

# BULLETIN

A PUBLICATION OF THE SLEEP RESEARCH SOCIETY, USA

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Volume 6, No. 2, August, 2000



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### **Changing Requirements**

In light of its goal to encourage fellowship training in sleep medicine as the route to Board certification, the American Board of Sleep Medicine will adopt the following changes in the eligibility requirements:

1. **Waiver #2**, which is based on clinical experience in sleep medicine without formal training, will be eliminated beginning with the examination cycle of 2003-2004. All applications for Waiver #2 **MUST** be postmarked no later than March 1, 2002. All training requirements under Waiver #2 **MUST** be completed by June 30, 2002. Applicants accepted for the examination under Waiver # 2 must have successfully completed the Part II examination by the end of 2005, notwithstanding any other regulations to the contrary.
2. **Waiver #1**, which is based on a combination of training and clinical experience in sleep medicine, will be changed beginning with the examination cycle of 2003-2004. All applications for Waiver #1 under the current requirements (12 months, of which a minimum of 6 months shall be training under a Diplomate of the ABSM) **MUST** be postmarked no later than March 1, 2002. All training and clinical experience requirements under the current requirements for Waiver #1 (12 months) **MUST** be completed by June 30, 2002. Beginning with applications for the 2003-2004 examination cycle, this waiver will require 18 months of training and clinical experience, of which at least 6 months full-time (or equivalent part-time) must be training under a Diplomate of the ABSM.
3. **Waiver #1** will be eliminated beginning with the examination cycle of 2005-2006. All applications for Waiver #1 **MUST** be postmarked no later than March 1, 2004. All training requirements under Waiver #1 **MUST** be completed by June 30, 2004. Applicants accepted for the examination under Waiver # 1 must have successfully completed the Part II examination by the end of 2007, notwithstanding any other regulations to the contrary.

Successful completion of a sleep fellowship (regular or alternate track) accredited by an organization recognized for this purpose by the ABSM will be required by candidates taking the ABSM examination beginning with the Part I examination of 2005. At present, the only organization so recognized is the American Academy of Sleep Medicine (AASM). All applications under the regular or alternate tracks based on one year of training **NOT** accredited by an organization recognized for this purpose by the ABSM **MUST** be postmarked no later than March 1, 2004, and all training requirements **MUST** be completed by June 30, 2004.

### **Maintenance of Certification**

Commencing with certificates issued in 2006, the ABSM will issue a 10-year, time-limited certificate. Those who have received their certificate prior to this date will not be required to undergo a maintenance of certification process.

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### **Important Dates Regarding Changing Requirements**

Deadline for postmark of applications accepted under waiver #2	March 1, 2002
Deadline for completion of clinical experience under waiver #2	June 30, 2002
Deadline for postmark of applications accepted under waiver #1 (current requirements) (current requirements - 12 months training and clinical experience)	March 1, 2002
Deadline for completion of training and clinical experience under waiver #1 (current requirements - 12 months training and clinical experience)	June 30, 2002
Deadline for postmark of applications accepted under waiver #1 (new requirements) (new requirements - 18 months training and clinical experience)	March 1, 2004
Deadline for completion of training and clinical experience under waiver #1 (new requirements - 18 months training and clinical experience)	June 30, 2004
Deadline for postmark of applications accepted under the regular or alternate tracks based on one year of training <b>NOT</b> accredited by an organization recognized for this purpose by the ABSM	March 1, 2004
Deadline for completion of training under the regular or alternate tracks based on one year of training <b>NOT</b> accredited by an organization recognized for this purpose by the ABSM	June 30, 2004
Commencing with applications accepted for the 2005-2006 examination cycle, completion of a sleep fellowship (regular or alternate track) accredited by an organization recognized for this purpose by the ABSM will be required by all candidates taking the ABSM examination.	

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## President's Message

The APSS meeting in Las Vegas was the largest APSS meeting to date. The final figures from the central office indicate a 22% increase in meeting attendance this year over last year. The Program Committee organized an outstanding series of scientific sessions and special events. There was a high level of trainee participation and the feedback regarding the meeting from SRS membership has been uniformly positive. Time now to mark our calendars for next year's APSS meeting in Chicago, June 5-10, 2001.

The annual meeting also serves as a nodal point benchmarking the year's progress in sleep research. As we advance toward the Chicago APSS meeting, there are a number of SRS issues on which member input is invited.

Join me in extending a warm welcome to the newly constituted SRS Executive Committee. Voluntarism is an admirable attribute and each of these individuals has volunteered their time and efforts to the SRS.

The journal *Sleep* also continues to grow and there is an increase in the number of submitted manuscripts. SRS members who are interested in serving as reviewers are encouraged to contact the editorial office at 507-287-6006 and ask for Tom Meyer and indicate an interest in contributing to the peer review process.

Another venture that will appeal to some SRS members is the opportunity to contribute to the National Sleep Foundation publication entitled *Seep Matters*. The specific goal is to provide this quarterly publication with a brief interpretive summary of scientific papers that have made a critically important impact on sleep research. *Sleep Matters* has a circulation of 35,000 to 45,000. The distribution includes all members of Congress, relevant federal agencies, up to 3,000 sleep centers, and professional and lay members of the National Sleep Foundation. These numbers illustrate that SRS contributions to this publication will represent a significant educational opportunity. Celebrate the discoveries from your area of sleep research by submitting an interpretive. Mr. Lance Brink at the central office can provide you with details on how to proceed.

The Sleep Research Society continues to build relationships with other professional societies. As part of the celebration of the 20 anniversary of the American Academy of Sleep Medicine, SRS past-President Mary Carskadon, presented the AASM with a contribution to the Sleep Medicine Research Foundation.

Club Hypnos is another program through which the SRS has promoted relations with other societies. Steve Henriksen and now Jodi Mindell make the Club Hypnos



social an integral part of the Society for Neuroscience meeting. Members interested in using the Club Hypnos Program to highlight sleep research at other society meetings are encouraged to contact Jodi Mindell at [jmindell@sju.edu](mailto:jmindell@sju.edu)

Joyce Walsleben provides an update in this issue of the Newsletter on contributions by SRS members to encourage and promote women in science.

Steven Henriksen was missed in Las Vegas and we appreciate Steve's efforts during the APSS meeting as the SRS Representative to the National Institute of Mental Health (NIMH) Fourth Annual Research Roundtable in Washington, D.C. Steve outlined the purpose of the meeting as providing an opportunity for professional organizations who are stakeholders in the NIMH mission to provide input to the Director, Dr. Steve Hyman. Additionally, the meeting allows the NIMH to educate organizations about changes in strategic plan, and to highlight programs of particular emphasis.

Lance Brink and staff continue to provide critically important SRS support at the national office. The newly approved SRS Bylaws were not completed in time for inclusion in the 2000-2001 APSS Directory. Mr. Brink will be mailing the recently completed SRS Bylaws to each SRS member.

The American Academy of Sleep Medicine and the Sleep Research Society jointly sent an expression of condolences to the recent funeral of Dr. Michael Aldrich. Individuals who would like to contribute to the Aldrich Scholarship Fund will want to read the obituary in this issue of the Newsletter.

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## Michael S. Aldrich, In Memoriam

Michael S. Aldrich, Professor of Neurology, was founder of the University of Michigan Sleep Center, mentor to many in the field of sleep medicine, and devoted husband and father. He died on July 18, 2000, at the age of 51. He leaves behind a devoted wife, Leslie; three children, Brian, Matt, and Jenny; sister and brothers Carol, Bob, and Tom; and parents Knight and Julie.

Mike will be greatly missed and remembered by numerous colleagues as an insightful leader who helped raise the clinical work and research in sleep medicine to a level of excellence both in his own laboratory and internationally. The major focus of his research was narcolepsy; he spearheaded advances in both basic and clinical aspects of this disorder, and helped to develop current diagnostic criteria. He also made important contributions to research on sleepiness, obstructive sleep apnea, the relationship of sleep to neurological disorders, and the effects of alcohol on sleep.

Mike first became involved in sleep research as a college student working with Allan Rechtschaffen at the University of Chicago. After attending Swarthmore College and medical school at the University of Virginia, Mike gained exposure in sleep disorders associated with psychiatric illness during a rotation with Ian Oswald in Edinburgh, Scotland. Under the mentorship of Sid Gilman, Chair of the Department of Neurology at the University of Michigan, Mike completed his internship, neurology residency, and clinical neurophysiology fellowship. He received additional training in sleep medicine at Stanford University with Christian Guilleminault and William Dement, and at Henry Ford Hospital with Thomas Roth. In 1985, he joined the University of Michigan faculty and founded the Sleep Center. The sleep laboratory grew into a nine-bed, state-of-the-art facility, and was named the Michael S. Aldrich Sleep Laboratory in April 2000.

Mike showed exceptional commitment to the education of medical students, residents, and fellows in sleep medicine. At the University of Michigan, he integrated sleep medicine experience with the neurology residency and neurophysiol-

ogy fellowship in a program that serves as a model for many others. Mike was president of the American Board of Sleep Medicine from 1994 to 1997 and in recent years held a Sleep Academic Award from the National Heart, Lung, and Blood Institute. In 1998, the American Sleep Disorders Association (now American Academy of Sleep Medicine) awarded him the William C. Dement Academic Achievement Award. His single-authored, comprehensive textbook, *Sleep Medicine*, was published by Oxford University Press in 1999; its clarity, rigor, accuracy, and readability epitomize the strengths Mike brought to education in sleep medicine.

Mike was committed to his family and friends; he had the ability, rare among physicians, to lead a balanced life. His devotion as a husband and father was as remarkable as his dedication to sleep medicine. In many different ways, he was a role model who will be missed very much, but his wonderful influence will continue to benefit those who knew him, and those who did not for many years to come.

