



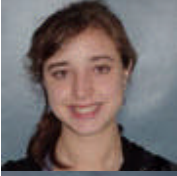
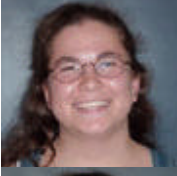
William C. Dement
Sleep and Chronobiology Behavioral
Science Research Apprenticeship

Retreat Colloquium

19-21 August 2002

Whispering Pines Conference Center
URI Alton-Jones Campus
West Greenwich, RI

Monday	Event	Speaker	Topic
1200 1315	Lunch	Christopher L. Drake, Ph.D. Young Investigator	Daytime Effects of Variations in Nocturnal Sleep
1430	Break		
1500		Erica Roth	The Physical Consequences of Sleep Apnea
1515		Colleen Dunn	Psychological and Sleep Disorders Coexisting Simultaneously; The Best Diagnosis to Begin the Best Treatment
1530		Michelle Olsheski	Shiftwork—Risky Business
1545		Talia Daley	Treatments of Pediatric Sleep Apnea
1600	Break		
1615		Dawn McDaniel	Cultural Variations in Sleep
1630		Muntasir Hoque	Treatment of Insomnia
1700	Hors d'oeuvres		
1800	Dinner		
1930	Special Guest	William C. Dement, M.D., Ph.D.	My Life with Mary Carskadon

Tuesday	Event	Speaker	Topic
0800	Breakfast		
0915		Jeanne Duffy, Ph.D. Young Investigator	Early Birds & Night Owls—What Role Do Circadian Rhythms Play?
1030	Break		
1045		Jessica Smith	The Creepy-Crawlies: Restless Legs Syndrome
1100		Jennifer Basarab	ADHD and Sleep Disturbances
1115		Leah Schweid	Dreams and Hallucination: The Very Fine Line
1130		Annelise Gardiner	The Effect of Psychotropic Medications such as SSRI's on Sleep and Dreams
1200	Lunch		
1330		Julia Fritz	A Hard Day's Night: The Interplay Between Sleep and Depression
1345		Erin Kelleher	The Effect of Psychological Trauma on Children's Sleep
1400		Lt. Jeff Dyche, Ph.D. Young Investigator	Circadian Rhythms in an Undersea Environment: A Simulated Submarine Study
1530		All	Faculty-Staff “Walk in the Woods”
1700	Hors d’oeuvres		
1800	Dinner		
1930	FUN NIGHT		

Wed.	Event	Speaker	Topic
0800	Breakfast	Namni Goel, Ph.D. Young Investigator	A Novel Auditory Stimulus Phase-Shifts Human Circadian Rhythms
0915			
1030	Break		
1045		Alberto Manzi	Sleep States and Memory Processing
1100		Eliza Van Reen	Brain Tumors and Symptomatic Narcolepsy
1115		Sarah Lust	The Nature of Somniloquy: What Happens When we Talk in Our Sleep
1130		Tracy Rupp Brown Grad Student	Validation of a Driving Simulation/Cognitive Task
1145		Mary A. Carskadon	Farewell
1200	Lunch		

Young Investigator Presentations

Christopher L. Drake, Ph.D., Senior Bioscientific Staff, Henry Ford Hospital, Sleep Disorders and Research Center, Detroit, MI

Daytime Effects of Variations in Nocturnal Sleep

Because previous studies have used self-selected or convenience samples, we do not currently know the prevalence or consequences of daytime sleepiness in the general population. Data will be presented on the first large-scale population-based study of physiological sleepiness. These epidemiological data show that few individuals regularly consume enough sleep to fulfill their biological sleep need. Not surprisingly, our data suggest that this sustained sleep reduction leads to daytime sleepiness in a substantial number of individuals in the general population. In parallel, our laboratory studies have demonstrated that similar reductions in sleep and the resulting daytime sleepiness can lead to impairments in memory, psychomotor performance, and mood. Finally, and most importantly in relation to morbidity, there is considerable data to suggest that even moderate reductions in sleep below 8 hours per night can lead to a greater risk for accidents. Moreover, we will present data showing that reduction in sleep can decrease ones' ability to detect physiological variations in sleepiness. This inability to detect risk in association with dangerous activities such as driving or operating in dangerous environments may be one of the most unrecognized and devastating aspects of chronic sleep loss.

Jeanne Duffy, M.B.A., Ph.D., Instructor in Medicine, Harvard University; Associate Neuroscientist, Brigham & Women's Hospital

Early Birds & Night Owls—What Role Do Circadian Rhythms Play?

“Early to bed and early to rise makes a man healthy, wealthy, and wise”

That phrase, familiar to most Americans, suggests not only that going to bed and waking early is the key to a good life, but implies that those who sleep and wake later are somehow lacking in character or ambition. But are these assumptions true?

