

Researchers find genes important to sleep

February 22 2009

For many animals, sleep is a risk: foraging for food, mingling with mates and guarding against predators just aren't possible while snoozing.

How, then, has this seemingly life-threatening behavior remained constant among various species of animals?

A new study by scientists at North Carolina State University shows that the fruit fly is genetically wired to sleep, although the sleep comes in widely variable amounts and patterns. Learning more about the genetics of sleep in model animals could lead to advances in understanding human sleep and how sleep loss affects the human condition.

The study, published online in *Nature Genetics*, examined the sleep and activity patterns of 40 different wild-derived lines of *Drosophila melanogaster* - one of the model animals used in scientific studies. It found that, on average, male fruit flies slept longer than females; males slept more during the day than females; and males were more active when awake than females. Females, in turn, tended to have more frequent bouts of sleep, and thus were disrupted more from sleep, than males.

The study identified almost 1,700 genes associated with the variability of sleep in fruit flies, say study authors Dr. Trudy Mackay, William Neal Reynolds and Distinguished University Professor of Genetics and Entomology, and Dr. Susan Harbison, a post-doctoral researcher in Mackay's lab. Many of these genes were not previously known to affect sleep.

Fruit flies within each of the 40 lines were homozygous, or exactly the same genetically, but the lines were completely different from one another, Mackay says. Small glass tubes containing one fruit fly and some food were placed in a machine that uses infrared sensors to monitor the minute-by-minute activity of the flies. If at least five minutes passed without any fly activity, it was calculated as sleep.

The study predicted that certain important genes would affect sleep duration. Independent verification with mutations in those genes did indeed have an effect on how long fruit flies slept. The study also discovered teams of genes that appeared to act together to affect some portion of sleep.

"We're starting to get a glimmer of how groups of correlated genes are overrepresented in different traits, and we now know more about how traits are associated with each other at the molecular level," Mackay says.

More information: "Co-regulated transcriptional networks contribute to natural genetic variation in *Drosophila* sleep", Authors: Susan T. Harbison, Mary Anna Carbone, Julien F. Ayroles, Eric A. Stone, Richard F. Lyman and Trudy F.C. Mackay, North Carolina State University, Published: Online Feb. 22, 2009, in *Nature Genetics*

Source: North Carolina State University

Citation: Researchers find genes important to sleep (2009, February 22) retrieved 26 April 2024 from <https://medicalxpress.com/news/2009-02-genes-important.html>

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