

Gene that controls circadian rhythms identified

Special to Sentinel-Voice

HOUSTON—A gene that tells the body when to sleep and awaken has been identified by scientists at Baylor College of Medicine in Houston.

"The rigui gene, named after an ancient Chinese sundial, plays a critical role in controlling sleep patterns and other body functions related to circadian rhythms," said Dr. Cheng Chi Lee, principal investigator for the study reported in the Sept. 19 issue of the journal "Cell."

Lee and colleagues in Baylor's Department of Molecular and Human Genetics collaborated with Dr. Gregor Eichele and his staff in Baylor's Department of Biochemistry. The research team found that the rigui gene turns on and off in mice throughout 24-hour periods. A similar gene was discovered in the fruit fly 13 years ago.

"Until now, the molecular components of the circadian clocks in mammals have remained elusive," said Lee, assistant professor of molecular and human genetics at Baylor. "We don't know how many other genes are involved in the body's circadian pathway. But the rigui gene could be a key target in developing treatments for jet

lag and sleep disorders and ways to regulate hormone secretion, urinary excretion and other body functions that occur during a 24-hour cycle."

When the Baylor researchers noticed a similarity between the rigui gene in mice and the gene in fruit flies that regulates circadian rhythms, they searched for proof that the rigui gene serves as the "circadian gene" in mammals. Four observations confirmed the connection:

- One of the areas of the brain where the rigui gene is expressed, or turned on, is the master control center for circadian clocks.

- The rigui gene turns on and off throughout the day in a 24-hour rhythm.

- Even when kept in the dark for three days, the rigui gene continued to turn on and off on the cycle established during the most recent exposure to daylight, indicating the circadian clock in humans is gene-driven.

- When exposure to daylight was shifted by six hours, the rigui gene adjusted to the change and "reset" its clock. This explains why travelers to foreign countries eventually adapt to changes in time zones.

"The rigui gene is the first to be identified that truly meets

"The rigui gene, named after an ancient Chinese sundial, plays a critical role in controlling sleep patterns and other body functions related to circadian rhythms."

— Dr. Cheng Chi Lee

all four of these criteria," Lee said. Pictures of the mouse brain taken at different times during a daily cycle revealed that the rigui gene was not always turned on. Although the rigui gene is found everywhere in the body, it turns on and off

only in the brain's master control center and in eye tissue.

"Every biological organism is controlled by circadian rhythms, including animals that breed and plants that flower at specific seasons," Lee said. "We now have a key to

understand more about how genes control circadian behavior and physiology."

The U.S. Department of Defense and the Clayton Foundation of Research funded the study.

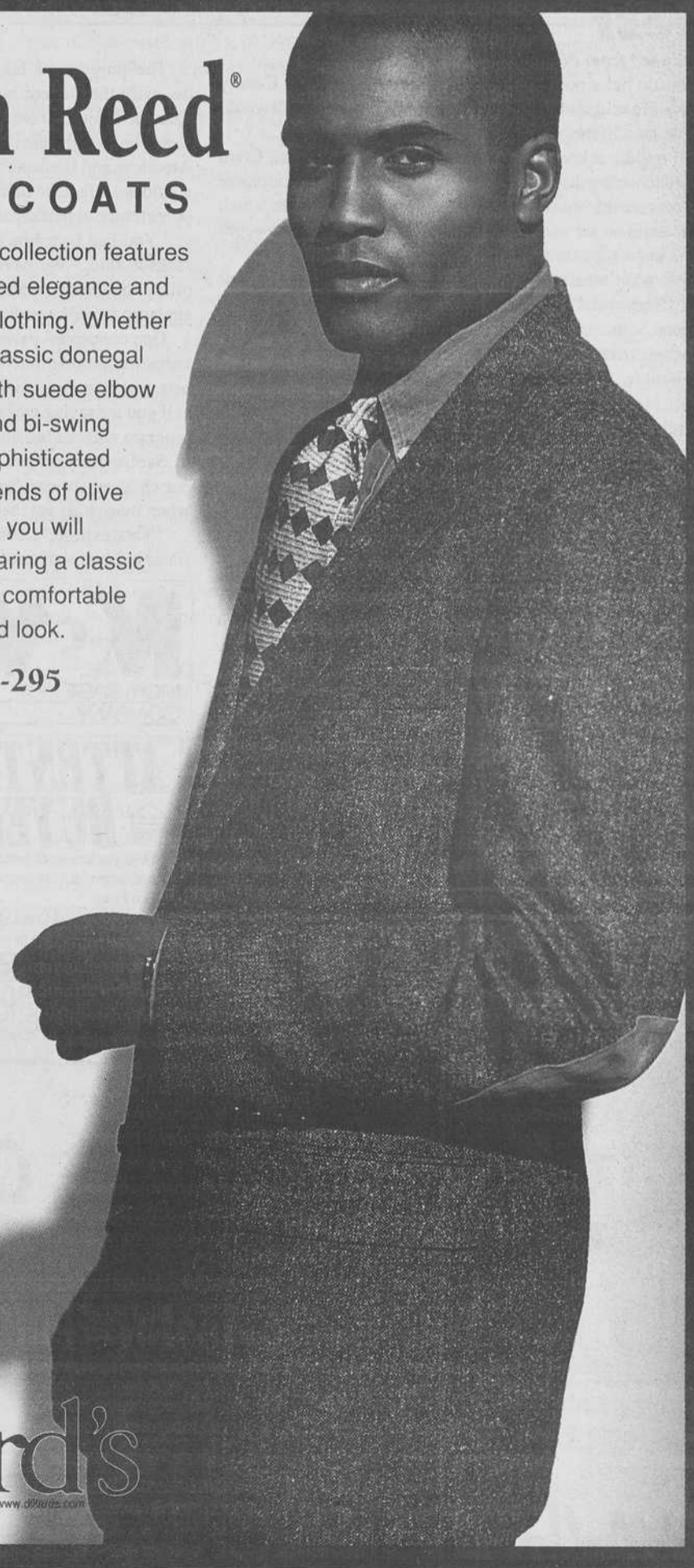
Lee's and Eichele's co-

authors of the "Cell" paper are Drs. Zhong Sheng Sun, Olga Zhuchenko, Jennifer Bailey, all in Baylor's Department of Molecular and Human Genetics, and Dr. Urs Albrecht in the Department of Biochemistry.

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