In his memory, the Michael S. Aldrich, M.D. Sleep Disorders Fund has been established as an endowment, the interest from which will support a visiting professor program, a research fellowship, and eventually an endowed professorship in sleep medicine. Contributions may be sent to the Michael S. Aldrich, M.D. Sleep Disorders Fund, University of Michigan Department of Neurology, 1500 E. Medical Center Drive, 1914 Taubman Center, Ann Arbor, MI 48109-0316. For additional information concerning the fund, contact Dr. Sid Gilman, (734) 936-9070.

*Beth A. Malow and Ronald D. Chervin  
Michael S. Aldrich Sleep Disorders Laboratory  
Department of Neurology, University of Michigan, Ann  
Arbor, Michigan, U.S.A.*

# Sleep World Conference

## October 21-26

Ricardo A. Velluti,  
M.D., .Sc.—Chair,  
World Conference

Pier Luigi  
Parmeggiani, M.D.—  
Chair, WFSRS  
Program Committee

Michael Chase,  
M.D.—President  
WFSRS

2001

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We are looking forward to welcoming you during the springtime in Punta del Este, Uruguay, one of the most beautiful seaside resorts in Latin America.

### Congress Information

Venue —Conrad Hotel; [www.conrad.com.uy](http://www.conrad.com.uy)

Dates— Sunday, October 21, 2001, 19:00 p.m.  
Friday, October 26, 2001, noon.

Congress Secretary—Miss Ivana Faccini

Congress Web Site—<http://www.WFSRS.org>

An international Scientific Program Committee will evaluate the quality of the proposals for Symposia and Focus Groups submitted by any member of the Sleep Research Societies.

Hosted by the Latin  
American Sleep  
Society (LASS)

Symposia or Focus Groups proposals including clinicians and basic sleep researchers will be privileged.

Deadline for Symposia and Focus Groups proposals—November 15, 2000

Early Registration Deadline—April 2, 2001

Deadline for Abstracts (Posters)—May 15, 2001  
.....→

## Student BITS - Brief Insights for Training in Sleep

The Student BITS segment is an ongoing forum for issues pertaining to sleep and to the training and retention of sleep scientists, from a trainee's perspective. The function of sleep represents one of the most compelling questions of our time, or any time, and the answer could be found within our generation. How will we know that answer and all of its implications for brain function, once we have found it? How will we continue to attract and retain highly intelligent, well-trained, and motivated people into this endeavor?

All trainees, undergraduate, graduate, or postdoctoral, who are interested in submitting an article for Student BITS are invited to contact Monica Eiland, Assistant Editor, SRS Bulletin: Student BITS: email: meiland@ucla.edu; phone (818) 891-7711 ext 7380; fax: (818) 895-9575; regular mail: Neurobiology Research 151A3, Sepulveda Veterans Administration Medical Center, 16111 Plummer St., North Hills, CA 91343.

**Student BITS Special Announcement**—Enjoy writing and editing? Looking for some experience working on a publication? Have lots of opinions about sleep and sleep training? You could be the next Assistant Editor for the Sleep Research Society Bulletin. Primary responsibilities include locating and/or writing material for the Student BITS column. For more information about this exciting position, contact the present Assistant Editor, listed above.

**A Postdoctoral Roundup**—In the throes of preparing a thesis? Don't know where to start looking for that all-important postdoc? It's never too early to start looking. For those of you not able to attend this year's excellent Trainee Day at the APSS Meeting, I've prepared a list of postdoctoral positions and programs featured at this year's job fair. (And for those of you at an earlier stage in your careers, I've left in the undergraduate and graduate components of these training programs.)

**Dalhousie University, Canada:** Description: The Neuroscience Graduate Program offers comprehensive training in neuroscience. They are involved in training at the undergraduate (honors theses), graduate (M.Sc., Ph.D. in neuroscience) and postdoctoral levels. Primary focus of this particular lab is cholinergic and adenosinergic mechanisms of sleep and wakefulness, and links between the circadian and sleep-wake systems.

Requirements: High school diploma, Undergraduate degree, or Ph.D.

Faculty: Dr. Kazue Semba; also, over 40 members of the Institute of Neuroscience whose research interests include sleep and biological rhythms.

Contact Information: Kazue Semba, Ph.D., Department of Anatomy and Neurobiology, Dalhousie University, Halifax, Nova Scotia, Canada B3H 4H7, Phone: (902) 494-2008, Fax: (902) 494-1212, Email: semba@is.dal.ca

**Harvard Medical School Division of Sleep Medicine:** Description: Pre- and Post-Doctoral Fellowships in the Program for Training in Sleep, Circadian, and Respiratory Neurobiology sponsored by the National Center for Sleep Disorders Research of the NIH National Heart, Lung, and Blood Institute. Designed to provide a structured, comprehensive opportunity to train outstanding individuals for academic positions with specific expertise in basic science, patient-oriented, and applied research.

Requirements: Undergraduate or Ph.D. Degree

Faculty: E.N. Brown, C.A. Czeisler, R.E. Kronauer, R.W. McCarley, S. M. Reppert, C.B. Saper, S. A. Shea, D.R. Weaver, J.W. Weiss, C.J. Weitz, D.P. White

Contact Information: Charles A. Czeisler, Ph.D., M.D., Program Director, Program for Training in Sleep, Circadian, and Respiratory Neurobiology, Circadian, Neuroendocrine and Sleep Disorders Section, Brigham and Women's Hospital, Harvard Medical School, 221 Longwood Avenue, Boston, MA 02115, Attn: Sleep Training Program — Ms. Catherine Bauer

**Northwestern University and the University of Chicago:** Description: The Training Program in Sleep Research offers predoctoral and postdoctoral training in sleep research, chronobiology, and related disciplines. The six primary faculty utilize approaches and techniques in the areas of genetics, endocrinology, pharmacology, neurobiology, cognitive neuroscience, gerontology, and chronobiology. Training will focus on modern, basic-oriented research as well as patient-oriented research using animals models and humans for the study of sleep.

Requirements: Undergraduate degree or Ph.D.

Faculty: F.W. Turek, J. Takahashi, P. Zee, L. Pinto, E. Van Cauter, W. Mendelson.

Contact Information: Pauline Jasim, Administrative Research Coordinator, Center for Circadian Biology and Medicine, Northwestern University, 2153 N. Campus Drive, Evanston, IL 60208-3520, Phone: (847) 467-6512; Fax: (847) 467-4065.

University of California at Los Angeles Sleep Multi-Site Training Program for Basic Sleep Research: Interested in embarking on a career in sleep research as a postdoctoral trainee?

Interested in going to a laboratory anywhere in the world with your own post-doc funding?

Interested in obtaining funds for a post-doc in your laboratory?

Contact the Multi-Site Training Program for Basic Sleep Research, Michael H. Chase, Ph.D., Brain Research Institute, UCLA School of Medicine, 43-367 CHS, Los Angeles, CA 90095, PH: (310) 825-3348, FX: (310) 206-3499, E-mail: mchase@ucla.edu

University of Michigan: Description: A one-year or two-year fellowship in sleep disorders medicine beginning in July of each year. Training in sleep medicine can be combined with training in EEG and Clinical Neurophysiology.

Requirements: Candidates should have completed a neurology residency in an accredited training program and be board-eligible.

Faculty: R.D. Chervin, A.Y. Avidan, A.S. Eiser, S.L. Garetz, T.F. Hoban, B.A. Malow, L.M. Selwa

Contact Information: Ronald Chervin, M.D., M.S., Interim Director, Sleep Disorders Program, 8D 8702 University Hospital, Box 0117, University of Michigan Health System, Ann Arbor, Michigan 48109-0117; or, Dr. Beth Malon, (734) 647-9064.

University of Pennsylvania: General Postdoctoral Program

Description: The postdoctoral training program includes tracks for Molecular Biology/Genetics, Systems Neurobiology, and Human Studies/Patient-Oriented Research. The program features a seminar series, grant-writing course, clinical epidemiology conference, regular career counseling breakfasts, and mentorship committee for each fellow. There is also a Ph.D. graduate program and an M.D./Ph.D. graduate program for medical interns/residents to obtain a Ph.D. and do basic/clinical research.

Requirements: Undergraduate degree, Nurses post-Ph.D., M.D., or Ph.D.

Faculty: T. Abel, J. Eberwine, G. FitzGerald, J. Hendricks, A. Pack, A. Sehgal, G. Aston-Jones, D. Contreras, L. Kubin, S. Kuna, A. Morrison, S. Veasey, R. Arens, D. Dinges, S. Kuna, G. Maislin, A. Pack, A. Rogers, T. Rebbeck, R. Schwab, B. Strom, and T. Weaver

Description: The Morrison lab is trying to determine what structures prevent behavioral arousal from rapid eye movement sleep (REM), given that the brain in REM exhibits most of the features of the brain in alert wakefulness. They employ primarily behavioral and pharmacologic techniques. Their current focus is the role of the amygdala in the control of REM onset and its maintenance.

Requirements: Ph.D.

Faculty: Dr. Adrian R. Morrison, D.V.M., Ph.D., Laboratory for Study of the Brain in Sleep

Contact Information: Email: armsleep@vet.upenn.edu; <http://phl.vet.upenn.edu/~armsleep/lab.html>

Description: Postdoctoral position for an in vivo electrophysiologist to study brainstem neurons involved in generation of REM sleep and REM sleep-related respiratory disorders. Studies employ a pharmacological model of REM sleep-like state and combine single-cell recording with immunohistochemistry. Other studies conducted in the lab include tract-tracing and investigation of mRNA expression profiles in identified brainstem neurons using single-cell RT-PCR.

Requirements: Ph.D.

Faculty: Dr. Leszek Kubin, Ph.D.

Contact Information: Dr. Leszek Kubin, Department of Animal Biology 205DA/VET, School of Veterinary Medicine, University of Pennsylvania, 3800 Spruce Street, Philadelphia, PA 19104-6046, Phone: (215) 898-1893, Email: lkubin@vet.upenn.edu

University of Pennsylvania: School of Medicine

Description: Undergraduate, graduate, post-graduate, and early career M.D.s and Ph.D.s, focussing on sleep and circadian regulation of neurobehavioral, psychophysiological, and immunoendocrine functions.

