

Light Treatment and Biological Rhythms

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Letters to the Editor

TREATMENT OF SAD

Editor's Note: In a recent issue of *LTBR*, Edwin Tam, M.D., and Raymond Lam, M.D., reviewed the treatment studies of SAD published between 1989 to the end of 1994 (*Treatment of Seasonal Affective Disorder*, Vol. 7, No. 3, March 1995). Among the work reviewed was that of Odd Lingjærde, M.D., Ted Reichborn-Kjennerud, M.D., and colleagues. These authors took exception to several issues concerning the manner in which their studies were presented, and their comments in that regard are presented below. Following those comments is the response by Drs. Tam and Lam.

To the Editor:

Comments to a survey: In *Light Treatment and Biological Rhythms*, Vol.7, No.3, March 1995, Tam and Lam present a survey of SAD treatment which calls for some comments, mainly regarding their references to our studies.

1. Our light treatment study (Lingjærde et al. 1993a) is referred to under both open trials and under trials comparing bright and dim light; the latter is not correct. More important, the reviewers fail to mention the more interesting findings of this study: (1) that we obtained satisfactory effect with only 1500 lux for 2 hours in 6 days, and (2) that in most patients the improvement was maintained for the rest of the winter season. It is an intriguing question why some of us in Europe have found a sustained effect of a short light treatment period, for instance in December, in at least some patients, whereas the common experience in North America is rapid deterioration upon interruption of treatment.

2. Our double-blind comparison of the MAO-A inhibitor moclobemide and placebo for 3 weeks (followed by open moclobemide in the nonresponders) (Lingjærde et al. 1993-b), is criticized for "poor diagnostic assessment, inadequate duration of treatment, suboptimal dose, small sample size"—no less! True, our patient group (N = 34) could have been

larger, and the dose of moclobemide (400 mg) also, although it was the recommended dose at the time of the study. Regarding duration of the treatment period (before changing to open moclobemide in non-responders), there were several reasons for choosing three weeks: (1) ethical reasons, considering the very rapid effect of the alternative treatment, light; (2) in a previous small open trial with moclobemide, there was a significant improvement already after one week, and a very marked improvement after four weeks (Lingjærde & Haggag 1992); (3) finally, since standard light treatment induces a marked improvement already after 3-7 days, it is of limited interest to show a drug to be better than placebo

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only after a longer period than about three weeks (see also next paragraph). Finally, as to our "poor diagnostic assessment", this is a rather grave accusation, that we find totally unwarranted, but which may perhaps be due to a misunderstanding. All patients in our study were diagnosed by one of us, both experienced psychiatrists, based on a combination of SPAQ screening and a thorough semistructured clinical interview, partly SCID-based, and with use of accepted diagnostic criteria. One can of course disagree with our inclusion criteria, and with our decision to include three patients with subsyndromal SAD (who have also been shown to respond to light treatment (Kasper et al. 1989)), but that has nothing to do with diagnostic assessment procedure.

As to the results of our study, Tam and Lam only state that no differences were found between drug and placebo. That

is not quite correct, since we found that moclobemide had a significantly better effect than placebo on the atypical symptom cluster, comprising hypersomnia, hyperphagia and carbohydrate craving, although this superiority was not reflected in the improvement according to the total score on an extended MADRS scale. They also fail to mention the clearly most interesting finding in our study: the highly significant negative correlation between age and improvement at 3 weeks ($r = -0.76$, $P = 0.001$) in the placebo group, and a strong tendency in the same direction in the moclobemide group ($r = -0.48$, $P = 0.06$). An effect of age on improvement in depression is not a new finding, but we believe that this is the first time such a marked age effect has been found for placebo treatment in SAD.

3. Finally, we object to Tam and Lam's statement that fluoxetine appears to be as effective as bright light exposure using light boxes. As far as we can see, this is based only on Lam and coworkers' 5-week study comparing fluoxetine and placebo (Lam et al. 1994). In the presentation of this trial, it is stated that the primary analysis using the intent-to-treat method showed no statistically significant differences between fluoxetine and placebo in the SIGH-SAD, Beck, or CGI scores. Only some post-hoc analyses revealed some significant differences. This is hardly a valid basis for saying that fluoxetine seems to be as effective as bright light, especially when considering that this was an effect after 5 weeks, whereas light shows its effect already after a few days.

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To the Editor:

Thank you for the opportunity to respond to the comments by Drs. Lingjærde and Reichborn-Kjennerud. Firstly, in a general review article like ours (Tam and Lam, 1995), it is not possible to include every detail about every study. Therefore, many studies had interesting findings that we did not highlight for the sake of space and clarity. We predominantly focused on the main outcome measures, and less so on posthoc results.

We did err in including the 1500 lux light study as one of the placebo-controlled studies validating the effectiveness of bright light (Lingjærde et al., 1993a), as it was an open trial.

The criticisms of the moclobemide study (Lingjærde et al., 1993b) were not meant to question the investigators' clinical abilities in the area of diagnosis. We regret if our choice of words gave that impression, and agree that the use of the term "poor diagnostic assessment" was not warranted. Rather, "unclear inclusion criteria" may have better described our impression. Although their diagnostic process is somewhat clarified by their letter, we had difficulty sorting out from their methods and results section exactly what patients were being studied. The methods section stated that the inclusion criteria were either DSM-III-R criteria or Rosenthal criteria for SAD. In Table 1 of their paper, five patients never met DSM-III-R criteria for major depression. As indicated in their letter, the table also showed three subsyndromal patients included, despite not meeting their inclusion criteria. However, this still left us wondering about the other two patients. The reason for this discrepancy remains unclear to us. The comment about the relatively small sample size was brought up elsewhere as a general shortcoming of most studies published in both light therapy and pharmacotherapy. We did not intend to single out this study as being somehow weaker in this regard.

As for the dosing and treatment period, the authors themselves raise these concerns in the discussion section of their paper. To address their specific points: Firstly, current knowledge does not attribute moclobemide with more "rapid-action" than other antidepressants. From what we know about antidepressant effects in general, three weeks is inadequate to judge clinical response. Secondly, despite some controversies about the ethics of placebo, placebo-controlled studies are still essential to establish clinical efficacy. Light therapy continues to be dogged by the difficulty of establishing a true placebo; and there are no long-term placebo controlled studies of light therapy. The "ideal" long term

treatment of SAD is thus still being explored. Therefore, as long as patients are suitably informed, it would be ethical to conduct antidepressant studies of SAD involving longer treatment periods. Certainly our rigorous ethics committee has approved placebo-controlled studies of 5, 6 and even 8 weeks in SAD. (One only needs to look at Figure 1 of their study to appreciate placebo effects: after patients were switched from the double blind to open moclobemide, there was a dramatic reduction in depression scores after 1 week of treatment. Why would those patients who were on moclobemide for 3 weeks suddenly show the same dramatic response as those patients who were on placebo? The answer probably lies in placebo response.) Thirdly, we feel that there is an interest in comparing light therapy to an adequate course of antidepressant treatment. Not all SAD patients may respond to light therapy, necessitating exploration of treatment alternatives. As well, a significant percentage of our population have expressed a preference for medication, with its relative ease of use, even in the face of slower onset of action.

