grooming Sequence in Drosophila. Current Biology. https://doi.org/10.1016/J.CUB.2020.01.045

Visually-mediated escape

- Wang, S., Borst, A., Segev, I., & Palmer, S. (2019). Axonal gap junctions in the fly visual system enable fast prediction for evasive flight maneuvers. BioRxiv, 814319. https://doi.org/10.1101/814319

- Ache, J. M., Polsky, J., Alghailani, S., Parekh, R., Breads, P., Peek, M. Y., … Card, G. M. (2019). Neural Basis for Looming Size and Velocity Encoding in the Drosophila Giant

Fiber Escape Pathway. Current Biology, 29(6), 1073-1081.e4. https://doi.org/10.1016/j.cub.2019.01.079

- Ache, J. M., Polsky, J., Alghailani, S., Parekh, R., Breads, P., Peek, M. Y., … Card, G. M. (2019). Neural Basis for Looming Size and Velocity Encoding in the Drosophila Giant Fiber Escape Pathway. Current Biology, 29(6), 1073-1081.e4. https://doi.org/10.1016/j.cub.2019.01.079

General insect flight (mostly recent)

- Muijres, F. T., Elzinga, M. J., Melis, J. M., & Dickinson, M. H. (2014). Flies Evade Looming Targets by Executing Rapid Visually Directed Banked Turns. Science, 344(6180), 172–177. https://doi.org/10.1126/science.1248955

- Schnell, B., Weir, P. T., Roth, E., Fairhall, A. L., & Dickinson, M. H. (2014). Cellular mechanisms for integral feedback in visually guided behavior. Proceedings of the National Academy of Sciences of the United States of America, 111(15), 5700–5705. https://doi.org/10.1073/pnas.1400698111

- Han, J.-S., & Han, J.-H. (2019). A contralateral wing stabilizes a hovering hawkmoth under a lateral gust. Scientific Reports, 9(1), 17397. https://doi.org/10.1038/s41598-019-53625-0

- Liu, P., Sane, S. P., Mongeau, J. M., Zhao, J., & Cheng, B. (2019). Flies land upside down on a ceiling using rapid visually mediated rotational maneuvers. Science Advances, 5(10), eaax1877. https://doi.org/10.1126/sciadv.aax1877

- Natesan, D., Saxena, N., Ekeberg, Ö., & Sane, S. P. (2019). Tuneable reflexes control antennal positioning in flying hawkmoths. Nature Communications, 10(1), 5593. https://doi.org/10.1038/s41467-019-13595-3

- Combes, S. A., Gagliardi, S. F., Switzer, C. M., & Dillon, M. E. (2020). Kinematic flexibility allows bumblebees to increase energetic efficiency when carrying heavy loads. Science Advances, 6(6), eaay3115. https://doi.org/10.1126/sciadv.aay3115

- Lyu, Y. Z., Zhu, H. J., & Sun, M. (2020). Wing kinematic and aerodynamic compensations for unilateral wing damage in a small phorid fly. Physical Review E, 101(1), 012412. https://doi.org/10.1103/PhysRevE.101.012412

Methods

- Stowers, J. R., Hofbauer, M., Bastien, R., Griessner, J., Higgins, P., Farooqui, S., … Straw, A. D. (2017). Virtual reality for freely moving animals. Nature Methods, 14(10), 995–1002. https://doi.org/10.1038/nmeth.4399