Requirements: High school diploma, undergraduate degree, Ph.D., or M.D.

Faculty: D. Dinges, H.P.A. Van Dongen, A.I. Pack, S. Kapoor, J. Kloss, S.D. Douglas, T. Weaver, M. Rukstalis

Contact Information: David F. Dinges, Ph.D., Director, Unit for Experimental Psychiatry, Chief, Division of Sleep and Chronobiology, Department of Psychiatry, University of Pennsylvania School of Medicine, 1013 Blockley Hall, 423 Guardian Drive, Philadelphia, PA 19104-6021, Phone: (215) 898-9949; Fax (215) 573-6410; Email [dinges@mail.med.upenn.edu](mailto:dinges@mail.med.upenn.edu)

## University of Toronto, Canada:

Description: The Centre for Sleep and Chronobiology has eight research programmes, in Biologic Rhythms, Neuroendocrine Research, Behavioral Immunology, Comparative Sleep-Wake Physiology, Clinical Sleep-Wake Disorders, Human Performance and Function, Sleep and Chronobiology in Defense Operations, and Chronopharmacology. Educational programmes include undergraduate courses and summer programmes; polysomnography technology training, Graduate training at the M.Sc and Ph.D. levels, and Postdoctoral opportunities in Sleep Medicine Clinical Training and Continuing Medical Education.

Requirements: Graduate applicant must have qualifications that would be acceptable for admission to a specific division of the School of Graduate Studies at the University of Toronto, e.g., Institute of Medical Sciences. External or self-funding is desirable for applicants from outside Canada.

Faculty: D. Bradley, G. Brown, H. Driver, R. Goldstein, P. Hanly, R. Heslegrave, V. Hoffstein, R. Horner, J. MacFarlane, I. MacLusky, H. Moldofsky, E. Phillipson, M. Ralph, C. Shapiro, A. Blackman, K. Chapman, S.

Radomski, W. J. Reynolds, S. Weiss, M. Hawke, G. Bjarnasson, O. Veidlinger.

Contact Information: Interested graduate and postdoctoral applicants might apply to individual directors of the various laboratories.

As always, contact the laboratory of interest to query about current openings.

Other helpful strategies for finding postdoctoral positions: Use Medline to identify literature and researchers in your area of interest. Attend and present data at professional meetings. Join and become involved in professional societies (like SRS and APSS Trainee Day, hint, hint). And remember: Your best source of information and guidance when seeking a postdoctoral position is... Your Ph.D. Advisor.

And now, for something completely different...

Position Now Available: Web Project Manager for Sleep Home Pages and other Research/Medical Web sites; Contact: Michael H. Chase, Ph.D., WebSciences International, (310) 478-6648; mchase@websciences.org

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## The Sages of Sleep

For those of you new to the Sleep Research Society that may not have met Bernie Webb, let me introduce you. Wilse B. Webb started publishing in the area of sleep in 1957. I count just short of 200 books, journal articles, reviews on everything from sleep deprivation effects in rats and humans on performance, stress resistance and weight to the effects of alcohol and caffeine on visual dreaming. He contributed to an understanding of sleep in older and younger males, and in females at a time when most research was based on male medical students. He mentored many of our best researchers; Mike Bonnet, Dave Berry, Scott Campbell, David Dinges, and Peretz Lavie to name a few. Mostly he was, and is, an elegant experimentalist, clear thinker, and prodigious contributor to our field. Here, in the first of a two-part feature, he offers us his view of the first 20 years of sleep research. Thank you for this Bernie. Now, meet another Sage of Sleep.

*Rosalind Cartwright*

### SOME ASPECTS OF EARLY SLEEP RESEARCH (1955-1975)

The years 1955 to 1975 encompass the emergence of contemporary sleep research. Within that period I will exam-

ine three events that occurred almost simultaneously; the discovery of the REM/dream relationship, the discovery of the neurological site of the REM sleep, and the publication of a monograph on sleep deprivation and its effect on performance. I have searched for precursors to each event and the early critical responses.

### The REM-dream connection

In his book, *Sleep and Wakefulness*<sup>1</sup>, Kleitman writes,

“In our laboratory we literally stumbled on an objective method of studying dreaming while exploring eye motility in adults, after we found that in infants eye movements persisted for a time when all discernible body motility ceased (p. 92).” Instead of direct inspection, as was done for infant’s eye movements, those of the adult sleepers were recorded indirectly, to insure undisturbed sleep in the dark. When such recordings were made of adult sleep, “...to correlate REMs with other concomitants, simultaneous recordings were made of changes in the sleepers’ EEG, pulse, and respiration. It was soon apparent that the REMs were associated with a typical low-voltage sleep pattern and statistically significant increases in heart and respiratory rates...These changes suggested some sort of emotional disturbances, such as might be associated with dreaming.

To test this supposition sleepers were aroused and interrogated during, or shortly after the termination of, REMs, and they almost invariably reported having dreamed. If awakened in absence of REMs...they seldom recalled dreaming. (p. 94).”

This description indicates that the event was dependent on the convergence of six prior conditions.

1. The observations in infants that rapid eye movement episodes constitute a large part of the sleep period and occur with short inter-bout intervals. It was the “bursts of eye movements during immobility” that lead to further measures.
2. Eye movement measurement techniques were available. As Kleitman notes, “...it was possible to register potential differences whenever the eye moved in its socket...The many investigators who have used this method (eleven citations) agree...(pg. 93).”
3. The EEG technique was available as a measure of sleep. This technique had been extensively developed following the work of Davis, Loomis, Harvey and Hobart. Without this development the “wakeful” period within sleep would not have been noticed.
4. Concomitant measures (EEG, pulse and respiration) adjunctive to the eye movement measures were used. This permitted the identification of “an emotional event”.
5. Using adults permitted questions about the presence or absence of dreams in conjunction with ongoing eye movements.
6. And most important, Nathaniel Kleitman, was present. He had the ability to recognize the importance of the original observations in the infants and the ability to extend the observations.

## The Neurophysiology of REM

Michael Jouviet writes of his discovery of the REM sleep, or “hind brain” sleep center<sup>2</sup>

“In 1956, when I returned to Lyon from Professor H. W. Magoun’s laboratory in Long Beach, California...My research interests were focused on a great dilemma...I had studied...Pavlov’s theory...that the cerebral cortex was necessary for any kind of learning...however, during my stay at Long Beach I had the growing feeling that the reticular formation was a kind of ‘microorganism’ which could execute any kind of ‘transactional mechanism’...I decided, together with Francois Michel, to study a simple type of learning in chronically decorticated cats...(we found) it was impossible to record EEG signs of sleep synchronization from the subcortical structure...On the other hand subcortical prepara-

tions of partially decorticated cats still exhibited quite well the alternation from spindles to fast activity. We also noted that our totally decorticated cats were sometimes behaviorally asleep even with exhibiting any spindles or slow waves in the brain stem...As a next step we decided to record EMG (electromyographic) activity...Since we were operating on mesencephalic and pontile cats, the only places to implant subcortical electrodes were the pons and...the reticular formation...during long lasting EEG recordings we were surprised to see, every 30 or 40 minutes, a periodic appearance of “spindle-like” activity in the pons which coincided with the total disappearance of the EMG in the neck...Apparently, then, we were faced with some kind of ‘hindbrain (rhombencephalic) sleep’ which contrasted with slow-wave sleep (SWS) sleep...Very quickly we started similar polygraphic recording in normal cats. We were surprised to see that the cortical activity was similar to the cortical activity seen during waking at the time of the total disappearance of the EMG...At this time Dement<sup>3</sup> had just published his classical paper on ‘activated sleep’ (in the cat). It became evident that this “activated sleep” with rapid eye movements was in fact something very different from SWS, and that it was a different phase or state of sleep. To our surprise, we had to conclude that ‘dreaming’ had to be triggered by a structure located in the lower brain stem (pp. 25-27).”

In 1959 Jouviet and Michel<sup>4</sup> published their initial findings. Jouviet presented a definitive paper in 1961<sup>5</sup>, at the first international symposia on sleep.

There are a number of apparent precursors for the discovery of the site of REM sleep.

1. The experimental probing of the central nervous system for a sleep center is generally attributed to Hess and his coworkers<sup>6</sup>, who introduced the procedure of implanting electrodes, stimulating brain areas and observing effects on subsequent sleep behavior. Particularly active in this research were Jasper and his coworkers. The alternative approach to sleep induction was that of brain lesions. Bremer<sup>7</sup>, who developed the *cerveau isole* and *encephale isole* procedures, was the crucial person in this research. Ransom and Nauta also made substantial contributions. This highly active research provided the background for Jouviet’s discovery.

2. There were three essential technical procedures available to Jouviet; the decortication procedures pioneered by Bremer, the use of stimulating electrodes pioneered in the work of Hess and Rheinberger, and Jasper’s measurement of slow wave sleep in the cat.

3. Jouviet began with an interest in the research on the brain-stem reticular activating formation. Morruzi and Magoun and Lindsley in 1949-50, using both stimulating and lesion

procedures, reported that cortical arousal was mediated by the afferent pathways of the reticular activating system and through the ascending reticular activating system. They inferred that a background activity level may account for wakefulness and a reduction may account for sleep.

4. Without the earlier discovery of rapid eye movements within sleep it is doubtful that the active sleep phase would have been recognized.

5. Dement's independent measurement of REM sleep in the cat<sup>3</sup> affirmed Jouvet's discovery of the REM sleep site.

Often the presence of other individuals may be crucial, and in this instance it is likely that Francois Michel was a crucial element, both in developing the decortication procedures, and in the perseverance of testing 52 chronically implanted cats.<sup>4</sup>

### Sleep Deprivation and Performance

In 1959, researchers at the Walter Reed Army Medical Research Center published a monograph on the effects of prolonged sleep deprivation on human performance.<sup>8</sup> A review of human sleep deprivation experiments suggests that this area of research has been characterized by bursts of independent research publications without apparent convergent antecedents.