Regarding their atypical scale results, the significant differences in baseline scores prior to treatment meant that any changes may also have resulted from simple regression to the mean.

Finally, we believe that our statements regarding the comparison between antidepressants and bright light were suitably qualified in our paper. Based on both our 5-week placebo-controlled fluoxetine study (Lam et al., in press) and Ruhrmann's 5-week controlled fluoxetine-light study (Ruhrmann et al., in press), we said that these results "...sugges[ing] that antidepressants are as effective as bright light" and "fluoxetine *appears* to be as effective as bright light exposure". The significant results on our fluoxetine study were not post hoc (Lam et al., in press). The continuous measures (SIGH-SAD, Beck scores) were our primary measures of response but, like most clinical trials, the clinical response rates were secondary measures. The post hoc measures referred to the severity analyses showing greater effect in the most severely depressed patients. Interestingly, we examined (post hoc) our data in the 68 patients randomized to fluoxetine or placebo, and were unable to replicate their results showing negative correlation of response with age. The importance of sample size and power in negative studies is again illustrated by the fact that although the continuous measures did not meet significance, our effect sizes were similar to other clinical antidepressant trials in nonseasonal depression that involve larger samples. An 8-week study was recently reported of sertraline versus placebo in SAD (Moscovitch et al., 1995). Although their effect size was almost identical to ours, they randomized 187 patients

(!) and did find a statistically and clinically significant superiority for the drug.

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VIRTUAL MELATONIN

Date: Wed, 7 Jun 1995 05:05:35 -0500 (CDT)

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Subj: Wurtman's APSS Lecture

The following article is an account of the E-mail correspondence that started as shown above. I sent it after the APSS meeting in Nashville in June, where I attended the invited lecture by Richard Wurtman on melatonin. The room was jammed with people. They must have known what an enlightening and entertaining lecture it would be. However, I had just begun to study the vast literature about melatonin, and was confused by a few of the statements Wurtman made. I jotted three of these statements down on Opryland Hotel memo paper. A few days later at home the note popped up, reminding me of my new favorite hotel "lobby"—the vast

indoor/outdoor air-conditioned space that almost makes you feel like you're actually in a real tropical forest—but with no bugs! I stared at my note thinking: Now I'll have to pore through my pile of reprints to try to understand these intriguing statements. And I also wondered: Did he really say those things, or did I misunderstand?

Then I had a great idea. E-mail! I'll E-mail some melatonin experts I know who were also at Wurtman's talk. I can put them all on one mailing list and ask them all at once with just a few keystrokes. I love E-mail! It's still a novel toy to me, and one of the fastest, and most polite (unobtrusive), methods of communication yet. They may ignore my message—but probably somebody will answer. Well. Most of them did. In fact, I seemed to open up a floodgate. What follows is a dressed-up synopsis of that correspondence, with references added for your benefit. The names of the melatonin experts who did not participate have been deleted and shall remain anonymous. The numbers for the melatonin experts listed below do not correspond to their order in the list above.

ME: Thought you guys could help me understand three things Wurtman said:

1) Melatonin does not have to decrease body temperature to work [as a sedative].

EXPERT 1: The mechanism of melatonin's hypnotic action is not yet known. Centrally, melatonin affects GABA and 5HT (Anton-Tay, et al., 1971; Anton-Tay, 1974), both of which have known effects on sleep. Close coupling of melatonin and core body temperature is revealed by photic and pharmacological suppression of its endogenous nocturnal production which attenuates the nocturnal decline of body temperature (for review see Badia, et al., 1992). Administering melatonin has acute hypothermic effects that likely mediate its hypnotic effects. In any event, since nearly any dose of melatonin will decrease body temperature (Dollins, et al., 1994; Hughes, et al., 1994), melatonin's hypnotic effects will be quite difficult to separate from its hypothermic effects.

EXPERT 2: The majority of studies show exogenous melatonin to be hypnotic (Tzischinsky and Lavie, 1994; Waldhauser et al., 1990), hypothermic (Cagnacci et al., 1992; Strassman et al., 1991), or both (Dawson et al., 1995; Deacon et al., 1994; Hughes et al., 1994). In his presentation, Dr. Wurtman briefly showed unpublished data suggesting that melatonin's hypnotic effects could occur in the absence

of its hypothermic effects. This finding is novel. However, it was not clear what temperature-taking method was used and if a constant routine was implemented. Dr. Wurtman's laboratory has traditionally measured oral temperature in the absence of a constant routine. Since the hypothermic effects of low doses of melatonin are likely small, it would be necessary to use the most sensitive methodology available to detect temperature changes (e.g., the measurement of core body temperature during a constant routine with sleep allowed and sleep architecture controlled for) before such a statement could be made with certainty.

EXPERT 3: Wurtman's group has published data showing no difference in body temperature changes between a 0.3 mg and a 1.0 mg dose of melatonin (Dollins et al., 1994), as well as no significant difference in sleep onset latencies with these doses (Zhadnova et al., 1995). Studies in which higher pharmacological doses of melatonin have been administered (e.g., Lieberman et al., 1984; Dollins et al., 1993) have similarly shown that different doses are roughly equally effective in terms of sleep onset latency. One of the problems with the conclusion that "therefore, melatonin does not have to decrease body temperature to work" is that the data above are much more messy when examined in detail. Temperature changes following various melatonin doses have been measured only recently, and temperature decreases are consistently observed. However, there is no consensus about the magnitude of the dose-response curve. Hughes et al. (1994) found no difference in tympanic temperature following melatonin doses of 10 and 40 mg at >1000 hr, but temperature decreases following a 1 mg dose differed from both the 10 and 40 mg doses. Dawson et al. (1992) have determined that there are differences in temperature decreases between .1 and .5 mg doses administered at 1400 hr. These results and other correlational and experimental evidence (see Myers, 1995, for a summary) indicate a strong relationship between endogenous melatonin levels and body temperature. However, the nature and extent of temperature changes following low doses and large doses of melatonin at various circadian times has not been fully explored.

To date, no study has carefully and successfully teased apart the temperature effects and hypnotic effects of melatonin, although Cagnacci et al. (1994) have presented evidence that may be useful in addressing such a question. In a recent study, this group determined that suppressing melatonin levels using bright light only affected body temperature if melatonin was suppressed beyond a certain threshold. Examining sleepiness levels with a threshold design may more directly support Wurtman's claim. Only when an experiment finds no effect on body temperature and a salient ef-

fect on polygraphically recorded sleep onset latency will the claim that melatonin can act as a sedative without affecting temperature be validated.

ME: Here's another statement Wurtman made. Did he really say this and what do you think about it?

2) Increasing the dose of melatonin does not increase sleepiness.

