

Chocolate's Theobromine, and Not Caffeine, Significantly Reduces Sleep in *Drosophila*

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Chocolate and caffeine are well-known to affect the quality of sleep. Chocolate, however, contains only minimal traces of caffeine but larger amounts of theobromine, a related alkaloid stimulant, whose effect on sleep has not been documented. Studying the effect of theobromine on the sleep/wake cycle of *Drosophila melanogaster*, whose circadian cycles are the same as humans, may allow us to better understand its impact on human sleep. This research investigates whether theobromine increases wakefulness and reduces sleep for *D. melanogaster*, relative to caffeine, a known stimulant. Theobromine and caffeine were separately administered to the Sucrose/Agar food supply of white-eyed adult *D. melanogaster* at relative concentrations of 8:1 (respectively) typically found in chocolate. For each alkaloid added, the Circadian sleep pattern (24-hour fly activity) for single test subjects was monitored for five days using a Trikinetics Sleep Chamber and *Drosophila* Activity Monitor (DAM). Sleep and wake times were collected, and later processed using pySolo. Analysis of circadian sleep cycle data in *D. melanogaster*, for relative amounts of theobromine to caffeine (8:1 ratio) found in chocolate, suggests that theobromine disrupts sleep, while caffeine plays only a limited role. Theobromine-fed flies register 30% less total sleep at night versus the control group, while for caffeine-fed flies, only a 4% reduction in sleep is observed. Moreover, theobromine-fed flies demonstrate a 90% increase in activity during the daytime vs. both caffeine-fed and control flies. These results suggest that theobromine, and not caffeine, may be the dominant chemical in chocolate that affects the human sleep/wake cycle.

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Second Award of \$2,000