The first human deprivation experiment was that of Patrick and Gilbert in 1896. They kept three subjects awake for 90 hours and used a battery of physiological and psychological tests. The next experiment was 26 years later. In 1922, Robinson and coworkers reported on the effects of 65 hours of sleep deprivation of three subjects and a twenty-four deprivation on a class of students. Kleitman also began a series of sleep deprivation experiments in 1922. These experiments involved about 60 hour of sleep deprivation of 35 subjects, and a battery of tests. Results of these studies were partially reported between 1923-1934.

Through the 1920s and 1930s there were intermittent and, apparently, independent reports of the effects of sleep dep-

riation: Weisskotten (with himself as a subject) in 1925; Miles published several studies between 1929 and 1931; Warren and Clark tested Bills' blocking theory in 1937. Tyler published several studies in 1946 and 1947. These later studies were the first to use military personnel and pre-saged a series of armed forces studies by the Air force, begun in the 1950s (Chiles, Adams, Alluissi, et al) and the Army program at Walter Reed. In Europe, Bjerner published in the 1940s elegant experiments on reaction time during sleep deprivation. In 1958, Robert Wilkinson at the Applied Psychology Research Unit in Cambridge England, began publishing his seminal experiments.

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**SECTION ON CIRCADIAN RHYTHMS***by Robert Sack***Tau Tauology**

There was a full program in circadian rhythms research at the APSS meeting in Las Vegas — more than I can possibly cover in this column. I would like to reflect on the symposium organized by Scott Campbell entitled “tau.” A major question addressed in this symposium was: What is the true period of the human circadian pacemaker? One can think of it as a kind of trait vs. state question (see the letters by Campbell and Czesler published in *Science* 288, 1174-1175, 2000). Campbell argues that tau is malleable and is shaped by circumstances and behavior; the intrinsic period is generally close to 24.0 h but that taus observed in temporal isolation experiments are highly dependent on the experimental conditions, especially the sleep wake schedule permitted in the protocol.

Charles Czesler takes the standard view that tau is a genetically inherited property of the circadian pacemaker, but that it is closer to 24.0 h than previous thought, based on the classical temporal isolation studies. He reviewed the findings from the forced desynchrony protocol in which tau averaged 24.18 h. and was not different in old vs. young subjects. Mary Carskadon and colleagues have recently reported (*Neuroscience Letters* 260, 129-132, 1999) an average tau in teenagers (studied in forced desynchrony) of 24.3 h — only slightly longer than the adults. Thus tau appears to be rather stable across the lifespan (or could there be something about the forced desynchrony protocol that constrains tau to a narrow range?)

In a separate symposium on sleep and circadian rhythms in the totally blind organized by Elizabeth Klerman, three groups of researchers consistently report an average tau in totally blind subjects with free-running rhythms of 24.5 h, quite a bit longer than in forced desynchrony studies. A few blind subjects had a tau longer than 25.0 h. It would seem that blind subjects are ideal for determining tau because there is no chance that even dim light exposure could confound the measurement. However, Bob Moore commented that the clock of the blind person is “not normal” and therefore these data cannot be extrapolated to sighted people. (Are there any data from animal experiments to indicate that blinding alters tau?)

Will the “real tau” please stand up!

And does it matter that the average free-running human circadian period is 24.2 to 24.3 h rather than 25 h as we all thought not so long ago? I suspect most people (including

non-circadian sleep scientists) have trouble seeing the importance of a few tenths of an hour. When thinking about these different estimates, it may be best to forget the 24 and remember that a subject who is free-running at 24.4 h is delaying his phase twice as fast as a subject free-running at 24.2 h.

There are some immediate clinical implications; if tau is close to 24.0 over the life span, it is harder to invoke a long tau to explain why teenagers have such difficulties getting up in the morning, or a short tau to explain the tendency of old folks to wake up early. Also, it may not make as much sense to schedule night shift workers in a delayed direction, or to expect jet travelers to have an easier time in the westward direction.

At a more fundamental level, tau is important because in the next chapter of circadian rhythm research there will undoubtedly be a major effort to link “clock genes” to human variations in sleep and rhythms. Genetics research of this kind requires a clearly identifiable phenotype. If tau can be clearly defined in humans, then phenotypes can be associated with genotypes, and progress could be dramatic. If not, it is unclear how can the clock gene work will be applied to human sleep problems.

Czesler recognizes that the shorter tau observed in forced desynchrony could reflect aftereffects of previous entrainment to a 24.0 h day. In my opinion, aftereffects are an under-emphasized aspect of circadian physiology that could explain much of the day-to-day stability of rhythms. Perhaps a better term is needed; “aftereffect” sounds too much like “afterthought.” It might be better to refer the effects of prior entrainment as “circadian inertia.”

Martin Ralph concluded the “tau” symposium by reporting his recent work on tau mutant hamsters. He compared the life span of homozygous mutant animals (tau = 20.2 h) to the heterozygous (tau = 22.1) and the wild type controls (tau = 24.0). All the animals were living on a 12:12 day. Of the three groups, the heterozygotes had the shortest life span. Ralph speculated that these animals were under the greatest stress because they were able to entrain to the 24 h schedule but with great difficulty. The homozygotes (who had the shortest tau — outside the range of entrainment to a 12:12 schedule) lived as long as the normal controls; it was as if they disregarded the light-dark cycle and consequently did not experience the stress of circadian adaptation. These are provocative results and suggest that maintaining circadian synchrony is good for your health. The other approach (in evidence in Las Vegas — “the town that never sleeps”) is to disregard your clock altogether.

## SECTION ON BASIC RESEARCH

by Chiara Cirelli

First, a few words about the APSS meeting in Las Vegas which, based on what I heard from several colleagues, was a resounding success. Given the record attendance, I assume that almost everybody must have been there. Thus, rather than attempting to summarize the "basic science" that was presented, I will just mention two topics that stood out because of the remarkable convergence of new work. The hypocretin/orexin system was perhaps the dominating new theme of the meeting: an exceptionally clear and comprehensive keynote lecture of Emmanuel Mignot on narcolepsy was followed by a dedicated symposium and oral session of great quality. Also, 3 other events (1 symposium, 1 oral presentation and 1 poster discussion group) included several presentations concerning hypocretin/orexin. It is astounding to witness the extraordinary pace at which this new field is now moving. Many different labs are now actively, if not frenetically, involved, using species as different as mice, rats, dogs, and humans, and approaches ranging from molecular biology to pharmacology and to electrophysiology. It is an easy prediction that the hypocretin/orexin system will be extraordinarily well-represented at the next APSS meeting. But other, time-honored topics in sleep research are also making a comeback, most notably phylogeny. Brand new studies on whales, pigeons, ducks, turtles, bees, and flies were presented at a dedicated symposium and subsequent oral session. These studies confirm that the investigation of sleep in species very distant from our own can open intriguing new horizons concerning the fundamental questions of mechanism and function. Two main innovations were introduced in Las Vegas: 1) all the posters were displayed for most of the meeting; 2) all the posters were discussed during a dedicated poster viewing time. In addition, some posters were selected by the APSS Program Committee to be discussed in "Poster Discussions" and "Interactive Poster Discussions". The Poster Discussions were organized in the same way as the Poster Symposia had been in previous years - i.e. with 5-min formal slide presentations. I chaired one of these "non-interactive" poster discussions: in fact, it turned out that there was a remarkable amount of discussion after each talk and the audience was very much engaged. If you attended an Interactive Poster Discussion, you may provide the Program Committee with some useful feedback. How successful was the format? Should the APSS Program Committee continue it or extend it next year? To my

mind, this kind of format works best if there is a highly integrated group of posters. This year, for example, "hypocretin/orexin" would have been a perfect candidate.

As is customary, the APSS executive Committee will meet

in January to work on the program for the 2001 APSS meeting in Chicago. However, proposals for symposia, focus groups, courses, and (very important!) nominations for 1-hour invited lectures will be discussed already next month. Again, I want to strongly encourage all the members to submit proposals for speakers and topics that deserve a dedicated course, symposium, or focus group. To select 1-hour invited lectures is a particularly challenging task for the APSS executive Committee and it would be extremely useful to hear suggestions from all the SRS members. The 1-hour lectures are a major opportunity for all of us to hear and meet outstanding scientists outside the sleep field whose work could inspire new directions of research within the sleep community. So, please do contact me at [cirelli@nsi.edu](mailto:cirelli@nsi.edu) and make as many suggestions as you can!

## SECTION ON SLEEP AND BEHAVIOR

by Richard Bootzin

The recent APSS meeting was a great success. From the comments I've heard

about the program, as well as from the sessions I was able to attend, the quality of the scientific program was outstanding. Our section was well represented in every aspect of the program from symposia on sleep debt and understanding adolescents' sleep requirements to oral presentation sessions on cognitive neuroscience of insomnia, sleep in children and adolescents, sleep in depression, and aging and sleep to a discussion section on dream construction. There were also a number of sessions that appealed to members from across sections. This included Emmanuel Mignot's wonderful keynote address on narcolepsy as well as sessions such as one on the neuroanatomy of sleep in which cognition, sleep onset imagery, and sleep deprivation were integrated with brain imaging studies.

The changes made this year in the poster discussion sessions were successful as well. David Dinges and Rachel Morehouse led a new format, an interactive poster discussion, on sleep deprivation in which there was a discussion of a group of a posters, and I led a more traditional session on the treatment of insomnia. The program committee had raised the bar regarding the quality of posters selected for presentation and this plus the emphasis on discussion in all the poster discussion sessions made the sessions more interesting and informative. Most attenders also appreciated having the posters up for the entire meeting. One problem, however, was the numbering system of the posters which made it almost impossible to locate a specific poster. I've been assured that the problem will be fixed for next year's meeting. If you have other observations that you would like the program committee to consider for next

year's meeting in Toronto, let me know. My email address is [bootzin@u.arizona.edu](mailto:bootzin@u.arizona.edu).

## SECTION ON SLEEPINESS

by *Joyce Walsleben*

Greetings !