EXPERT 2: This statement may be accurate if the amount of time after the administration of exogenous melatonin was held constant across doses and was relatively short (e.g., < 2-3 hr). However, larger doses would likely be more effective at producing sleepiness at later post-administration times due to the sustained elevation in endogenous melatonin levels (Dawson & Encel, 1993).

EXPERT 1: Perhaps one of the most compelling questions of melatonin and sleep research is whether melatonin's hypnotic and hypothermic effects are dose-dependent or whether melatonin's actions are a result of some threshold event. Although dose-response relationships for melatonin administration have been reported for subjective sleepiness (French, et al., 1993) and for sleep duration (Hughes, et al., 1994), Wurtman and colleagues have found no such relationship for sleep latency. Our data suggest that while low and high doses facilitate the initiation of sleep equally, higher doses are required to consistently sustain sleep. Furthermore, Nave and colleagues report failure to replicate their very nice melatonin (3 mg & 6 mg) and evening nap data (1995) using smaller doses (0.3 mg & 1.0 mg). I should note that our sleep data may have been due to metabolism of the low dose below some effective threshold by the last hours of the sleep opportunity. We are currently testing this question by comparing the hypnotic efficacy of a high dose with that of a low dose given in sustained release formulation.

EXPERT 3: This claim appears to be based mainly on the lack of differences in sleep onset latencies or "sleepiness" (subjective) between various pharmacological as well as various physiological doses of melatonin. However, Wurtman's group previously tested sleep onset latency electromechanically, using a button-release mechanism to indicate sleep onset. This measurement is not as sensitive as polysomnographic recording, and is not specific to sleep onset, as it may also assess degree of muscle relaxation. One could argue that this electromechanical measure tapped the anti-anxiolytic effects of melatonin instead of the hypnotic effects. Second, even in studies that have recorded sleep

onset polygraphically, it is not clear that either "sleepiness" or sleep onset latencies have been systematically assessed in the window between melatonin administration and 1 hour and 45 minutes later. This may be a very sensitive window for differences in dose effects on sleepiness. Additionally, other investigators have "picked up" dose differences in sleepiness ratings with higher doses of melatonin.

ME: What do you think about this statement of Wurtman's?

3) There is no circadian rhythm in response to melatonin. Take it and 1/2 hr later you feel sleepy.

EXPERT 2: This statement is not supported by previous research. There are several studies failing to find hypnotic effects of melatonin (James et al., 1987) and a possible explanation for this failure appears to be time of administration. Exogenous melatonin is typically ineffective as a hypnotic when it is administered at times when endogenous melatonin levels are already elevated (Dawson & Encel, 1993). The results of Tzischinsky et al. (1992) and Nickelsen et al. (1989) support the notion of a circadian rhythm in melatonin's hypnotic efficacy. In addition, other effects of exogenous melatonin such as phase shifting (Lewy et al., 1992; Zaidan et al., 1994) are dependent upon time of administration and it seems likely that the hormone's hypnotic effects would therefore be as well.

EXPERT 1: Although diurnal variation in the timing of melatonin's peak effects has been reported for sleep latency (Tzischinsky & Lavie, 1992), research by Wurtman and others suggest that this may not be a robust effect. A circadian rhythm in melatonin's hypnotic efficacy, however, is strongly suggested by findings that melatonin administered in the absence of elevated nocturnal levels of endogenous melatonin consistently facilitate sleep while melatonin administered after 2200 hr often has no apparent effect (especially at low doses). This circadian relationship may reflect a threshold action for melatonin's sleep promoting effects. Melatonin administered before the nocturnal rise in endogenous melatonin can facilitate sleep, however, melatonin administered at night may not, perhaps because some hypothetical threshold has already been reached. Again more research is required to determine the nature of melatonin's hypnotic effects and to quantify these circadian effects.

EXPERT 3: Again, it is not clear that "1/2 hour later" there have been systematic evaluations of sleepiness or sleep latency effects. The range of circadian times at which low doses of melatonin have been administered and sleepiness has been assessed are limited as yet. There is some initial

evidence that in individuals with low melatonin levels (e.g., elderly or individuals with pharmacologically suppressed levels) that exogenous melatonin will facilitate sleep onset during the nighttime hours (e.g., Garfinkle et al., 1995; Tzischinsky & Lavie, 1994). However, there are also negative results using exogenous melatonin during the nighttime hours, when endogenous melatonin is being synthesized.

An important omission in much of the work testing the sedative-hypnotic properties of melatonin is that women have rarely been included. Given the putative effects of exogenous melatonin on reproductive hormones (e.g., Cagnacci et al., 1991; Voordouw et al., 1992) the physiological role of melatonin may be vastly different in men and women. For this and other reasons, it is premature to conclude that low doses of exogenous melatonin will facilitate sleep onset in any individual with a normal sleep onset latency, or even in insomniacs or those with low endogenous melatonin levels.

Melatonin may very well be the endogenous indicator of sleepiness level, or a chemical marker of sleep propensity. However, the data to date more firmly support the concept that melatonin exerts its hypnotic effects by mediating the body temperature decrease associated with sleep initiation, and further by providing a chemical timing signal, following which "nighttime" and "sleep-inducing" activities in the central nervous system are initiated. Consider the following: it is difficult to believe that a hormone which is undetectable in approximately 10% of young, normal sleepers, is an endogenous indicator of sleepiness levels. There may be some relevance of interindividual levels in melatonin, reflected in the response of an individual to exogenous melatonin, but the data to support such a hypothesis are lacking as yet. In fact, data that disconfirm such an idea are equally compelling. We should still be giving as much weight to negative findings as to positive findings concerning melatonin and its role in sleep.

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ANNUAL SLTBR BUSINESS MEETING

June 9, 1995, Frankfurt, Germany

President Anna Wirz-Justice, Ph.D. called the meeting to order. Reports from committee chairs were presented.

I. Membership

Dr. Norman Rosenthal reported for Dr. Brainard, the Membership Committee chair, that membership has increased significantly over the past year. One quarter of all members are European/Canadian. He asked everyone to solicit new members for SLTBR, since our growth is essential to our existence.

II. Finance

Dr. Sonia Ancoli-Israel, Treasurer, reported that the first formal budget for the Society was prepared for the 1995 year. In addition, she is also receiving monthly financial reports which allow better control and planning of SLTBR activities. The major income sources are meetings, dues and publications. Major expense areas are administration and meetings.

III. 1996 Annual Meeting

Dr. Wilfried Köhler, the Annual Conference Meeting chair for the 1995 Frankfurt meeting, reported attendance as follows: 51 members, 35 non-members, 7 students and 14 faculty, for a total of 107. In addition, a Sunday workshop was scheduled and approximately 27 registrations were received.

IV. FDA

Dr. David Avery reported on U.S. regulations on light boxes over the past few years. In order to submit a request for changes in the current regulations, approximately \$10,000 is needed.