- Chen, C.-L., Hermans, L., Viswanathan, M. C., Fortun, D., Unser, M., Cammarato, A., … Ramdya, P. (2018). Imaging neural activity in the ventral nerve cord of behaving adult Drosophila. BioRxiv, 250118. https://doi.org/10.1101/250118
- Aimon, S., Katsuki, T., Jia, T., Grosenick, L., Broxton, M., Deisseroth, K., … Greenspan, R. J. (2019). Fast near-whole-brain imaging in adult drosophila during responses to stimuli and behavior. PLoS Biology, 17(2), e2006732. https://doi.org/10.1371/journal.pbio.2006732
- Stamper, S. A., Madhav, M. S., Cowan, N. J., & Fortune, E. S. (2019). Using Control Theory to Characterize Active Sensing in Weakly Electric Fishes (pp. 227–249). Springer, Cham. https://doi.org/10.1007/978-3-030-29105-1_8
- Grover, D., Katsuki, T., Li, J., Dawkins, T. J., & Greenspan, R. J. (2020). Imaging brain activity during complex social behaviors in Drosophila with Flyception2. Nature Communications, 11(1), 1–10. https://doi.org/10.1038/s41467-020-14487-7
- Li, S., Günel, S., Ostrek, M., Ramdya, P., Fua, P., & Rhodin, H. (2020). Deformation-aware Unpaired Image Translation for Pose Estimation on Laboratory Animals. Retrieved from http://arxiv.org/abs/2001.08601
- Vo-Doan, T. T., & Straw, A. D. (2020). Millisecond insect tracking system. Retrieved from http://arxiv.org/abs/2002.12100
- Nath, T., Mathis, A., Chen, A. C., Patel, A., Bethge, M., & Mathis, M. W. (2019). Using DeepLabCut for 3D markerless pose estimation across species and behaviors. *Nature protocols*, *14*(7), 2152-2176. Retrieved from https://www.biorxiv.org/content/10.1101/476531v1

Classics

- Pringle, J. W. S. (1948). The gyroscopic mechanism of the halteres of Diptera. Philosophical Transactions of the Royal Society B: Biological Sciences, 233(602), 347–384.
- Pringle, J. W. S. (1949). The excitation and contraction of the flight muscles of insects. The Journal of Physiology, 108(2), 226–232.
- Pringle, J. W. S. (1968). Comparative Physiology of the Flight Motor. Advances in Insect Physiology, 5(C), 163–227. https://doi.org/10.1016/S0065-2806(08)60229-5

- Heide, G. (1983). Neural mechanisms of flight control in Diptera. BIONA-Report, 2, 35–52.

- Ellington, C. P. (1984). The aerodynamics of hovering insect flight. I. The quasi-steady analysis. Philosophical Transactions of the Royal Society of London. B, Biological Sciences, 305(1122), 1–15.

- Ellington, C. P. (1984). The Aerodynamics of Hovering Insect Flight. II. Morphological Parameters. Philosophical Transactions of the Royal Society B: Biological Sciences, 305(1122), 17–40. https://doi.org/10.1098/rstb.1984.0050

- Ellington, C. P. (1984). The Aerodynamics of Hovering Insect Flight. III. Kinematics. Philosophical Transactions of the Royal Society B: Biological Sciences, 305(1122), 41–78. https://doi.org/10.1098/rstb.1984.0051

- Ellington, C. P., Berg, C. Van Den, Willmott, A. P., & Thomas, A. L. R. (1996). Leading-edge vorticies in insect flight. Letters To Nature, 384(19), 626–630. https://doi.org/10.1038/384626a0

Preference rankings:

Sam:

1. Maniates-Selvin, J. T., Hildebrand, D. G. C., Graham, B. J., Kuan, A. T., Thomas, L. A., Nguyen, T., … Lee, W.-C. A. (2020). Reconstruction of motor control circuits in adult Drosophila using automated transmission electron microscopy. BioRxiv, 2020.01.10.902478. https://doi.org/10.1101/2020.01.10.902478
2. Li, S., Günel, S., Ostrek, M., Ramdya, P., Fua, P., & Rhodin, H. (2020). Deformation-aware Unpaired Image Translation for Pose Estimation on Laboratory Animals. Retrieved from http://arxiv.org/abs/2001.08601
3. Isaacman-Beck, J., Paik, K. C., Wienecke, C. F. R., Yang, H. H., Fisher, Y. E., Wang, I. E., … Clandinin, T. R. (2019). SPARC: a method to genetically manipulate precise proportions of cells. BioRxiv, 788679. https://doi.org/10.1101/788679
4. Natesan, D., Saxena, N., Ekeberg, Ö., & Sane, S. P. (2019). Tuneable reflexes control antennal positioning in flying hawkmoths. Nature Communications, 10(1), 5593. https://doi.org/10.1038/s41467-019-13595-3

Kemper:

1. [paper selection]

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Han Kheng:

1. [paper selection]
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Deepika:

1. [paper selection]
2. [paper selection]
3. [paper selection]
4. [paper selection]

Itai:

1. [paper selection]
2. [paper selection]
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