I hope our APSS 2000 meeting stimulated everyone. By all accounts of size and comments it was a success, but we want your input. Please feel free to comment to me or another from the program committee so we know what changes you may want, what successes you felt and want more of, what areas we need to improve. We are already planning toward the year 2001. If you have any suggestions for guest speakers, especially those from outside our field please let us know immediately!

Hats off again to our section's hero, Emmanuel Mignot for his Keynote Lecture. Once again many of our distinguished section members gave of their time and energy to keep this meeting current and raise the bar of scientific presentations. Thank you! I hope you will continue to be so giving next year.

We also have a special request from one of our members, Kingman Strohl, elsewhere in this bulletin. The SRS has been asked to add input to the Sleep Academic Award's special internet educational package. Please read Kingman's request and respond if you are interested.

I wanted to share information with you about an exciting movement in the scientific areas. In June, I was privileged to attend the second meeting of the AXXS' 99 and 2000 Achieving XXcellence in Science group. This is a group of

scientists interested in advancing women's (and other minorities) contributions to science through professional societies. Hopefully you will be hearing more about them as time goes on. The members are all dynamic and successful professional women in science who are attacking this topic with amazingly organized and directed energy.

The group is sponsored by the Office of Research on Women's health, NIH, the National Institute of Environmental health Science and the American Society for Cell Biology. Co-sponsors include most of the houses of NIH as well as the Fogarty International Center and the Warren Grant Magnuson Clinical Center.

Our goal was to explore the roles of scientific societies in advancing science by building the careers of all women in science, from the predoctoral to senior level. We have targeted a number of recommendations and action items which include: forming an umbrella organization to facilitate the exchange of information, establish a national report card on the status of women, design best practices.

I am happy to say first that the SRS was part of that movement and will continue to be involved. I think the credit goes to past president Mary Carskadon for her initial interest and support. I am also happy to say that the SRS stands pretty tall in the area of best practices and support for fairness and care of women scientists. We cannot afford to be complacent however. Continued vigilance is needed to be sure that women and other minorities are represented in the best ways possible. So, I urge you to lift your awareness and watch for movement. Spot area where movement is needed and support your society efforts to advance the role of women in science.

I wish you all a happy summer!

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## High School Essay Contest Winners

### Biological Implications on Adolescent Sleep

by *Elizabeth Moore*

Teacher-Miss Martioski

School-Richard Montgomery High School, Rockville, MD

It has been long observed that if given the choice, adolescents stay up late at night and sleep-in during the morning. Some common assumptions to explain this habit are "teenage rebellion" or "because teens are lazy." Fortunately, through use of empirical sleep research, these myths have been debunked. Empirical sleep research reveals that adolescents have a biological disposition for delayed sleep and late waking. Through use of direct obser-

vation rather than speculation, sleep researchers were able to find the cause of adolescent delayed sleep patterns.

In the 1970's and 1980's, due to the lack of empirical sleep research, scientists accredited the delay of sleep onset and the reduction of sleep in adolescents purely to extrinsic, or psychosocial factors (Carskadon 348-353). An extrinsic factor is something from one's environment, or outside the body, affecting him or her. One extrinsic factor observed was the change of parental involvement in adolescents' sleep schedules. In a survey of children and adolescents, the majority of older teens reported no or little parental involvement in bedtimes, and consequently reported needing an alarm clock or assistance in waking up (Carskadon, 348-353). Other extrinsic factors affecting adolescent sleep are

an increase in social activities, higher academic expectations, and an increased employment of adolescents. Not until the late 1980's and early 1990's did scientists begin to hypothesize that intrinsic, or biological factors as well played a role in adolescent sleep behavior.

As reports of adolescent delayed sleep patterns in the United States were found to be identical to those in South America, Asia, Australia, and Europe, scientists began to hypothesize that intrinsic, or biological factors also played a role (Carskadon 348-353). An intrinsic factor is something from within one's body affecting him or her. Scientists began to empirically study influences on adolescent sleep based on two intrinsic factors—sleep/wake homeostasis, and the circadian timing system (Carskadon 348-353). Sleep/wake homeostasis is the internal balance between sleep and wake. This process is examined through the multiple sleep latency test (MSLT) (Carskadon 348-353). MSLT measures one's "waking alertness" by measuring the speed in which one falls asleep. A longitudinal study using MSLT showed that, "More mature adolescents showed signs of reduced alertness [than younger children] even though they slept an equivalent amount at night (Carskadon 348-353)." Scientists found that the change in sleep tendency in adolescents, especially the midday sleepiness, "may indicate a reorganization of the sleep/wake homeostatic mechanism to favor daytime napping and an extended late-day waking period, again favoring a later bedtime (Carskadon 348-353)."

The second intrinsic factor influencing adolescent sleep patterns is the circadian timing system, which is controlled deep within the brain by the suprachiasmatic nuclei of the hypothalamus. Circadian rhythms are biological sequences that occur in a 24-hour period. A precise way to measure the circadian timing system is measuring the secretion of melatonin, a sleep-inducing hormone produced by the pineal gland, and regulated by the circadian timing system.

Perhaps the most influential recent study of adolescent delayed sleep patterns was performed in Brown University's Chronobiology and Sleep Research Laboratory by sleep physiologist Mary Carskadon. The study, called "School Transition Project," involved 25 teenagers making the transition from middle school to high school (Carskadon 348-353). At the laboratory, their overnight sleep and melatonin secretion was monitored and alertness tests were performed using MSLT. The sleep researchers found that between ninth and tenth grade, the average amount of sleep on school nights of the adolescents dropped from seven hours and nine minutes to six hours and fifty minutes. When testing morning alertness, Carskadon found that fifty percent of the tenth graders showed brain patterns similar to those with the sleep disorder narcolepsy (Carskadon 348-353). When given the opportunity to sleep at 8:30 a.m.,

their brains quickly entered rapid eye movement (REM), a brain pattern associated with deep sleep (Kaufman H7). Furthermore, in tests throughout the day, 12 of the 25 students fell asleep within three to four minutes—an evident sign of sleep deprivation.

Researchers found that the cause of adolescent morning sleepiness is the delayed onset of melatonin secretion. It was concluded that melatonin is secreted at about 9:30 p.m. in young adolescents and about 10:30 p.m. in older adolescents, explaining the delay at night in falling asleep. These empirical results allowed Carskadon to prove that adolescents have a biological disposition for delayed sleep and late waking due to a "shift" in the circadian timing system during puberty.

Along with discovery come consequences and implications. Teenage sleeping habits combined with early morning school times result in insufficient sleep. According to surveys, the majority of adolescents report being sleepy at some point during the day, and more than fifty percent wish to have more sleep (Manber 7-9). Sleepiness causes difficulty in waking up in the morning and the tendency of some adolescents to fall asleep in class. Tiredness is another consequence leading to a decrease in motivation and decreased persistence in achieving long-term goals (Dahl 354). Insufficient sleep also affects mood, attention, and behavior. Sleep-deprived adolescents often report irritability, moodiness, and low tolerance for frustration. According to sleep researcher Ronald E. Dahl, "There is clear evidence that sleep loss can lead to the development or exacerbation of behavioral and emotional problems (Dahl 354)." Sleep-deprived adolescents also perform poorly on tests of memory and reaction time, exemplifying their impaired judgment (Brownlee 54). A study by Carskadon revealed that students who obtain the least sleep earn C's and D's, while student who obtain the most sleep earn A's and B's (Brownlee 54). This new found evidence has serious implications on the education system, revealing that high school students are not given the opportunity to work at their full potential. The school systems in many states have reviewed data of adolescent sleep needs, however little action has been taken due to bureaucratic conflicts that would arise if school starting times were set back.

Through use of empirical research in the past and present, scientists have proved that adolescents have a biological disposition for delayed sleep. Using direct observation, scientists proved that biological factors affect adolescent sleep. Scientists have unlocked another important key to understanding adolescent development through a wealth of empirical evidence.

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### Asleep at the Wheel? You're Not The Only One.

by Sarah Israel

Teacher-Susan Moerder

School-Francis Parker High School, San Diego, CA

You're driving along the highway listening to your favorite song play on the radio. You notice that you're getting sleepy, but that's normal for the middle of the week. You had a huge exam this morning and didn't go to bed until the wee hours of the morning. But, you still had to get up at 6:30 to go to school and take the exam. Now, you've stayed after school for soccer practice, and you finally get to home and relax. You feel your eye lids start to close as you cruise down the street, and before you know it your car is off the road and you've become another statistic of a teenager who has fallen asleep at the wheel.

It's not a coincidence that many accidents where sleepiness was reported as the main cause of involved teenagers. Teenagers are notoriously associated with tiredness and sleep deprivation. In a study done by Brown et al. (1996), it was found that many students (65%) believed that their performance in driving was not affected by their sleep deprivation. Brown continues to say that "this is a potentially life threatening misconception as it may not be until a student experiences a 'close call' or accident that the truth will be appreciated."

Since newly licensed drivers are teenagers who notoriously suffer from sleep deprivation as well as delayed sleep phase, it isn't surprising that 17% of the adolescents who were surveyed in the same study done by Brown et al. (1996) had fallen asleep at the wheel at least one time. As children go through adolescence, their sleep rhythms shift forward, or delay. This causes the adolescents to not become tired until

late at night, but still want to sleep nine or ten hours, thus waking up in the late morning or early afternoon (Ancoli-Israel, 1996). But, because society does not function around the sleep schedule of a teenager, most adolescents are forced to curtail their sleeping time and conform to the schedule that society has set for them. This only leads to more tiredness and fatigue, which results in the body falling asleep at inopportune times. In automobile accidents where sleepiness was reported as the cause, most of the drivers were under thirty; these drivers could very well be affected by delayed sleep phase (Bearpark, et al., 1996).

Although teenagers and young adults are the ones who are affected by delayed sleep phase, sleepiness behind the wheel does not only affect them. It has been seen that the most common cause of fatal accidents in truck drivers is fatigue (Ancoli-Israel, 1996). Like teenagers, the truck drivers are awake at times when it is not natural for their body to be operating, and they often function on an inadequate amount of sleep. In a series of studies done by Webb (1995), it was found that 54% of total motor-vehicle accidents were caused by sleepiness. In addition, Webb also stated that "there can be little doubt that sleepiness has a salient role as a variable in accidents."