V. Insurance Reimbursement

Dr. David Schlager reported no major changes for managed care or private care is expected in the near future. Since some reimbursement is being made by some insurance companies there is hope for improvement in the future. He cited Dr. Terman's study which indicated only 20% apply for reimbursement

and of that group about 25% receive reimbursement. Dr. Rosenthal suggested we ask patients to give the SLTBR office a list of insurance companies that accept insurance as a benefit to the public. It was also suggested that an insurance executive make a presentation at next year's annual meeting on reimbursement policy procedures.

VI. Bulletin

Dr. Scott Campbell, editor of LTBR, requested articles for future issues of the *Bulletin*. He also requested member input and feedback on other issues of importance.

VII. President's Report

Dr. Anna Wirz-Justice stated SLTBR was now seven years old and changed from our early years. She announced The Resource Center for Associations was aboard to provide the Society with management and administration. Jerry Bowman (introduced) and Francine Butler are the Society's Executive Directors. Dr. Terman's Task Force Report was lauded. Vice President, Secretary and one board-member-at-large vacancies on the Board of Directors were reviewed. A number of member names were given to the President for Board consideration.

Dates for other Society annual meetings were given to the group: APA New York—May 4-9, 1996; SRBR—Amelia Island Plantation, Fla.—May 8-12, 1996, and APSS—Washington, D.C.—May 28 to June 2, 1996.

There were no other suggestions or recommendations from the audience.

VIII. President Elect's Report

Dr. Christian Gillin gave his thanks to Wilfried Köhler and his staff and students for an excellent meeting. Dr. Gillin's vision for SLTBR is to help create a national sleep research plan. The Society is doing well but increased new ideas, directions, and better management and administration are vital. Dr. Gillin also recognized and thanked many special guests that attended the meeting, with special thanks to the corporate sponsors/exhibitors. Finally, Dr. Gillin thanked Dr. Wirz-Justice for her leadership and accomplishments during her year as President of SLTBR.

FIRST EUROPEAN MEETING OF SLTBR HELD IN FRANKFURT

Report from the Seventh Annual Meeting of The Society for Light Treatment and Biological Rhythms, by Dan A. Oren.

June 9-11, 1995, Frankfurt am Main, Germany.

The first European-hosted meeting of our international society took place June 9-11 on the lovely campus of the Johann Wolfgang Goethe University with the Scientific Program being organized jointly by Ray Lam and Wilfried Köhler. Following a welcome by Wilfried Köhler and Anna Wirz-Justice, excellent overview lectures were presented by Frankfurt specialists G. Fleissner, H. W. Korf, and J. Stehle. In this observer's opinion, these opening lectures were a wonderful addition to the meeting, reviewing the state of the art in the basic science of circadian rhythmology and highlighting work done by researchers whose work should be of interest to more of our membership. Until our ever-expanding circle becomes wider, this format for inviting the expertise of fellow researchers who might not yet be presenting at SLTBR should prove valuable.

In another welcome innovation, the formal scientific presentations began with a well-attended poster session, moderated by Norman Rosenthal. Fresh off the jet from the USA, Norman was able to demonstrate that a vivid enthusiasm for light therapy and biological rhythms can conquer signs and symptoms of jetlag! The format was particularly conducive to highlighting the immense work that goes into preparing posters and to fostering give and take regarding the scientific issues.

Though a summary of this nature cannot do justice to the wide variety of presentations, I shall review some of the scientific work presented, with apologies to those researchers for whom space in this newsletter does not allow repetition of their results.

On the basic science level, Ivonne Balzer and Rüdiger Hardeland's work done at the Universität Göttingen demonstrating the effects of melatonin in the unicell organism *Gonyaulax polyedra* was presented along with their hypothesis that melatonin's evolutionary primary mode of action is one of detoxifying free radicals. Harald Murch and colleagues from Munich presented data suggesting that VIP has a phase advancing effect on sleep structure and on cortisol

secretion, possibly through action at the SCN. Helena Illnerová and colleagues from Prague and Worcester, Mass., demonstrated that expression of the light-induced *c-fos* gene in the rat suprachiasmatic nucleus is dependent upon photoperiod.

David Schlager and Joseph Schwartz presented fascinating epidemiological data emphasizing that observed nadirs of neo-natal mortality are coincident with seasonal birth peaks. Their graph showed twin peaks of neonatal mortality centering in May and October of each year. Since seasonal depressive syndromes are prevalent among reproductive age women at similar times of year, Schlager and Schwartz speculate that there may be some functional relationship between these circumstances.

In this era when researchers are paying particular attention to gender, Janis Anderson and colleagues from Harvard Medical School compared responses to the Seasonal Pattern Assessment Questionnaire between men and women and found that one possible explanation for the well-described gender differences in rates of SAD between men and women may lie in the possibility that men might be less likely to admit they have a depressive syndrome than women. If it were to turn out that these gender differences are due to psychology rather than physiology, it would suggest that current approaches to the biological study of SAD might benefit from more study of the psychological variables involved.

Konstantin Danilenko and Arcady Putilov presented data from the Institute of Physiology in Novosibirsk, Russia, demonstrating that certain non-seasonal risk factors for SAD, including brain injury and family problems, may be associated with SAD symptom profiles that do not fit typical profiles.

In the biological world, Gary Sachs and colleagues from Harvard presented preliminary data suggesting evidence of an association between increases in regional cerebral blood flow following light therapy in SAD patients who respond to light therapy. The work of Norio Ozaki and colleagues from the NIMH and NIAAA was not able to identify differences between a variety of serotonin-related genes in SAD patients versus normal controls. Given the potential importance of serotonin-regulation in depression and in circadian rhythms, the lack of difference found to date adds further challenges to researchers trying to explore the fundamental pathophysiology (ies?) of SAD. The work of Alexander Neumeister and colleagues from Vienna, however, supported serotonin hypotheses of SAD, as bright light

therapy-induced remission of SAD symptoms was interrupted by rapid depletion of dietary tryptophan.

The always-lively discussion of the value of light visors as treatment for SAD continued as Ybe Meesters and colleagues from Academic Hospital Groningen reported that wearing a light visor that produced infrared light is at least as effective as a light visor emitting bright white light. Clearly, resolution of the visor vs. placebo discussion will be of significant value to the field.

Stephen Deacon and Josephine Arendt of the University of Surrey, UK, shared their very important data demonstrating a dose-response relationship between acute ingestion of melatonin and its capacity to induce phase shifts in the biological clock. Their results show that an oral dose of melatonin as low as 0.05 mg administered at 1700h led to physiological night-time levels of plasma melatonin. As over-the-counter melatonin usage increases around the world, these kinds of data are particularly useful.

Formal presentations included Norman Rosenthal sharing the work of his group at NIMH that suggests a hypothalamic disturbance may be present in SAD. The NIMH's Thomas Wehr presented his team's intriguing data suggesting that the wintertime duration and amplitude of melatonin secretion in women is greater than in men, and that female SAD patients seemed to have less prominent changes in melatonin secretion than controls across the seasons.