Most of us know someone who is an “early bird”, getting up each day before dawn and retiring long before the late show comes on, just as we know a few “night owls”, who stay up until the wee hours of the night but then sleep in. Are these habits a matter of choice, as Ben Franklin suggested, or are there differences in biology between these two types of person? While some have argued that extremes in sleep-wake timing are a personality characteristic, as a biological rhythm researcher I have been pursuing another explanation: differences in the circadian timing system.

As early as the 1930's, Nathaniel Kleitman, a pioneer in the field of sleep research, studied self-described “morning” and “evening” type individuals. He found distinct differences in the daily pattern of body temperature, and attributed interindividual differences in performance over the day to differences in “type”.

More recently, the timing of sleep parameters [sleep latency, REM latency, EEG power density, and the ability to sleep at other than habitual times], the timing of physiologic rhythms [temperature; heart rate; adrenaline excretion; salivary cortisol levels; melatonin levels] and the timing of rhythms in performance measures have been reported to differ between morning and evening types. Those observations led to the suggestion that there must be a difference in the circadian timing system driving those differences between morning and evening types. However, if morning types sleep and wake earlier, it is not surprising that the timing of their physiologic and performance rhythms are also at an earlier hour. Thus, the results from most of those studies were confounded by the very differences in timing of sleep and behavior that define morning and evening types!

In the early 1990's we and other researchers began measuring endogenous rhythms in morning and evening types using protocols like the constant routine that eliminate periodic changes in behavior (posture, sleep-wake state, activity level) and in the environment (light levels, ambient temperature) and continue for at least 1 full circadian cycle (24+ hours). Using those techniques, it was found that the circadian phases of core temperature and melatonin excretion are set to an earlier hour in morning types than in evening types. However, it was still unclear whether morning types have earlier phases because of their earlier wake times, or whether they have earlier wake times because of their earlier phases. We not only measured endogenous rhythms in morning and evening types, we looked at the phase angle of entrainment of circadian rhythms to address the question of causality. We found that moderate morning types not only have earlier circadian temperature and plasma melatonin phases than do evening types, but when the circadian phases of the morning and evening types were compared with their usual sleep-wake cycles, morning types woke at a later circadian phase than did the evening types. Thus, we found a difference in the relative timing between the sleep-wake cycle and the circadian system between morning and evening types.

We explored the potential chronobiological mechanism(s) contributing to such differences in another study, where we compared the period of the circadian system with morningness-eveningness score in a group of young men. We found a significant correlation between those two measures, with shorter circadian periods associated with more morning-like preferences, and longer periods associated with evening-type preferences. While further studies will need to be carried out to confirm this finding, these results point to a specific chronobiological mechanism that could explain, at least in part, diurnal preference.

One consistent finding from several studies of morningness-eveningness is that middle-aged and older individuals are more likely to rate themselves as morning types. However, the mechanisms underlying morningness in older people appears not to be the same as that in young adults, but instead may be related to the inability of older persons to sustain sleep in the early morning hours.

Rapid progress has been made over the past decade in understanding some of the mechanisms underlying diurnal preferences. While much remains to be learned, it is clear that there are biological mechanisms contributing to morningness-eveningness, and that, at least for true evening types, "early to bed and early to rise" may not be the best advice.

1. Duffy JF, Dijk DJ, Hall EF, Czeisler CA. Relationship of endogenous circadian melatonin and temperature rhythms to self-reported preference for morning or evening activity in young and older people. *Journal of Investigative Medicine* 1999; 47:141-150.
2. Duffy JF. The early bird vs. the night owl. Do differences in circadian timing define our sleep preferences? *ADVANCE for Managers of Respiratory Care* 2000; 9:10-11.
3. Duffy JF, Rimmer DW, Czeisler CA. Association of usual wake time, entrained phase and self-rated diurnal preference with intrinsic circadian period in young men. *Behavioral Neuroscience* 2001; 115:895-899.
4. Duffy JF, Czeisler CA. Age-related change in the relationship between circadian period, circadian phase, and diurnal preference. *Neuroscience Letters* 2002; 318:117-120.

**Lt. Jeff Dyche, Ph.D., U.S. Navy Research Psychologist, Deputy
Department Head, Submarine Medicine Department, Naval
Submarine Medical Research Laboratory Groton, CT**



Circadian Rhythms in an Undersea Environment: A Simulated Submarine Study

Presently, Navy submarines operate on an 18-hour work-rest cycle. All watchstanders (about 70% of the crew) stand watch for six hours and are then off for 12 hours. Then they repeat the cycle. This practice, coupled with the absence of strong photic Zeitgebers, causes the circadian rhythms of the watchstanders to free run with a period of about 24.5 hours instead of entraining to the 24-hour clock (Kelly et al., 1996). In the meantime, the boat's operations and social cycles are maintained on the local 24-hour time. Like jet lag, this phase lag reportedly induces malaise among watchstanders.