One of the major differences between teenage drivers and older drivers is that the teenagers feel that they are invincible, that they can live forever. In a study done by Philip et al. (1999) where both young and older drivers were deprived of sleep then asked to drive a long distance, the younger drivers drove for longer without stopping to rest even though they were tired, while the older drivers knew that they should stop and nap before continuing on the road. It is often wondered why younger drivers don't pull to the side of the road and rest when they feel that they are becoming dangerously tired. Horne and Reyner (1995), explain that the sleepiness of the young drivers impairs their judgment to an extent where they can't make an educated decision about their driving.

There are many ways that society can deal with the problem of the sleepy driver. In a study done by Israel and Ancoli-Israel (1997), it was shown that light could affect the quantity of sleep in adolescents. Of the 24 subjects tested, it proved true that the subjects who were exposed to more bright light during the day had less interrupted sleep during the night. If adolescents could get outside, in the bright sunlight, during the early morning, it would greatly help them to become more awake and alert. This might even help to advance their circadian rhythms. Subsequently, if the teenagers are getting more sleep at night, they are less tired during the day and more capable of safely operating a vehicle. Many students drive early in the morning on the way to school and in the late afternoon on the way home. In many studies, these times are reported to be when most sleep-

related accidents occur.

Society has established that there is a significant problem with sleepiness behind that wheel. In the recent past there have been many national campaigns such as the “Drive Alert, Arrive Alive” slogan that many teenagers and people of all ages see hanging in rest stops along the highway and all over the nation. But it seems that teenagers as well as older drivers are not heeding this warning, which was put out by the National Sleep Foundation. Despite all the publicity that sleep-related accidents get, there is still an astronomical amount of accidents each year. If society wants these numbers to go down, the teenagers of today have to be educated about not driving when sleep deprived. There is mass education about driving under the influence of drugs and alcohol, and teenagers should learn about the hazards of driving while dangerously sleepy as well. Had the teenager described above been educated about the dangerous effects of driving while dangerously sleepy, he might have pulled to the side of the road and slept or called one of his parents to pick him up. Instead, he decided to drive, and became another name in the long list of those who have fallen asleep at the wheel.

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## The Aged Muscles of Sleep

by *Ali Okhowat*

Teacher-Ms. Williams

School-York Mills Collegiate Institute, Toronto, Ontario Canada

By the age of seventy, the average human being will have spent 200,000 hours sleeping. Approximately one-third of an entire lifetime is spent in this tranquil and relaxing state, or in what the famous English Romantic lyric poet, John Keats, described as the, “chief nourisher at life’s great feast”. Yet this restorative biological state is anything but nourishing for the majority of the elderly population.

A survey conducted by the National Institute on Aging on more than 9,000 persons, revealed that more than one half of individuals 65 and over complained of suffering from at least one sleep ailment (Foley et al., 1995). The most prevalent complaints had to do with early morning awakenings and difficulty maintaining sleep. Overall, the sleep of elderly persons is plagued by repeated spontaneous awakenings, an absence of the deep stages of non-REM (NREM) sleep (stages III and IV or slow-wave sleep) and increased fragmentation of their sleep-wake cycles (NIH Consensus Statement, 1990). Many different treatments involving the elderly have been experimented with, including sleeping drugs and photo-therapy, yet the most promising results seem to be brought about through the implementation of an exercise program. This essay will investigate the effectiveness of exercise in treating the shallow sleep and deteriorated circadian rhythms experienced by elderly persons.

Van Someren et al. (1997) have reported that, “In humans, a large number of studies suggests that increased physical fitness improves both daytime performance and nighttime sleep”. Various research studies have shown that exercise improves sleep quality and the consistency of the circadian timing system (Brownman and Tepas, 1976; Edinger et al., 1993; Piercy and Lack, 1998; Van Reeth et al., 1994; Van Someren et al., 1994).

One way in which exercise enhances sleep quality is by increasing the amount of time spent in slow-wave sleep (SWS). It is during this portion of sleep that the body produces the bulk of its daily human growth hormone (Hgh). Hgh promotes increases in bone density and muscle mass and strength (Van Cauter et al., 1998) – something that the elderly are deeply in need of. At 60 years old, there is very little time spent in the SWS portion of sleep and therefore very little Hgh released. This has dire consequences for elderly individuals, especially females, who are prone to developing osteoporosis and for the population in general which suffers from mobility disorders that could usually be pre-

vented or delayed through increased muscle mass and strength. A recent study by Van Someren et al. (1997) on the long term effects of training on the sleep of 10 healthy elderly males (average age 73 years) showed that, “physical activity counteracts the age-related fragmentation of the circadian rhythm”.

What must be kept in mind with regards to the benefits of exercise, is that the higher the intensity or the longer the duration of exercise that is continued towards an individual’s personal limit, the more likely the increase in sleep time and SWS following exercise. In light of this fact, it should be no surprise that athletes spend on average more time in SWS than untrained individuals (Griffin and Trinder, 1978). After an 88 kilometre marathon by a 22 year old, Shapiro and Verschoor (1979) reported an astonishing difference of 189 minutes to 120 minutes in SWS time for the post marathon versus pre marathon records. Obviously, the elderly need not run such ultramarathons, but this study clearly shows the correlation between exercise duration and SWS time. Apart from the enhanced sleep benefits, exercise of sufficient intensity or duration, will empower the elderly an increased feeling of independence and vitality.

In addition to these findings, exercise has also been reported to correct irregularities in the circadian timing system (CTS). The CTS is regulated by a small region of neurons that are collectively called the suprachiasmatic nucleus (SCN).

The SCN is the biological clock of the brain and thus controls the sleep-wake cycle. In humans, it is located within the hypothalamus superior to the optic chiasm (where the nerves from the eyes cross each other on their way to opposite sides of the brain). Joining the two together is the retinohypothalamic tract – a bundle of primary visual fibres that run from the optic chiasm to the SCN. It is through this direct connection that the sleep-wake cycle is regulated. Light passes through the retina to the SCN where it is interpreted and then passed along to the pineal gland (a pea sized organ located behind the hypothalamus) which secretes a substance called melatonin. The amount of melatonin secreted is inversely correlated with the amount of light present; that is, melatonin levels peak at nighttime and are at their lowest during the day. This correlation has led to the finding that increased levels of melatonin in the blood lead to fatigue and sleepiness (Coren, 89). Contrary to popular belief, the secretion of melatonin by the pineal gland is controlled by the SCN even in the absence of light – although the presence of light ‘fine-tunes’ these secretions. By removing brain tissue containing the SCN, it was discovered that the, “firing [of the SCN] waxes and wanes according to a circadian cycle” (Hobson, 39).

Unfortunately, melatonin levels and rhythmicity decrease as

we age (Skene et al., 1990) and there is an, “age-related reduction insensitivity of the SCN to activity-related synchronizing signals” (Van Someren et al., 1997). Daytime exercise is doubly effective in that it offsets the characteristic deterioration of circadian rhythm in the elderly by both stimulating increases in melatonin levels and resetting the sensitivity of the SCN. This translates to a more predictable sleep-wake cycle, less spontaneous arousals, and uninterrupted slumber.

Consequently, old age and difficulties sleeping are not doomed to go hand in hand. Exercise can dramatically improve the sleep of the elderly and by doing so has positive outcomes on other aspects of their lives. For the elderly, it is never too late to start an exercise program and never too late to enjoy the benefits.

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## Sleep Apnea: The Pause That Does Not Refresh

by Erika Färdig

Teacher-Shari Buckner

School-Richard Montgomery High School, Rockville, MD

Sleep apnea is a disorder in which air flow to the lungs is interrupted during sleep. This disorder affects between twelve and eighteen million Americans although the majority of cases are not diagnosed or treated due to lack of awareness by physicians and the general public. Sleep apnea tends to run within families, probably because of a genetic component, although research has yet to confirm a genetic link. Sleep apnea can strike anyone at any age and has been linked to cases of SIDS (Sudden Infant Death Syndrome). Twenty-eight percent of males over 65 and twenty-four percent of females have sleep apnea. Between the ages of 40 and 65, four percent of males and two percent of females have sleep apnea. People who have deformities of the nose or throat, those who snore, obese people, and those with elevated blood pressure are more prone to sleep apnea.

Sleep apnea may fall under one of three categories: obstructive, central, or mixed. Obstructive sleep apnea is the most common form. This condition is usually caused by the collapse of the soft tissue at the back of the throat during sleep. Central sleep apnea occurs when the brain fails to tell the muscles in the lungs to contract or expand which disrupts the normal respiration cycle. Central sleep apnea is much rarer than obstructive sleep apnea and cannot be corrected by surgery (Guilleminault and Robinson, 1998). The last type, mixed sleep apnea, is a combination of central and obstructive sleep apneas.

An apneic event is considered to be one uncontrolled halt in respiration for more than twenty seconds, and often for longer than a minute. Apneic events occur with varying frequency, depending on the severity of the case and range from twenty to over one hundred per hour. Breathing is restored when increased levels of carbon dioxide in the bloodstream tell the brain to send a signal to the body to resume a normal breathing pattern. Most sufferers begin breathing with a snort or gasp. Most often, the sufferer will have no recollection of these moments of waking. Apneic

events can interrupt periods of deep sleep, during which the body is restoring itself, growing, and replenishing its energy reserves. The result of interrupted deep sleep is often lethargy, periods of intense sleepiness during the day, irritability, decreased ability to concentrate, poor work performance, and sometimes early morning headaches. Nearly all people with sleep apnea snore during the periods in between apneic events. Untreated sleep apnea sufferers are at increased risk for cardiac arrhythmias, elevated blood pressure, stroke, and heart attacks.