In what has become an almost annual ritual, Michael and Juan Su Terman of Columbia University performed an elegant data analysis on their morning versus evening light therapy studies. Their current assessment regarding morning light therapy was that the greater the phase advance it induced, the more effective it was for SAD. Evening light phase shifts did not correlate with antidepressant responses. The most parsimonious way to interpret these data was that evening light might be a placebo, though they acknowledged that their data did not rule out the possibility that morning and evening light might have different therapeutic mechanisms of action.

A particular methodological contribution of the latest data from the NIMH and Columbia researchers is that nocturnal data may be necessary in order to observe some critical aspects of pathophysiology in SAD. Evening-only circadian rhythm data may be economical, but may lack full capacity to present a complete picture for circadian rhythm analysis.

Outgoing Society President Anna Wirz-Justice presented her team's data from Basel suggesting that early evening

administration of melatonin can phase advance circadian parameters of core body temperature and heart rate. They concluded that the phase advance of temperature was mediated via an immediate increase in heat loss together with an immediate decrease of heat production.

On the subject of temperature, this summary can not be properly concluded without acknowledging the warmth shown by meeting organizer Wilfried Köhler, local hosts Günther Fleissner and Gerta Fleissner, and the team of faculty and graduate students they assembled to create a genuine sense of welcome. The hospitality first evident in the opening night barbecue and the stunning and unprecedented sophistication of the Gala Banquet and Concert (not to mention the wit and wisdom of Jürgen Aschoff) set a standard that local hosts of future SLTBR meetings will be hard-pressed to match. Even if we can not replicate the physical environment of this Frankfurt conference, it would be a worthy goal to remember the positive emotional ambience created at this meeting. Now, more than ever, we are a scientific community, pursuing a mutual goal of understanding light and the biological clock and putting that understanding to practical clinical benefit. For insisting that SLTBR come of age in Europe, Anna Wirz-Justice deserves all of our thanks.

This summary represents the individual opinion of the author and does not necessarily represent the views of the U.S. Government or its National Institute of Mental Health.

REVIEW AND SUMMARY OF RECENT MEETINGS

Association of Professional Sleep Societies

The 9th Annual meeting of the Association of Professional Sleep Societies (APSS) was held at the Opryland Hotel in Nashville May 30-June 4. Setting the tone for the meeting was the first symposium entitled "Melatonin and Sleep", in which five perspectives on the hormone were presented. Julius Axelrod provided an informative review of the discovery of melatonin and its involvement with serotonergic systems. Gary Richardson presented the hypothesis that some humans will be responsive to melatonin at particular times, the "some" humans being those with melatonin receptors being expressed because of various modulatory factors (e.g., food intake), and "particular times" being when receptor sensitivity is optimal. Bob Sack discussed recent results of

shiftworkers' rhythms following melatonin-induced phase shifts. Dr. Sack supports the concept that melatonin will "work" when endogenous melatonin levels are low, but the role of endogenous melatonin is still unsolved. Wally Mendelson outlined evidence for the circadian timing signal role of melatonin, specifically describing its differential interpretation by the circadian system across diurnal and nocturnal species. Finally, Chuck Czeisler addressed the question of how endogenous melatonin is related to those roles ascribed to effects of exogenous melatonin. He presented data confirming that sleep propensity is indeed higher when melatonin levels are higher, but that individual melatonin levels are not predictive of sleepiness levels.

In a Clinical symposium on Insomnia, Mike Bonnet showed that physiological symptoms of hyperarousal can be documented in insomniacs with "sleep state misperception". Later in the meeting, Dr. Bonnet also presented data documenting differential levels of daytime sleepiness and metabolic rates in experimentally-induced versus "true" insomnia, suggesting that characteristics of insomnia are distinct from those of disrupted sleep. Carol Lamarche presented data indicating that insomniacs fail to exhibit the sharp decrease in alpha and increase in delta power characteristic of normal controls. Jack Edinger reported that performance levels obtained in the laboratory correlated with previous night's sleep quality obtained by home-based polysomnography, ruling out a laboratory effect on sleep as responsible for important performance changes and documenting impaired daytime performance following poor sleep.

Highlights from the first day's poster sessions included investigations of methods to facilitate adaptation following major phase shifts. Erin Hoese showed that moderate exercise can facilitate adaptation to a simulated nightwork shift, especially in evening types. In a study manipulating morning exposure to bright light and measuring subsequent adaptation to night work in terms of alertness levels, Charmane Eastman determined that exposure to morning bright light is associated with lower alertness levels during subsequent night shifts. Ulrich Hirschfield's poster documented a more salient effect of bright light than Zolpidem on phase shift adaptation, concluding that the sleep induced by a hypnotic compound will not lead as rapidly to the normalization of sleep architecture as does bright light. Saeeduddin Ahmed showed that low-intensity green light, a potentially more tolerable stimulus than bright white light, is as effective as bright white light at inducing phaseshifts following both morning and evening light in patients with Winter Depression. A lack of seasonal changes in melatonin levels (in individuals residing in Portland) was documented

by Neil Cutler. Epidemiology of sleep disorders in blind persons was described by Christian Guilleminault, who reported that of nearly one thousand blind person surveyed, a majority complain of nocturnal sleep disturbances. Katharine Rex added to the existing information on the enigmatic finding that light can shorten irregularly long menstrual cycles, but because bright light and dim light (white or red), starting either before or after bedtime, can decrease menstrual cycle length, the characteristics of this effect remain to be determined. Richard Kronauer suggested that "less may be more" when he presented a mathematical model for the super additive effects of intermittent light, in which short pulses of light produce circadian effects that are synergistic. The model estimates that light "pulses" exceeding no more than 20% of the duration of a continuous light period will produce 75% of the effect on phase and amplitude as would that duration of continuous light exposure.

In a symposium entitled "Sleep Deprivation", an investigation by David Dinges concluded that many neurobehavioral functions are predominantly influenced by homeostasis during sleep deprivation. In fact, the homeostatic component of sleep regulation exerts influence on the circadian component during sleep deprivation. Thermoregulation during sleep deprivation was addressed in a study by Carol Landis which demonstrated that following sleep deprivation, body temperature is lower and the thermoregulatory response to heating and cooling is more rapid than prior to sleep deprivation, but the homeostatic threshold for sweating is not altered. Michele McCarthy documented that sleep deprivation has profound effects on the orienting response; both cognitive performance and the response latency to new stimuli were affected following 36 hours of sleep deprivation. Ken Wright showed that caffeine affects body temperature and melatonin levels in a manner similar to bright light, and a combination of caffeine plus bright light significantly enhances performance and alertness levels throughout a 48 hour sleep deprivation period. Suzanne Woodward showed that sleep fragmentation in symptomatic menopausal women (those who have hot flashes) is more severe than in asymptomatic menopausal women, regardless of whether the fragmentation is induced by hot flashes.

