SOUTHWESTERN NEWS

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40-YEAR SEARCH IS OVER: UT SOUTHWESTERN RESEARCHERS IDENTIFY KEY PHOTORECEPTOR IN FUNGI

DALLAS – July 4, 2002 – After 40 years of searching for the photoreceptor that controls multiple vital processes in fungi, researchers at UT Southwestern Medical Center at Dallas have discovered the protein that triggers this phenomenon.

Light regulates several physiological processes in fungi, including their ability to produce spores and the synchronization of their internal biological clocks, but their photoreceptors – receptors that are sensitive to light and are essential for most ongoing processes – were not known until this breakthrough discovery made by UT Southwestern researchers.

In this week's on-line version of *Science,* the researchers report that the protein White Collar –1, or WC-1, is the photoreceptor for light responses in fungi, which encompass yeast and mold. Fungi share with bacteria the important ability to break down complex organic substances of almost every type and are essential to the recycling of carbon and other elements in the cycle of life. Fungi are also important as foods and to the fermentation process in the development of substances for industrial and medical importance, including alcohol, antibiotics, other drugs and antitoxins.

UT Southwestern researchers also specifically identified WC-1's role in the internal biological clock of fungi, which is called the circadian clock and is controlled by light. This internal time-keeping system is a fundamental property in almost all organisms, allowing them to adapt to the natural environment.

"This discovery is important because it provides a better understanding of how life works and how life adjusts to the environment," said Dr. Yi Liu, senior author of the study and an assistant professor of physiology at UT Southwestern.

WC-1 previously had been identified as a protein involved in the transfer of genetic code

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information, a process called transcription, but researchers had not discovered its role as a photoreceptor until now.

"We hypothesized if the photo sensory domain of WC-1 was removed, all light-regulated processes, including the circadian clock, would be blind," said Liu.

The researchers tested this hypothesis by creating an organism that lacked WC-1 putative photo sensory domain.

Liu and his collaborators demonstrated that WC-1, like all known photoreceptors, is associated with a photo pigment, the molecule that is sensitive to light.

"As we predicted, this mutant organism was literally blind to light. The circadian clock was no longer synchronized by light and the light-regulated genes were not turned on after light treatment, which affected many physiological processes," Liu said.

"All light responses were interrupted in this mutant, including the growth of mold and the production of spores," said Liu, who also was co-author of a second study published on this week's *Science* Web site about the role of WC-1 in mediating light input to the circadian clock.

Other researchers involved in the UT Southwestern study included Drs. Ping Cheng and Qiyang He, both first authors of the study and postdoctoral researchers in physiology; Dr. Kevin Gardner, assistant professor of biochemistry; Lixing Wang, a research technician in physiology; and Dr. Yuhong Yang, a postdoctoral researcher in physiology.

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