Once a diagnosis has been reached, there are many treatment options available to control or eliminate sleep apnea. For some people, behavioral therapy is the best option. Patients are reminded not to consume alcohol, use tobacco, or take sleeping pills because these substances can induce tissue in the back of the throat to collapse during sleep. Pillows are used to position patients on their sides and are used by people who have apneic events only when lying on their backs when they sleep. Those who suffer from both sleep apnea and obesity can decrease the severity or number of the apneic events by losing weight.

For those whose sleep apnea cannot be controlled by behavioral changes, it may be helpful to use a mechanical device called Continuous Positive Airway Pressure, referred to as CPAP. CPAP is an air mask that is positioned over the nose when the person goes to bed. The mask is connected to a machine that controls the amount of air pressure forced through the patient's nasal passages during sleep. Pressure will prevent the throat from closing and causing an apneic event but will not prevent apneic events from occurring in those who have central sleep apnea. Sometimes patients who use the CPAP will wear a chin strap at night to prevent breathing through the mouth. Although treatment with nasal CPAP is usually effective, symptoms will return if the patient stops wearing the mask while sleeping. Patients should realize CPAP is not a cure for sleep apnea. Doctors should stress the benefits of improved health and alertness gained from continuous uses of CPAP when sleeping (Gagnadoux, et al. 1999).

Surgery is often not effective and can carry serious risks. The most common procedures remove adenoids, tonsils, or some tissue surrounding the back of the throat in an attempt to widen the beginning of the airway. Research on somnoplasty, the use of radiowaves to reduce the size of the uvula or back of the tongue, is being conducted to test its effectiveness as a treatment for sleep apnea. Lastly, if the case of sleep apnea is especially severe, doctors may recommend a tracheostomy. A tracheostomy is the surgical creation of a hole in the patient's windpipe and the placement of a short tube through which air can travel to the lungs. This procedure has a high rate of success because it bypasses the upper airway where the obstruction usually occurs. Also,

the tube remains closed while the person is awake and does not affect talking or conscious breathing.

While sleep apnea can be a life-threatening disease, increased public awareness and recognition in the health-care field can hasten the diagnosis and treatment of this condition. Many treatment options are available, and once an effective treatment is begun, sufferers will no longer have to live with the direct consequences of interrupted deep sleep (Ulfberg, Jonsson, and Edling, 1999). Increased awareness will decrease the potential deadlines of sleep apnea and insure that more people can get a restful sleep each night.

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## Sleep Deprivation and School Start Times: Will one effect the other?

by *Mariama Jerrell*

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School-The Bronx High School of Science, Bronx, NY

"All I need is four or five hours of sleep a night" (Segal 1998, 18). This fallacy, combined with the one that says, "The older you get, the less sleep you need," is common, especially among teenagers. Whether it is an after school job that the family budget depends on, or a school newspaper that must be at the printer by midnight, teenagers are going to sleep late and waking up early. With age comes added responsibilities and new found independence. Little can be done to change the fact that teenagers sacrifice quality sleep to cram in an extra hour of study time or a few more minutes of telephone chatting. Since teenagers are not

going to go to sleep any earlier, allowing them to sleep later would help increase total sleep time. Some school districts are trying to alleviate sleep deprivation by delaying school start times. Research documenting the importance of sleep and the dangers of sleep deprivation seem to support the need for change in societal practices such as school start times.

Researchers have found that sleep is especially important for mentally and physically developing people (Segal 1998, 19). The importance of quality sleep is comparable to the importance of a healthy diet and regular exercise. Yet, many advertisements are geared towards weight loss and few, if any, towards a better nights sleep.

Adolescents need to engage in deep sleep for longer periods of time than fully grown adults because during deep sleep, a growth hormone is released from the pituitary gland. Thus, by reducing total sleep time, teenagers reduce the amount of the growth hormone they receive which may result in stunted growth (Segal 1998, 19).

Although teenagers need more sleep, they are actually sleeping less because of their adjusting circadian rhythms. As adolescents mature, their "circadian type" shifts. This shift is a reflection of changing body temperature and changing daily rhythms in older adolescents. Based on the Morningness-Eveningness Questionnaire (1976), it determined that older adolescents tended to reach a level of optimum energy and alertness in the evening as opposed to younger adolescents who are "morning" types (Epstein, Chillag and Lavie 1998, 21:250). Thus, older adolescents tend to delay their periods of rest, or bedtimes, and total sleep time decreases (Carskadon, 1990, 9).

Furthermore, as adolescents go through puberty, their biological clocks delay the pineal gland's secretion of melatonin. Because this sleep inducing hormone is released at around 10:30 P.M. in older adolescents, as opposed to 9:30 P.M. in younger adolescents, all stages of sleep are pushed back to a later time.

Wake times tend to occur earlier for older adolescents. As students advance from junior to senior high school, their schedules change according to a change in school starting times. Generally, older students must report to school earlier than their younger counterparts and the result is a shorter sleep period (Bettelheim 1998, 8:555). The combination of later bedtimes and earlier rise times is not conducive to an adequate amount of total sleep time and leads to sleep deprived teenagers.

Sleep deprivation leads to vulnerability to accidents, uncharacteristic mood changes and drug and alcohol abuse. Speed of reaction, information processing, reasoning and problem solving, all imperative in the lives of adolescents,

are impaired in sleep deprived adolescents (Broughton 1991, 2:245). After comparing students and characterizing them by their sleep habits, Wolfson and Carskadon (1998) found that students with shorter total sleep times reported more depressive moods, daytime sleepiness and problematic sleep behaviors than students with adequate total sleep times. Similarly, students with irregular sleep habits had more daytime difficulty than students with regular sleep schedules. Sleep-deprived adolescents are also at a higher risk than non-sleep deprived adolescents regarding drug and alcohol abuse. In attempts to increase alertness or combat depressive moods, stimulants are often misused (Carskadon 1990,11).

Linguistically, sleep deprivation interferes with innovative responses, and behavior becomes more stereotyped (Harrison and Horne 1998, 7:95). The Haylings sentence completion test and a word fluency task were administered to 50 university student volunteers. The sleep deprived students answered the tests with predictable answers, while the students who reported adequate total sleep times completed the tasks with unique, more meaningful responses.

Sleep deprivation also hinders cognitive performance (Pilcher and Walters 1997, 3:121). Forty-four university students completed the Watson-Glaser Critical Thinking Appraisal after either 24 hours of sleep deprivation or 8 hours of sleep. Students from both groups completed a questionnaire assessing self-reported effort, concentration and estimated performance. Sleep-deprived subjects reported exerting more effort and more concentration than the non-sleep deprived subjects. Their work was to no avail, however, for their performance was worse than that of their rested peers. Interestingly, the sleep deprivation impaired self ratings of performance: the sleep deprived students did not recognize how much their performance was hindered and rated their estimated performance as higher than the non-sleep deprived students.

Poor academic performance is also a result of sleep deprivation. In a study examining sleep habits of Rhode Island high school students, teenagers determined to be sleep deprived reported impaired academic performance. Those students who reported later bedtimes, earlier weekday rise times and less total sleep, also reported lower grades than those non-sleep deprived students ( Wolfson and Carskadon 1998, 69: 874).

With such information in mind, school systems have examined school start times to determine whether students should be allowed to sleep longer in the morning by delaying school start time. One of the first schools to make a time change was Edina, in suburban Minneapolis. Three years ago, school start time was changed from 7:20 A.M. to 8:30 A.M. Once lethargic students are now alert and ready to

learn. The Edina experiment proved so successful that the entire Minneapolis school district pushed back school start times (Martin 1999).

It is clear that sleepy students cannot perform as well socially and academically as their less sleepy classmates. Perhaps other high school start times will be manipulated as to allow students to sleep later into the morning.

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## PICKWICK POSTDOCTORAL FELLOWSHIP

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Since 1995, the Pickwick Postdoctoral Fellowship program has provided funds to enable young researchers to devote the major portion of their professional effort to research related to the study of sleep or sleep disorders.

Pickwick Fellows receive funding of \$35,000 per year for one or two years. The second year of support is dependent upon satisfactory progress in the first year. Pickwick Fellows are honored each year at the Pickwick Club Research Dinner, an event sponsored jointly by the National Sleep Foundation, the American Academy of Sleep Medicine, and the Sleep Research Society.

### WHO CAN APPLY?

Applicants for the Pickwick Postdoctoral Fellowship must be U.S. citizens or resident aliens in recognized American or Canadian programs of study or laboratories with strong mentorship in the appropriate area. Fellowships are available for basic, applied or clinical research. Minorities are encouraged to apply.

Candidates must hold either an MD, DVM, PhD or DO degree in which the degree or subsequent training has been completed within the past five years. It is essential that there be evidence of aptitude for, and proficiency in, research.

### TIMEFRAME

The deadline for application is **December 15, 2000**. Awardees will be notified by May 1, 2001.

### HOW TO APPLY

The application used for this year's Pickwick Postdoctoral Fellowship program is the same as that required for the Individual National Research Service Award (NRSA PHS 416-1), available with instructions from the NIH, but with minor changes. These changes are as follows:

- The description of the research proposal for NRSA item #29b is limited to five pages.
- The sponsor should limit responses for NRSA items #33-35 to a single page.
- The candidate should assist the sponsor in writing NRSA item #36.
- The Human Subjects/Vertebrate Animals Use and Description question (NRSA item #36) should be submitted with the proposal. Certification of approval by the appropriate institutional Human or Animal Use Panel is not required for submission of the application, but such assurance is required within 30 days of the fellowship being awarded.
- Send **five** copies of the application to: Pickwick Postdoctoral Fellowship Review Committee, c/o National Sleep Foundation, 1522 K Street, NW, Suite 500, Washington, DC 20005.

To obtain a copy of the application for an Individual National Research Service Award (PHS 416-1) and instructions, you may either:

- Request a copy from the research and administration office at your current academic institution.
- Access the NIH Web page at [www.nih.gov/grants/funding/416/phs416.htm](http://www.nih.gov/grants/funding/416/phs416.htm) and download the information.
- Write: Fellowship, Division of Research Grants, National Institutes of Health, Suite 1040, 6701 Rockledge Dr. MSC 7710, Bethesda, MD 20892-7710. If you wish to use express mail or courier service, change the previous zip code to 20817.

