No rest for weary fruit flies
Strain could help researchers track genetic factors that lead to insomnia
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A new strain of fruit flies bred to have trouble getting shut-eye may open researchers eyes to the genetic causes of insomnia.

Not so long after scientists discovered that fruit flies sleep, Paul Shaw of Washington University in St. Louis and his colleagues bred a strain of *Drosophila melanogaster* to have many of the characteristics, and complications, of insomnia in people. Shaw’s team bred 60 generations of fruit flies, selecting for flies that slept the shortest amount of time. The resulting insomniac fruit flies may help scientists find genetic roots of the sleep disorder, the team reports in the June 3 *Journal of Neuroscience*.

There is a fine line between insomnia and sleep deprivation, says Thomas Roth, a sleep researcher at the Henry Ford Hospital in Detroit. Insomniacs lack the ability to fall asleep and sleep well (though Shaw and his colleagues think such people may be protected from many of the negative effects of sleeplessness). Sleep deprived people, however, simply stay up too late, not getting the sleep they need to function properly. Most attempts to mimic insomnia in animals fail to match some hallmarks of the disorder in humans, especially hypersensitivity to light, sound and other stresses.

"Was I ready to blow this paper off before I read it? Yeah. I thought it was just another guy doing sleep deprivation and calling it insomnia," Roth says. But the fruit flies "show real characteristics of insomnia.... They aren't just short sleepers."

The insomniac flies do sleep very little — only an hour a day, compared with about 12 hours a day for normal flies. Like humans with insomnia, the insomniac flies have trouble falling asleep and staying asleep, managing to stay asleep for only about half an hour at a time. And they are also super-sensitive to disturbances, such as a flash of light, taking more than an hour to fall asleep again after such a disturbance.

Activity of 1,350 genes is different between the insomniac flies and normal flies, the researchers found. The affected genes are involved in metabolism, neuron activity, stimulus perception, locomotion and information transmission within and between cells. The researchers have not yet traced the genetic defect responsible for insomnia in the flies. "It's undoubtedly not one gene," Shaw says. He expects 10 or more genes to be involved in causing the disorder.

The insomniac fruit flies lose more sleep than their human counterparts, who generally sleep six or seven hours a night rather than eight. Sleepless nights cause many problems for the flies, Shaw says. The flies "fall over a lot.... They are fat. They can't learn — no short-term memory." The flies also have shorter life spans than normal flies.

Obesity, memory problems and shortened life spans aren't generally associated with insomnia in people, Roth contends, but have been tied to sleep deprivation. The fruit flies may be a hybrid, having insomnia and sleeping so little that side effects of sleep deprivation become apparent, he says.

Despite the differences, says Michael Perlis, a sleep researcher at the University of Pennsylvania in Philadelphia, the flies' inability to fall asleep and stay asleep makes them a model of insomnia. The team will now have to tease apart which effects are due to insomnia and which are due to extreme lack of sleep.