This Week in The Journal

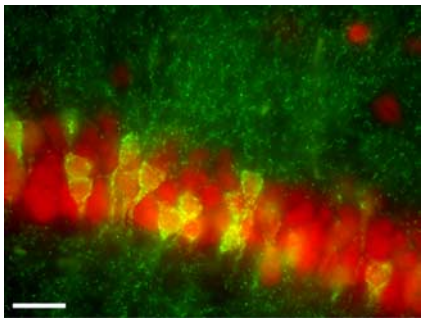
● Cellular/Molecular

Glowing Reports from Mitochondria

Krish Chandrasekaran, Julie L. Hazelton, Yu Wang, Gary Fiskum, and Tibor Kristian

(see pages 13123–13127)

In the fictional Star Wars universe, the Jedi have in their cells microscopic organisms, called midichlorians, which enable them to communicate with "the Force." Us humans are stuck with just plain mitochondria. Although not as flashy, these ancient organelles perform essential metabolic functions. This week, Chadrasekaran et al. designed a system to explore their role in forebrain neurons. To specifically label neuronal mitochondria, the authors crossed mice expressing a mitochondrial-targeted, enhanced yellow fluorescent protein (eYFP) under control of a tetracycline-responsive element, with mice expressing the tetracycline-controlled transactivator protein driven by a forebrain (neuron)-specific promoter. In these mice, eYFP turned on in neuronal mitochondria when the animals received a doxycycline-free diet. With this model system, the authors will be able to ask all kinds of interesting questions, and in the best spirit of *The Journal of Neuroscience*, these mice will be made available to the community. May the force be with them!



Mitochondrial-targeted eYFP (green) is shown in CA1 pyramidal cells whose cell bodies were labeled with anti-NeuN antibodies (red). See the article by Chandrasekaran et al. for details.

▲ Development/Plasticity/Repair

The Repertoire of RNAs in Nerve Cell Processes

Michael M. Poon, Sang-Hyun Choi, Christina A. M. Jamieson, Daniel H. Geschwind, and Kelsey C. Martin

(see pages 13390–13399)

Neurons transcribe mRNAs in their cell bodies; a small fraction of these mRNAs then travel into dendrites where they are translated. This local translation provides a means for neurons to quickly alter the protein composition of synapses in response to a specific stimulus. To identify mRNAs localized to the dendrites of hippocampal neurons, Poon et al. grew the neurons on custom filters with etched 3 μm pores and then mechanically separated axons, dendrites, and glial processes from cell bodies. They identified >100 mRNAs potentially localized to these processes by microarray analysis. Nineteen mRNAs were picked for further study. *In situ* hybridization confirmed that all 19 resided in MAP2-positive dendrites. Interestingly, a significant fraction of these mRNAs encoded molecules involved in translation, and several coimmunoprecipitated with the double-stranded RNA-binding protein Staufen, which has been implicated in RNA localization and translational regulation.

■ Behavioral/Systems/Cognitive

Sleepless in the Aquarium

David A. Prober, Jason Rihel, Anthony A. Onah, Rou-Jia Sung, and Alexander F. Schier

(see pages 13400–13410)

You'd think fish would not have that much on their minds to keep them up at night. But this week, Prober et al. describe transgenic zebrafish with a sleep disorder, a model system that may be useful in studies of sleep regulation. The authors first determined that hypocretin, the best characterized sleep–wake regulator in mammals, is expressed in hypothalamic neurons of 5-d-old zebrafish in a pattern strikingly similar to that of mammals. The authors then engineered transgenic fish with a hypocretin promoter that could be induced by heat shock. Overexpression of the gene in zebrafish larvae promoted wakeful activity, hyperarousal, and inability to stay still, hallmarks of insomnia in humans. The effects of hypocretin overexpression were more dramatic in the absence of circadian cues, suggesting that the circadian system may normally antagonize hypocretin function.

♦ Neurobiology of Disease

Low Testosterone and Alzheimer Mice

Emily R. Rosario, Jenna C. Carroll, Salvatore Oddo, Frank M. LaFerla, and Christian J. Pike

(see pages 13384–13389)

Waning testosterone levels in aging men may be responsible for a slew of physical symptoms, dementia among them. Recent studies indicate that men with Alzheimer's disease (AD) have lower testosterone level than aged men without AD. Because the decline in testosterone concentrations precedes symptoms of AD, testosterone could increase the risk of disease development. Based on this evidence, Rosario et al. tested the relationship between testosterone and AD development using a triple transgenic mouse model of AD, which carries mutations in amyloid precursor protein, presenilin1, and tau. Castrating the transgenic mice at 3 months led to significant increases in the deposition of the β-amyloid (Aβ) peptide in the amygdala and the hippocampus after a 4 month interval. There were also associated behavioral deficits, indicating that complete androgen depletion can speed up AD-like pathology. These effects were prevented if the castrated mice were treated with androgen.