**PLEASE CONTACT THE NATIONAL SLEEP FOUNDATION IF YOU HAVE ANY QUESTIONS.**

## Sleep Academic Award (SAA)

The Sleep Academic Award (SAA) program was launched in 1995 by the National Center on Sleep Disorders Research within the National Heart, Lung, and Blood Institute (NHLBI) to promote educational efforts and resources in sleep medicine. The SAA program was modeled after earlier NHLBI initiatives in medical education and training including preventive cardiology, asthma, tuberculosis, and nutrition. The focus of the SAA is on activities that assess and enhance education in regard to sleep disorders. The primary objective of the SAA initiative is to encourage the development and/or improvement in the quality of materials, instruction, and assessment activities at all levels of education, including those in nursing, basic science, undergraduate, and community-based programs. A secondary objective is to promote high quality research on sleep disorders. The first SAA was awarded in 1995. There are a total of 20 SAA investigators in the full program. The first group of awards will end in 2001, and the full program ends in 2003. The Awardees work collectively to define common goals and disseminate information. A recent development unveiled this Spring at APSS is a public website (MEDSleep) accessed on the AASM webpage that will serve to freely disseminate SAA developed "resources" for medical school and professional education. Resources include questionnaires, curricular materials, power point slide sets, standardized patient cases, and assessment tools. It is anticipated that the website will contribute to sleep medicine education beyond the direct funding currently provided through the SAA program.

What is the SAA Curriculum Development and Resource Committee? This committee has the charge to define and develop curricular programs for sleep medicine. One of its first actions was to develop a white paper describing the need for education in the field of sleep medicine. This white paper commentary, "The Need for a Knowledge System in Sleep and Chronobiology", will be published in *Academic Medicine* in August 2000. The current order of business is to develop a "model curriculum" for medical school education in these areas. We will be taking a learning theory approach and collect Learning Objectives and some textual items and visual resources for undergraduate professional education. To this end, the committee is currently collecting thoughts on an outline for such a curriculum and writing the teaching material (slides, syllabi, extra reading material, etc.) and assessments that might accompany instructional material. In the future, curricula for medical education at the other levels will be added. We hope to promote the application of educational science and value in the development and dissemination of current and future material. Another goal is to identify methods and tools that function successfully at schools with few "experts" available for lecturing and running discussion groups on sleep and chronobiology.

How could the Sleep Research Society help us? We believe that a successful first and second year medical school curriculum will always need an infusion of timely significant advances in the basic science of topics related to sleep and chronobiology. This will serve to provide a clearer understanding of pathophysiology, and identify the novel approaches that excite bright young individuals who may then contemplate basic science or clinical research in the field of sleep. Therefore, the expertise of all SRS members in specific areas of sleep and circadian control would be tremendously valuable to us now for ideas and methods and for developing and updating material in the future. We invite consideration of ways that the SRS become involved in the development of MEDSleep materials or in its dissemination to the greater community. The SRS will be here long after this SAA effort and will be in a position to promote the educational mission in the future.

The SAA awardees have concerns about the manpower and training needed to sustain sleep and chronobiology as a topic for education and basic research. The SRS has taken the lead in trainee relations within the field of sleep and circadian rhythms, and the SRS trainee program may provide an opportunity to contribute to SAA activities. A snapshot of current trainees (Ph.D., M.D., and M.D./Ph.D.) could be collected to identify needs or to facilitate these interactions. The foundations of our basic science in sleep and circadian control, and clinical sleep disorders, should be combined with training in educational methods and assessment to provide both successful researchers and teachers in the future.

The SRS board invites comment on the potential ways that the society can interface with the SAA program and respond to mutual interests and goals. An option being considered is the creation of an ad hoc Committee on Education and Curriculum Enhancement. This committee would have as its charge the development and evaluation of educational materials and would create a plan for interaction with the SAA and the AASM. This committee would also explore the possibility of using the SRS and/or AASM websites as avenues for dissemination of materials. Members of the committee would include SAA/SRS members, but also would have other members and trainees to provide strategic and tactical guidance for the society. A final task may include the updating of statistics on trainees in sleep research on a regular basis. Coordination of efforts, or at the very least sharing of data among the SRS, AASM, and SAA is consistent with the long-term goals of the SRS. The Executive Committee will keep track of these possible interactions and report back to the society. Kingman Strohl M.D. Corresponding Secretary SAA Curriculum Development and Resource Committee; KPSTROHL@aol.com; (Some of the SAA Awardees who are current SRS members include Kingman Strohl, Michael Aldrich, Sigrid Veasey, Catesby Ware, Deborah Sewitch, Wally Mendolsohn, Phyllis Zee, and Christian Guilleminault.)

## Announcements

### ANNOUNCEMENTS

**New SRS Trainee at Large Member Elected—** Congratulations to Scott Doran, Ph.D., RPSGT, on being elected as the 2000-2001 SRS Trainee Member at Large. Dr. Doran will serve as the Trainee Member at Large Elect role this year and will be active in several initiatives throughout this year of training.

**SRS Awards 2001—**The SRS Awards committee is pleased to call for nominations for the SRS Distinguished Scientist Award and the SRS Young Investigator Award:

**SRS Distinguished Scientist Award—**This is the Society's highest award for scientific advances in the field of sleep research. The award is given for significant, original and sustained contributions of a basic, clinical or theoretical nature. Members of the Sleep Research Society are invited to submit nominations to the Awards Committee. A letter outlining the scientific contributions made by the nominee and the reasons why the individual should be honored should accompany the nomination. Candidates need not be current members of the Sleep Research Society. Nominations will be reviewed, and the SRS Awards Committee, which may also offer nominations of its own, will make the Award. Deadline receipt for nominations is Monday, October 2, 2000. Please send nominations to: Sleep Research Society, 6301 Bandel Road, Suite 101, Rochester, MN 55901, Attn: Lance Brink, Phone: (507) 285-4384; Fax: (507) 287-6008; Email: LBrink@aasmnet.org

**SRS Young Investigator Award—**This award recognizes an outstanding research effort by a new investigator in the field of sleep research. The basis for evaluation of candidates is a single publication in a refereed journal; the candidate should be the first author; and the article must be published or officially accepted for publication by the application deadline. On the application deadline, candidate must be 35 years old or younger or within 5 years of obtaining a terminal degree. Exceptions to the age rule will be considered for those applicants who feel that extenuating circumstances warrant such consideration. A letter detailing these considerations must be included with the application.

The award consists of a plaque and a travel honorarium that may be applied toward travel to the 2001 Annual APSS Meeting. The plaque will be presented at a ceremony at the Annual APSS Meeting. To apply, candidates must submit 5 copies of the paper, a single CV, documentation of age (a copy of a driver's license, birth certificate or passport) and, if appropriate, a letter outlining extenuating circumstances regarding the age criterion. If a paper is in press at the time of application, a copy of the written notification of the paper's acceptance for publication must also be included. Applicants should provide the name of a senior investigator who will provide a letter of recommendation. The senior investigator does not need to be an author on the paper or abstract, but should be familiar with the candidate's role on the research project. The candidate is responsible for ensuring that the letter of recommendation from the senior investigator arrives by the application deadline. Last, a candidate must be a member

in good standing of the SRS or must include a completed application for membership and fee with the award application. Repeat applications from unsuccessful applicants from previous years are encouraged. Candidates are welcome to apply for both the Young Investigator Award and the trainee travel fellowship, but in the event the candidate receives the Young Investigator Award, she/he will receive only this award. The Committee is prepared to provide recognition for multiple awardees. In this way, several outstanding young sleep researchers can be recognized without restriction to just a single "winner." The number of awardees may vary from year to year, depending on the quality of the applications. Deadline for receipt of Applications is Thursday, March 1, 2000. Applications should be sent to: Sleep Research Society, 6301 Bandel Road, Suite 101, Rochester, MN 55901, Attn: Lance Brink, Phone: (507) 285-4384; Fax: (507) 287-6008; Email: LBrink@aasmnet.org

**Complimentary one-year subscription to Sleep and Breathing—**The Editors of Sleep and Breathing and its publisher Thieme are offering a limited number (150) of free one-year subscriptions to current post-doctoral M.D. or Ph.D. trainees in sleep medicine and research. We will start this program with 2000 Volume 4, Issue 3. The candidate (or faculty requester) for the Sponsored Complimentary Subscription should FAX the request to Allison Heim at FAX 212-947-1112. In the fax the candidate (Fellow or Post-Doctoral) should clearly state who the Program Director is and at which Institution he/she is enrolled and to specify the "end date" of the Fellowship or post-graduate position. The request MUST be submitted on the Letterhead of the Institution of training. Finally, clearly indicate the address to which the journal should be sent.

**The National Multi-Site Training Program for Basic Sleep Research—**provides for the interdisciplinary training of predoctoral and postdoctoral trainees in basic sleep research and offers unique research and educational opportunities throughout the nation. Funding is provided for predoctoral trainees (five years of support). Investigators who wish to obtain funding for a postdoctoral trainee (who must be a U.S. citizen) to work in their laboratory should contact: Michael H. Chase, Ph.D., Director, Multi-Site Training Program for Basic Sleep Research, Brain Research Institute, UCLA School of Medicine, 43-367 CHS, Los Angeles, CA 90095, Phone: (310) 825-3348, Fax: (310) 206-3499, E-mail: mchase@ucla.edu

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**Harvard Postdoctoral Position**—Available in the

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wakefulness in animal models. Technical approaches include:

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tochemistry, stereotaxic surgery. NIH salary scale or better,

depending on experience. Relevant experience preferred. Send:

CV, brief description of research experience/interest, names of

three references to: Robert Strecker & Robert McCarley,

Harvard Medical School, Brockton VAMC (151C), 940 Belmont

St., Brockton, MA 02301; email: robert\_strecker@hms.har-

vard.edu

FAX: (508)895-0171

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