A poster symposium on Human Melatonin Physiology again provided a colorful venue for supporters and skeptics of the melatonin story. Interesting data were presented by Steven Plenzler, who confirmed that salivary melatonin levels are reliable within individuals across nights, and Orna Tzischinsky, who showed a positive relationship between sleep start time and melatonin onset in adolescents during

the spring and summer seasons, but not in the fall following a phase advance of school start time. Patricia Murphy reported that melatonin levels are altered by administration of ibuprofen throughout a 48 hour constant routine. Bryan Myers demonstrated that a 12 hour bright light pulse on one night shows a carryover effect into the next night, attenuating the temperature but not the melatonin rhythm on the subsequent night. Also, 12 hour bright light pulses on consecutive nights continue to affect melatonin and body temperature similarly during both nights. Rachel Nave indicated that low doses of melatonin decreased sleep onset latencies during the evening when sleep propensity is presumably low. The Saturday symposium on Sleep and Behavior was replete with studies documenting the chronic sleep debt owed by humans and its consequences. Michael Harnish reported that the nutritional content of a meal does not differentially affect postprandial sleepiness, but a solid meal results in more sleepiness than a water meal. Shawn Youngstedt reported that sleep disturbances of caffeine-induced insomnia are not significantly attenuated by exercise, although exercise alone does enhance SWS and decrease REM sleep.

The final day of the meeting held many stimulating presentations. The Sunday symposium entitled "Photic Manipulation of Circadian Rhythms" included the Young Investigator Award presentation by Megan Jewett which addressed the question of whether a single bright light pulse induces Type 0 or Type 1 resetting in humans. Based on previous models of the circadian system, Jewett proposed that the human circadian system is both a phase and amplitude system, and determined that Type 1 resetting occurs with a single pulse of bright light. Julie Carrier showed that three nights of evening bright light exposure had minimal effects on slow wave activity. Chuck Czeisler showed that moderately bright light (1260 lux) effectively shifts both TRH and cortisol rhythms. Charmane Eastman gave a rousing presentation in which she demonstrated that appropriately timed bright light will facilitate adaptation to phase shifts, but one must be careful in determining for a given individual the appropriate lighting regimen. When light effects conflict with the desired effect, adaptation is severely impeded, especially if a phase advance is desired.

Circadian rhythm manipulations and their consequences in elderly subjects were the main topics of a symposium on Aging. Tim Monk presented solid evidence that the temperature rhythm in older persons may not necessarily be reduced, especially in older women relative to younger men. Don Bliwise showed thought-provoking data indicating that the temperature nadir was earlier in nursing home subjects

who were closer to death. Michael Vitiello addressed the relationship between growth hormone secretion and sleep quality in older men and women. Endurance training stimulated growth hormone secretion, although subsequent sleep enhancement appeared more related to initial sleep quality rather than to the interim change in growth hormone levels. Nava Zisapel added to the melatonin story by claiming that low doses of exogenous melatonin will improve sleep in subjects with pharmacologically suppressed melatonin levels.

A lecture on melatonin effects in humans was given by Richard Wurtman near the end of the meeting. Dr. Wurtman described his laboratory's data concerning effects of low melatonin doses in old and young subjects. He spoke of how melatonin is a hypnotic in the strictest sense, and not only a circadian timing signal, if at all. It is this lecture that is the basis of an informal discussion presented in this issue.

In general, the system in which clinical, basic, and human research are simultaneously tracked worked well as in the past, and registrants were generally able to attend the presentations of their choice. One drawback, however, was the sheer number of posters, presented both in oral symposia and en masse in the exhibition hall. While it was a well-intentioned idea to place symposia posters in (or near) the room in which they would be discussed, many of the rooms were in use until sometimes 45 minutes prior to the oral presentations. The effect of separating the locations of the posters combined with a short 1-hr viewing window resulted in rushed or missed conversations with the authors.

Perhaps this reviewer's bias will be exposed, but it seemed the most impassioned and engaging conversations of the meeting concerned melatonin. The pervasive investigations of bright light effects on circadian rhythmicity and behavior from recent years appear to have been supplanted by studies involving both endogenous and exogenous melatonin. This was apparent in the number of presentations concerning the hormone, as well as the attendance at these presentations, which often resulted in standing room only. Additionally, discussions of melatonin and its putative actions were a uniting topic among basic and human researchers and clinicians.

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Abstracts presented at the meeting are published in *Sleep Research*, Volume 24. Copies of this volume may be obtained upon request from the Association of Professional Sleep Societies, 1610 14th Street N.W, Suite 300, Rochester, MN, 55901, or by calling (507) 287-6006.

International Symposium on Night- and Shiftwork

Under the direction of the Scientific Committee on Night- and Shiftwork, a working group of the International Commission on Occupational Health, the International Symposium on Night- and Shiftwork was held for the first time in North America June 13-18 in Ledyard, Conn. It certainly was a good occasion to get acquainted with the most recent facts and questions in this active research area.

The official theme of the symposium was "Working Towards Solutions," but to me the unofficial theme was communication. International communication, since the 160 participants represented 28 different countries, but also communication between all kinds of people involved in the management of night- and shiftwork: field and lab researchers, physicians, consultants, union representatives, shiftworkers, health care professionals, etc.

The Symposium began with an opening lecture given by Dr. T. Åkerstedt. First, Dr. Åkerstedt reminded the participants that the main challenge to shiftwork research is to find how to increase alertness during the night shift and to decrease chronic fatigue in workers. He then provided a quite extensive review of the different solutions used to increase alertness during the night. Noise and cooling seem to be efficient ways to reduce sleepiness if you don't mind making workers uncomfortable and quite irritated. Breaks, physical activity and caffeine have a good immediate effect on alertness, but of very brief duration. Naps (20-30 min of sleep) are quite efficient and have a strong effect of intermediate duration. However, the presence of sleep inertia delays the increase in alertness for almost half an hour following termination of the nap. Bright light seems very promising since it decreases sleepiness and the stimulating effect lasts for some time after the end of light exposure.

This lecture was a very good warm-up to the Symposium since many presentations during the following days concerned laboratory and field research on the use of noise, breaks, naps and stimulants during night shifts. However, bright light research was clearly under-represented probably because of the almost simultaneous timing of the meeting of the SLTBR in Frankfurt. Dr. Bougrine from France pre-

sented results showing that three cycles of bright light from 0200h to 0500h in permanent night workers was efficient to induce resynchronization and that it was not disturbed by two days off every six days. They applied bright light exposure in real shiftworkers and compared adaptation between light-exposed and non-exposed workers. After only three days of bright light exposure, the authors observed a better adaptation as measured by sleep duration and quality, mood and fatigue, and salivary melatonin rhythm. In a laboratory study simulating a 12-week shift rotation schedule, Neri and colleagues showed that a regimen of bright light during work episodes, and darkness during sleep episodes, prevents the performance decline usually observed during the night shift.

Other themes which attracted considerable research attention were the scheduling of rotating shiftwork (speed of rotation, number of consecutive nights), duration of night shifts (8-10-12-h shifts), social and familial consequences of nightwork, effects of shiftwork on sleep and health, and the contribution of workload to the effects of nightwork.