To investigate the level of fatigue and subsequent biological and behavioral changes in the submariner, we used a shore-based simulated "submarine" at the Chronobiology and Sleep Laboratory, Brooks AFB, TX. Nine Navy submariners were recruited as research subjects. All were exposed to the present 18-hour work schedule as well as two separate 24-hour schedules across a 40 day period. Variables examined and to be discussed include numerous performance, mood and physiological measures. Data from this laboratory experiment will be used in the planning of at-sea trials on operational submarines using a new 24-hour watchstanding schedule.

**Namni Goel, Ph.D., Assistant Professor, Department of Psychology, Wesleyan
University, Middletown, CT**

A Novel Auditory Stimulus Phase-Shifts Human Circadian Rhythms

Light is considered the primary entrainer of circadian rhythms in humans and other mammals. However, non-photic entrainers, including exercise, social stimuli, and olfactory and auditory stimuli, also phase-shift the non-human mammalian and non-mammalian circadian systems (1,2). In addition, a number of studies have shown that exercise elicits circadian phase changes in humans (3,4), though data for other non-photic stimuli are sparse [e.g., triazolam (5)]. Recent studies conducted in my laboratory demonstrate the phase-shifting effects of a non-photic auditory stimulus on the circadian core body temperature and melatonin rhythms in humans. These results are similar to findings from other studies using nonphotic stimuli and thus may suggest a common mechanism for modifying human circadian rhythms.

1. Mrosovsky, N. Locomotor activity and non-photic influences on circadian clocks. *Biol. Rev.* **1996**, 71, 343-372.
2. Menaker, M.; Eskin, A. Entrainment of circadian rhythms by sound in *Passer domesticus*. *Science* **1966**, 154, 1579-1581.
3. Buxton, O.M.; Frank, S.A.; L'Hermite-Baleriaux, M.; Leproult, R.; Turek, F.W.; Van Cauter, E. Roles of intensity and duration of nocturnal exercise in causing phase delays of human circadian rhythms. *Am. J. Physiol.* **1997**, 273, E536-E542.
4. Miyazaki, T.; Hashimoto, S.; Masubuchi, S.; Honma, S.; Honma, K.I. Phase-advance shifts of human circadian pacemaker are accelerated by daytime physical exercise. *Am. J. Physiol.* **2001**, 281, R197-R205.
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2002 William C. Dement Fellows

Jennifer R. Basarab

Rising junior, Cornell University

Talia Daley

Rising sophomore, Brown University

Colleen Dunn

Rising senior, University of Arizona

Annelise Gardiner

2001 graduate, University of California,
Davis

Julia Fritz

Rising sophomore, Oberlin College

Muntasir Hoque

Rising senior, Brown University

Erin Kelleher

2002 graduate, College of the Holy
Cross

Sarah Lust

Rising senior, University of Connecticut

Alberto Manzi

Rising 4th-year student, Second
University of Naples

Dawn McDaniel

Rising junior, Brown University

Michelle Olsheski

2002 graduate, Brown University

Erich Roth

Rising senior, Whitman College

Jessica Smith

Rising senior, Providence College

Leah Schweid

Rising sophomore, Brown University

Eliza Van Reen

Rising senior, University of Rhode
Island

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APPRENTICESHIP FACULTY

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Psychiatry and Human Behavior**

**Christine Acebo, Ph.D.
J. Todd Arnedt, Ph.D.
Mary A. Carskadon, Ph.D., Director
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Ron Seifer, Ph.D.**

University of Washington, School of Nursing

Susan E. Labyak, R.N., Ph.D.

**Valencia College, Department of Speech and
Communication**

Kathleen Perri

TEACHING ASSISTANT

Brown University, Department of Psychology

Tracy Rupp

CONSULTING PHYSICIANS

Brown University, Department of Pediatrics

**Victoria Dalzell, M.D.
Judith Owens, M.D.**

E.P. BRADLEY HOSPITAL SLEEP LABORATORY RESEARCH FELLOWS AND STAFF

**Margaret Borkowski, Ph.D., Postdoctoral
Fellow**

Michael DeRosa, Assistant Data Assistant

Patrick Dwyer, Research Assistant

Max Elliott, Administrative Secretary

Crystal Fonseca, Data Assistant

Kristen Fortin, Research Technologist

Reynaldo Gomez, Summer Cook

Maureen Hamel, Research Assistant

**Oskar Jenni, M.D., Postdoctoral Research
Fellow**

Lauren Lessard, Research Technologist

Jennifer Maxwell, Data Coordinator

Dawn Roux, Research Assistant

Candice Smith, Research Technologist

Nicole Spanakis, Research Technologist

Suni Sun, Laboratory Coordinator

Donna Taraborelli, Research Assistant

Daniel Taylor, Psychology Intern

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