Breakthrough in worm research has implications for human disease studies

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It's just a worm, a tiny soil-dwelling nematode worm – but the implications are big for biomedicine and circadian biology as shown in a recent study authored by University of Nevada, Reno researcher Alexander van der Linden. The article on the circadian clock of the *Caenorhabditis elegans* worm was published in the peer-reviewed, open-access journal, *PLoS Biology*.

"Circadian rhythms are important in all organisms because they regulate biological functions such as food intake, temperature, metabolic rate and sleep," van der Linden said. "The discovery of clock-controlled genes in *C. elegans* should lead to an expanded research role in worms, and give a better understanding of the mammalian circadian clock.

For more than two decades, researchers have wondered whether *C. elegans*, one of the foremost research model organisms, contains a circadian clock. Circadian rhythmic behaviors described previously in *C. elegans* are variable and hard to quantify, and no genes were known to exhibit gene expression oscillations with 24-hour cycles as shown in many other animals.

Now, a team of researchers led by professors of biology Piali Sengupta and Michael Rosbash at Brandeis University, Waltham, and lead author van der Linden, who is a former postdoctoral fellow in the Sengupta Lab and now assistant professor in the College of Science at the University of Nevada, Reno, has uncovered genes in *C. elegans* under clock control from both light and temperature.

"*C. elegans* offers several advantages to study the function of human disease genes through their corresponding worm genes," he said. "We now not only have a new model to study the function of this important biological clock, but we can also study how the clock evolved over time, since nematodes and humans diverged about 600 to 1,200 million years ago."

Almost every organism on earth exhibits circadian rhythms – periodic cycles of behavior or gene expression that repeat roughly every 24 hours. These rhythms are generated by a circadian clock – an internal time-keeping mechanism – which can be entrained and synchronized by environmental signals such as temperature or light/dark cycles.

"Given its small and well-mapped nervous system, combined with a wealth of available genetic and behavioral tools, *C. elegans* is a viable research organism in the circadian field," van der Linden said. "The next critical step will be to determine how these worm molecular rhythms relate to circdian behavioral rhythms."

Provided by University of Nevada, Reno