

## **A Critical Period of Sleep for Development of Courtship Circuitry and Behavior in *Drosophila***

**Matthew S. Kayser, Zhifeng Yue, and Amita Sehgal**

**University of Pennsylvania**

Most animals sleep more early in life than in adulthood, but the function of early sleep is not known. Using *Drosophila*, we find that increased sleep in young flies is associated with elevated arousal threshold and resistance to sleep deprivation. The cellular basis of excess sleep in young flies resides in a specific circuit wherein reduced dopamine signaling to the dorsal fan shaped body (dFSB) permits higher activity of this sleep-promoting region. Experimental hyperactivation of this circuit only during a critical developmental window results in sleep loss and lasting deficits in adult courtship behaviors. These deficits are accompanied by impaired development of a single olfactory glomerulus, VA1v, which is unique in displaying extensive sleep-dependent growth in young flies. Ongoing work examines if growth of VA1v reflects addition of new synapses, and whether sleep loss during this time impairs synaptogenesis. Our results demonstrate that sleep is required for normal brain development and an adult behavior critical for species propagation, and suggest that rapidly growing regions of brain are most susceptible to sleep perturbations early in life.

