Research

Institution	Professor	Research
U of Kansas Main Campus	Nancy A. Dahl	*Melatonin and Dopamine as Neuromodulators of Light-Driven Photomembrane Metabolism* Melatonin is also produced in the vertebrate retina where it controls functions such as allowing old fragments of light sensitive membrane to be discarded. Melatonin is synthesized from serotonin by rods and cones during the dark, and because it is lipid soluble, it quickly diffuses through the retina. In light, the enzyme converting serotonin to melatonin disappears and serotonin accumulates. It is unknown which colors of light are capable of inhibiting melatonin syntheses.
Wesleyan University	G. Robert Lynch	*Rhythms in the Suprachiasmatic Nucleus: Role in Mammalian Photoperiodism* Biological time keeping is a fundamental property of living systems. In mammals, these daily physiological and behavioral events, such as sleep/wake cycle, temperature and hormone levels, are regulated by an internal clock located within the suprachiasmatic nucleus of the hypothalamus. A fundamental question is how this neural clock modulates overt rhythmicity in response to input signals, such as light. Hormone factors, especially melatonin, modulate both the firing pattern within the suprachiasmatic nucleus and changes in daily behavior (sleep/wake cycle).
U of Alaska Fairbanks	Pierre Deviche	*Identification of Encephalic Photoreceptors* Precisely timed bursts of bright light can stop the daily cycle of the human biological clock. A major question is how photic signals are transduced into physiological responses. Two structures in the brain that have been identified as playing a role in this response are the suprachiasmatic nuclei of the hypothalamus and the pineal gland. These structures receive neural input from the retina of the eye when it is stimulated by light.
U of Pittsburgh	Xiao-Jing Wang	*Computer Simulation of Sleep Slow Oscillations in the nalamic Circuitry: Role of Synaptic Inhibition* Oscillations of about 7-14 Hz occur during early stages of sleep and slower oscillations of 0.5-5 Hz occur during later stages of sleep. It is known that the 7-14 Hz oscillations arises from the thalamus and there is some evidence that the slower oscillation may also be a thalamic oscillation.

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ST. John's University	Alice S. Powers	*Studies of the Blink Reflex in Turtles*
U of Missouri Saint Louis	Stephen W. Lehmkuhle	*Visual Processing in the Dorsal Lateral Geniculate Nucleus (LGN)* It could be possible that the visual cortex "sees" only after the LGN modulates it with an emotional, memory-based, input. Therefore, the cortex creates a picture that is a composite of retinal activity with limbic input. In this way we see what we want to see.
Virginia Commonwealth University	Ary S. Ramoa	*Activity-Dependent Mechanisms in the Developing Lateral Geniculate Nucleus (LGN)* Before the time that the nervous tissue of the eye (the retina) can respond to fight, the nerve cells in the eye generate waves of activity that are transmitted to the cells in the eye's central nervous system target (the dorsal lateral geniculate nucleus). Importantly, the waves of retinal activity are patterned, and they occur during a time of development when the patterns of connections between the eye and the brain are being established and refined.
Northwestern University	Joyce Keifer	*In Vitro Generation of Conditioned Eye-Blink Reflex* The eye-blink reflex has been widely adopted for physiologic studies of the mechanisms of conditioned response learning.
U of Illinois Urbana Champaign	David E. Irwin	*Properties of Transsaccadic Memory* We scan the world by means of saccades—fast eye movements that are separated by brief fixations during which the eyes are relatively still. Each eye movement causes visual stimulation to be swept across the retinas, producing a blur or smear that is not ordinarily perceived because vision is suppressed during saccades. Because of this suppression, we acquire visual information from the world only during fixations, when the eyes are still. For this reason, our visual information about the world is registered in isolated glimpses that are separated in time. Furthermore, the contents of these isolated glimpses are not identical, because different regions of the world fall on different parts of the retina when the eyes change position. Despite this rapidly changing and discontinuous visual input, we ordinarily perceive the world as unified, stable, and continuous.