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PLEASURE: THE MISSING LINK IN THE REGULATION OF SLEEP

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Highlights

- Sleeping is pleasant, a fact that has been ignored by sleep scholars
- Pleasure is the long missing link in the regulation of sleep
- Dopamine links the brain rewarding system and the sleep–wake circuitry
- Sleep begins when the displeasure of continuing awake is excessive
- Sleep ends when sleeping is no longer pleasant
- Only mammals and birds are able to experience emotional sleep

ABSTRACT

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Although largely unrecognized by sleep scholars, sleeping is a pleasure. This report aims first, to fill the gap: sleep, like food, water and sex, is a primary reinforcer.

The levels of extracellular mesolimbic dopamine show circadian oscillations and mark the "wanting" for pro-homeostatic stimuli. Further, the dopamine levels decrease during waking and are replenished during sleep, in opposition to sleep propensity. The wanting of sleep, therefore, may explain the homeostatic and circadian regulation of sleep. Accordingly, sleep onset occurs when the displeasure of excessive waking is maximal, coinciding with the minimal levels of mesolimbic dopamine. Reciprocally, sleep ends after having replenished the limbic dopamine levels. Given the direct relation between waking and mesolimbic dopamine, sleep must serve primarily to gain an efficient waking.