

Rhythms Of Sleep

Dreaming through the noise

by David Spurgeon

Sleep, William Shakespeare wrote in *Macbeth* more than 400 years ago, "knits up the ravell'd sleeve of care." It is "the death of each day's life, sore labor's bath, Balm of hurt minds, great nature's second course, Chief nourisher in life's feast." Today science can give us no better definition: physiologically speaking, we still do not know what sleep accomplishes.

"Scientifically, there is an internationally agreed state known as sleep, based on brain wave tracings from electrodes placed in the upper back part of the head (the occipital region)," explains retired NRC physicist G.J. Thiessen. "It is characterized by the absence of alpha rhythm, which has a frequency of 10-14 Hz. Beyond that, science doesn't really know much about what sleep is." (An alpha rhythm is a particular brain wave pattern, which can be detected with an electroencephalograph (EEG)).

George Thiessen's professional interest in sleep is related to one of its worst enemies: noise. For years he has been trying to measure the effects of noise on sleep — and through those measurements to learn whether it's possible to determine the consequences, if any, of sleep disturbance on health. As it happens, his professional interest coincides with a personal one. "I myself am not a good sleeper," he confides.

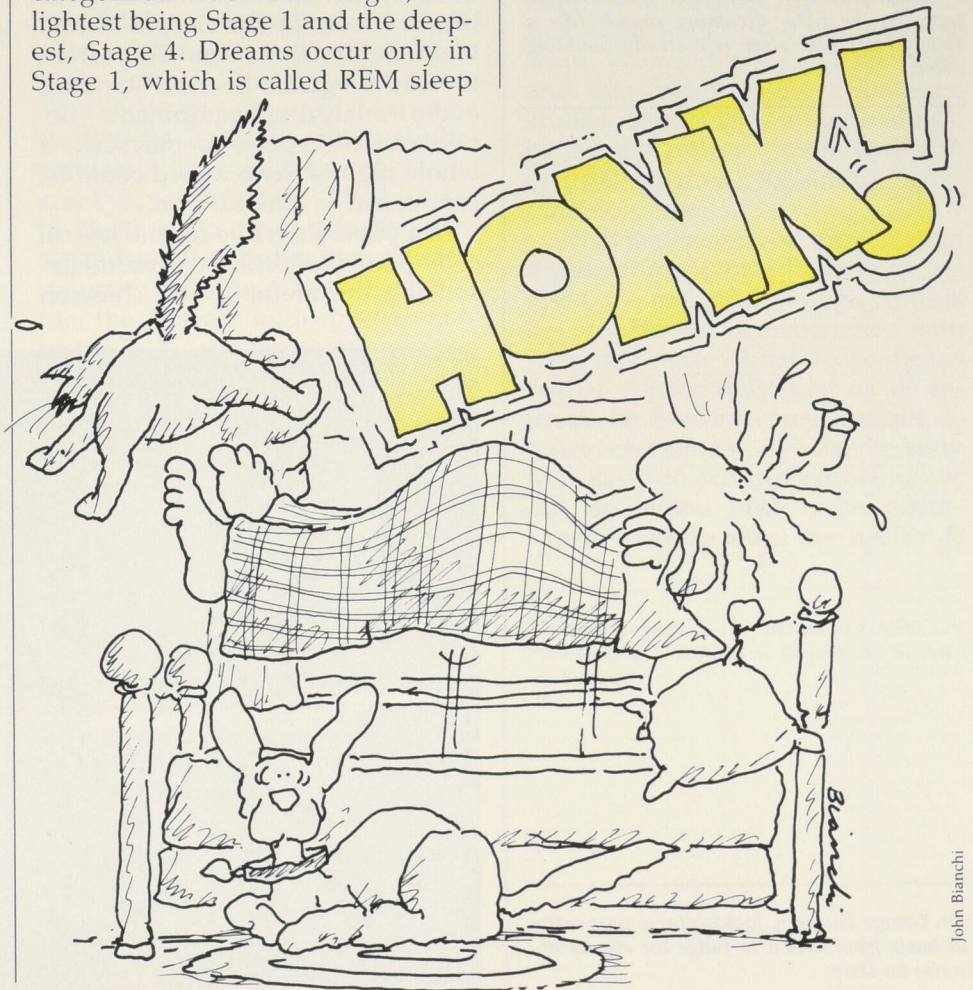
The project arose during the 1960's when municipalities were just beginning to take note of environmental problems like pollution, and for which NRC had been acting as an advisor. At the time, juries of experts were using subjective factors such as annoyance levels on which to base their judgments; Thiessen and others at NRC thought they needed a more rational basis.

The assumption they wanted to test: that the high and increasing levels of noise in urban areas — from such sources as trailer trucks, motorcycles, and power lawnmowers — were deleterious to health because they interfered with sleep. It was a widely accepted assumption, as Dr. Thiessen found from the response to publication of his work. The World Health Organization was among those enthusiastically asking for the results of his investigations.

When Dr. Thiessen's work began, other researchers had determined that the depth of sleep could be categorized into four stages, the lightest being Stage 1 and the deepest, Stage 4. Dreams occur only in Stage 1, which is called REM sleep

because of the occurrence of Rapid Eye Movements during dreaming. Dr. Thiessen wanted to determine what sorts of noise and what noise levels caused sleepers to shift to lighter sleep stages, a change that could be considered to interfere with sleep.

The standard method of sleep measurement used at the time involved monitoring the subject's brain waves by means of an elec-



John Bianchi