In addition to traditional oral and poster presentations, the meeting also included some special features. One was a session on shiftwork consultation where three professional consultants explained the nature of their approach to organizations' problems with shiftwork. It was very obvious that consultants and researchers live in two different worlds. Consultants have a very global approach, since they have to include all aspects of an organization in their evaluation of a situation. They have no way to control variables and select specific subjects and, as underlined by Dr. Moore-Ede, "In consulting, bias is good," meaning that they have to create positive expectations from the management and from the workers. At one point, discussion began to take a less friendly tone. One consultant was complaining about the fact that too many studies were conducted in laboratories, implying that if he cannot use it, it was useless. Some researchers, quite shocked by this affirmation, replied that if the consultants would share the vast data bases they accumulate in their work, then the researchers would work less in the dark. But, in consulting, information is money and researchers felt that their work is used, while at the same time, they are deprived of all feedback on the practical applications of their results in the real world. In the end, all three consultants maintained that they were not opposed to information exchange, and the special session ended with some promise of future collaboration.

Other special features of the Symposium were the Evening and Night Shifts. The Symposium was taking place at the

Foxwoods Resort and Casino, owned by the Mashantucket Pequot Tribe. The Casino operates on a 24-h basis and, on the first night, symposium participants were invited to a tour of the installation. I declined this invitation since, as a sleep researcher, I have more than enough first-hand experience with night shifts. I heard that it was interesting. The Evening Shifts were quite fun. These consisted of debates on themes related to shiftwork, first about the use of the Standard Shiftwork Index, and second about the best number of nights in a row in a rotating schedule. After presentations of two opposite points of view, all participants were invited to discuss the question around tables of eight to ten people, while enjoying free beer and wine. Spirits were high, discussion lively and, naturally, none of the questions got a definite and unanimous answer.

The symposium was very well organized, thanks to Prof. Donald Tepas who chaired the symposium organizing committee, with the help of R.J. Holzworth, T. Monk and M. Paley. It was a long and intensive meeting, with presentations all day, group lunches, evening shifts and a nice evening cruise on the Connecticut River. For five days, participants lived closely together and the variety in nationalities, as well as in fields of expertise, made this symposium a very stimulating experience. The Symposium was appreciated by all participants, and we were all very grateful to Dr. Tepas for having instilled some of his friendly personality into the meeting.

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American Physiological Society Conference— "Understanding the Biological Clock: From Genetics To Physiology"

The 1995 American Physiological Society (APS) Conference entitled "Understanding the Biological Clock: From Genetics to Physiology", organized by Jay Dunlap and Jennifer Loros, was held from July 8-12, 1995, on the campus of Dartmouth College in Hanover, NH, a small and very quiet New England town. The conference was a special opportunity for the 249 participants to interact with colleagues from all the fields of biological rhythms research, and an occasion for the nine study groups involved in the editing of

a textbook on genetic and physiological analyses of circadian clock to meet.

The first day of the conference focused on the molecular analysis of circadian oscillators. The participants in this symposium presented results of chronogenetic investigations in a variety of species (e.g. *Drosophila*, fungus, mouse). We learned about the latest developments in the use of genetic mapping and the molecular characterization of genes involved in the production of clock molecules. For example, J. Takahashi presented work on the Clock mutation in the mouse. Genetic mapping allowed his group to place Clock on the midportion of chromosome 5. At least three circadian properties are altered by the Clock mutation: the steady-state period, the sustained expression of rhythmicity and the phase shifting response to light.

The second day of the conference was dedicated to analyses of circadian clocks at the level of cells and tissues. Among the various presentations, R.G. Foster presented studies on circadian photoreceptors in the mouse. Results obtained by this group from rodless transgenic mice corroborated the notion that rod photoreceptors are not required for circadian responses to light. Results presented by T. Roenneberg on feedback loops in the circadian system of *Gonyaulax Polyedra* also reminded us that "the circadian system is a highly adaptive timing system, which actively samples the environment for the availability of important resources".

The third day of the conference focused on circadian and circannual rhythms in organisms. In the symposium entitled "Human Circadian Control, Physiology and Clinical Applications", J. Arendt reviewed data on the acute and phase-shifting effects of orally administered melatonin on human circadian rhythms. She pointed out that, in time zone change and shift-work, melatonin is clearly able to enhance the rate of adaptation of many behavioral and hormonal circadian rhythms when it is used to reinforce ambient time cues. She also showed a significant dose-response relationship between oral melatonin, the magnitude of temperature suppression and the degree of phase shift in the endogenous melatonin and temperature rhythms, suggesting that the acute changes in body temperature produced by melatonin may be a primary component of the phase-shifting mechanism. C. Czeisler discussed the resetting properties of light in humans. He also presented part of his work with D. Boivin on the dose response curve to light in humans. Contrary to previous conceptions, it seems that the human circadian system can be entrained by a light intensity as low as 180 lux. T. Wehr talked about the ability of human biological systems to respond to simulated changes in length of photoperiod.

However, naturalistic studies on circadian rhythmicity in winter and in summer challenge such results: normal women showed an increased duration of melatonin secretion during winter, but for normal men and women with SAD duration of melatonin secretion did not change with seasons. Leiner reviewed data on the input of the clock on the cardiovascular system. Finally, D.-J. Dijk discussed the circadian regulation of human sleep. He demonstrated, from data obtained with the forced desynchrony protocol, the contribution of both circadian modulation and the sleep homeostat to sleep propensity, sleep structure, slow-wave activity and spindle activity; he also pointed out that the phase relationship between the sleep-wake cycle and the circadian pacemaker during entrainment promotes the consolidation of sleep and wakefulness.

On the last day of the conference, each study group presented the highlights of their book chapter. These chapters cover, among other subjects: properties of clocks at the organismal level, functional organization of animal circadian systems, clocks at the cellular and subcellular levels, clock regulation of gene expression, behavioral and ecological relevance of clocks, photoperiodism and circannual rhythms and the basic physiology of human timing systems. The chapter from the study group on "Clocks and Human Biology: Clinical Aspects", written by A. Wirz-Justice, J. Arendt, S. Campbell, W. Hrushesky, B. Lemmer, A. Lewy and M. Terman, will be of special interest for the members of the SLTBR and their students. This chapter presents sections on disturbances of circadian rhythms and their treatment by manipulation of the circadian system, the role of circadian and seasonal rhythms in depression and manic-depressive illness, and the impact of daily rhythms on the manifestations, diagnoses and treatment of other disturbances.

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FLASH(LIGHT) POLL RESULTS

The Flash(light) Poll solicits opinion from the membership, primarily in the form of a yes/no response, concerning a current, hopefully provocative, issue. The feature was introduced in the October, 1994 issue of LTBR. Here, the results of the latest poll are presented.

The issue for debate was: *"I believe that researchers should be responsible for the accuracy of Institutional press releases describing the researchers' work."*

This poll issue stemmed from my editorial in the last LTBR entitled, "The fine art of overstatement." In that piece, I suggested that we, as suppliers of the scientific fodder often used in press releases by our institutions, should hold ourselves responsible for the accuracy with which that information is reported. Most respondents agreed, in principle, with this argument, though several of you emphasized the potential difficulties associated with putting this principle into action.

