

Regulation of circadian locomotion of the German cockroach

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German cockroach locomotion is driven by sexually divergent circadian rhythms. Male adults express the typical nocturnal pattern with peak activity at scotophase. Adult females differ from males because their locomotor circadian rhythms are masked by their reproductive cycles. Under aggregation-promoting conditions, females mate with mature males and carry their oothecae for the entire embryonic development. Locomotion is minimal to mask their circadian rhythms. Under isolation-promoting conditions, virgin females become arrhythmic and undergo high activity levels, thought to increase mate-finding. High locomotion, also, masks their circadian rhythm. In this paper I review on the outcomes of ovariectomy, starvation, electroretinogram (ERG) and gene-silencing experiments on reproductive-related masking. Ovariectomy, starvation and ERG reveal the masked clock. The time signal generated in clock cells by *period* and *timeless* is mediated through expression of pigment dispersing factor (PDF). Silencing *pdf* with injected dsRNA eliminated the locomotor circadian rhythm. This establishes a regulatory pathway between *pdf* expression and locomotion. This opens the issue of a broad understanding of the pathway. We investigated the energy needs of locomotion and our unpublished data shows that hypertrehalosemic hormone is released from corpora cardiaca on a circadian rhythm basis. The implication of this finding is that animal behaviors and the underlying metabolic processes are coordinated in time by circadian clock.