At this point in the Results column, I usually provide statistics on the characteristics of our sample; a breakdown by profession, nationality and mode of responding. However, as only 25 members chose to respond to our current issue, I could, in the same space, print each respondent's name! Thus, we will dispense with demographics and go straight to the results.

Of the 25 respondents, 17 (68%) believed that researchers should be responsible for the accuracy of Institutional press releases describing the researchers' work. Only four individuals believed the opposite. (Three respondents provided comments, but did not see fit to give a yes/no answer. One member's faxed response was unreadable)

Several comments accompanying the "YES" response were, more precisely, "YES, but . . ." responses:

Leon Lack (Flinders Univ., Adelaide, S.A.) provided a stunning example. He wrote,

"You can give an accurate and unexaggerated story and even vet the story for accuracy, but you can't stop a sub-editor from [subsequently] giving it a sensationalized headline."

Along with his response form, Leon sent me a copy of a newspaper story concerning his lab's research on body temperature and insomnia. The headline read: A CASE OF THE BED TIME HOTS

Another "Yes" respondent expressed a similar view.

"While [researchers] may not be able to control what eventually gets published . . . they do have responsibility for circumspection in interpreting their findings."

"NO" respondents argued that the problem is out of our hands:

"Don't make people responsible for things over which they have no control."

"Committee meets — release is formulated — release goes to Executive Director — release goes to Press" "It's a hell of a lot of work and impossible to achieve."

Finally, we heard from one science writer, who wrote the following:

"I suggest SLBTR members read "Communicating Science News," a guide for scientists, physicians, and public information officers prepared by the National Association of Science Writers. It's \$3, postage included. For copies, send a check to the NASW at P.O. Box 294, Greenlawn, NY 11740."

BOOK REVIEW

A BOOK FOR ALL SEASONS

*Seasonality and Human Ecology—35th Symposium
Volume of the Society for the Study of Human Biology*
Edited by S. J. Ulijaszek and S.S. Strickland
250 pp., U.S. \$64.95

The book is a compilation of papers discussed at the Society for the Study of Human Biology Symposium on Seasonality and Human Ecology, held in April 1992 at the University of Cambridge. Included are papers from biologists, anthropologists, physiologists, and nutritionists which consider various ways in which seasonality influences human biology and behavior.

Topics addressed include the influence of seasonality on hominid evolution, seasonal climatic effects on human physiology, fertility, and physical growth, seasonality in morbidity, mortality, and nutritional status, and seasonal factors in food production, modernization, and work organization in Third World economies.

Chapters of particular interest include one by anthropologist R. A. Foley on the influence of seasonality on hominid evo-

lution. This chapter considers the importance of seasonal extremes and deprivations as agents of selection and provides an especially rare and readable review of the timeframes and geographical radiations of hominid evolution. Another chapter, by M. A. Stroud provides an overview of thermoregulation across a broad range of environmental temperatures, concluding that adaptations to heat are well-understood and largely physiologic while adaptations to cold are less effective overall and, in humans, largely behavioral. D. L. Ingram and M. J. Dauncey provide a brief, broad, and by now somewhat dated overview of the neurobiology of seasonality, including melatonin and light, SAD, and seasonal breeding in humans. Other selected chapters include seasonal effects on physical growth and development by T. J. Cole, the dimensions of seasonal undernutrition by A. Ferro-Luzzi and F. Branca, agriculture, modernization, and seasonality by R. A. Huss-Ashmore, and seasonal organization of work patterns by C. Panter-Brick.

The breadth of topics considered under the rubric of seasonality renders the book of both limited and special value for those interested in seasonal rhythms of mood and behavior. In reading it, one is impressed by several recurrent themes. First that seasonality is a periodicity that is manifest at all levels of human organization from the molecular to the social and macroeconomic. Second, that recent and rapid socioeconomic changes have surely altered but not eliminated seasonal strategies almost everywhere in the world. Third, that the forms of seasonal adaptations are quite varied, sensitive as they are to local ecological conditions, and thus a diversity of responses, even within relatively small areas and short time periods, can be appreciated. The latter are sobering but probably important reminders for workers trying to study and make sense of data flowing from different ethnic and geographic sources. Overall, the book provides a rich single source of references and information on avenues of research relevant to the thinking if not all the actual work in our field.

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BULLETIN BOARD

Welcome New Members

A warm welcome to the following new members who have joined the society since the publication of the June issue of *LTBR*.

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Position Available

The Institute for Circadian Physiology, One Alewife Center, Cambridge, MA 02140-2317, seeks a Director to guide its future scientific program and development. ICP is an independent non-profit (501.c.3) organization established in 1988. It aims to determine the most effective and healthy ways to adapt the human circadian system to the work, rest and travel schedules demanded by the contemporary industrial and professional world. It includes several basic and applied research laboratories in the areas of biological rhythms, sleep, alertness, fatigue and performance.

With the award of a multi-year corporate commitment to support the Institute's development and expansion, the Board of Trustees is recruiting a full-time Director/CEO. Applicants must possess a doctorate degree, a distinguished ca-

reer of scientific achievement in circadian physiology or a related field, and demonstrated vision and capacity for leadership and advocacy of the Institute's programs. The Director will lead a research team as well as manage and oversee the entire program. Responsibilities include fiscal and operating activities and supervision of a development office. There are opportunities for recruitment of senior scientific staff, facilities expansion and university liaisons.

At the Trustees' request, an external Search Committee has been formed that includes Alexander A. Borbély, M.D. (University of Zurich), Tom B. Leamon, Ph.D. (Liberty Mutual Research Center for Safety and Health), Michael Terman, Ph.D., Chair (Columbia University) and Thomas A. Wehr, M.D. (National Institute of Mental Health). Confidential inquiries, and letters of application with curriculum vitae and listing of five references, may be sent to Dr. Terman at NYSPI Unit 50, 722 West 168th Street, New York, NY 10032; fax (212) 960-2584.

LIGHT SYMPOSIUM CONFERENCE

October 9-11, 1995, Atlanta, Georgia. For information contact Dr. Michael Hollick, Boston University School of Medicine, 80 E. Concord St., M-1013, Boston, MA 02118 USA. Tel 617-638-4545; Fax 617-638-8882.

AUSTRALASIAN SLEEP ASSOCIATION ANNUAL CONFERENCE

March 28-29, 1996, Perth, Australia. For information contact Dr. John Wheatley, Department of Respiratory Medicine, Westmead Hospital, Westmead NSW 2145, Australia. Tel 61-2-633-6797; Fax 61-2-893-9060.

THIRTEENTH CONGRESS OF THE EUROPEAN SLEEP RESEARCH SOCIETY

June 16-21, 1996, Brussels, Belgium. Tel 32-2-647-87-80; Fax 32-2-640-66-97.



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