munication — conversations with new friends or travels to learn experimental skills in laboratories specialized in the area he wanted to investigate. In this way he became a kind of specialist in the hybridization of academic disciplines. In Stockholm, his work on cosmic physics was developed through interaction with a meteorologist, a geologist, an astronomer and a physico-chemist. Arrhenius never wanted to secure an institutional basis for his informal research group. He did the same when he entered biochemistry through his collaboration with a Danish scientist, Madsen.

Instead of spending time developing institutions, he devoted his energy to controversies — with Nernst and Ehrlich for instance — and to popular lectures and writing that extended his fame far beyond a circle of academic scientists. Crawford

argues that there was a public audience for science in Sweden when the Nobel prizes were founded. This reinforced Arrhenius's reputation and provided him with a well-equipped Nobel Institute for Physical Chemistry. Despite the marginal and nonacademic style he had chosen, Arrhenius became a central figure and a powerful international academic authority.

Crawford not only reveals the diversity of Arrhenius's contributions to science but also opens a window on the international scientific community of a century ago. Her book does more than fill a biographical gap. □

Bernadette Bensaude-Vincent is in the Department of Philosophy, Université de Paris X, 200 Avenue de la République, 92001 Nanterre Cedex, France.

To sleep, perchance to learn

Mary A. Carskadon

The Enchanted World of Sleep. By Peretz Lavie. Yale University Press: 1996. Pp. 270. \$27.50, £18.95.

PERETZ Lavie weaves a magical spell about sleep science through an often personal yet scientifically accurate vision in this very readable small book. Originally written in Hebrew and received with popular acclaim in Israel, the English translation retains its charm for the lay reader and interested scientist alike.

Two principal features contribute to the reader's enjoyment. The first is Lavie's penchant for providing historical context and human-interest insights about the investigators who have been instrumental in unmasking sleep's mysteries. The second feature is afforded by the broad landscape of Lavie's own research experience, which allows him to explain difficult concepts with data conjured up in his own laboratory.

The foreword by Michel Jouvet begins the enchantment with a primordial view of life's rhythms. Lavie then whisks forward to the present-day sleep laboratory for an entrancing tale of sleep and dreams. He traces Greek and Judaic traditions and quickly moves from the theories of Alcmaeon to Pavlovian conditioning. Modern approaches to studying the sleeping brain are described with clarity, from the primitive electroencephalograph recordings of Caton and Beck to the tale of Hans Berger, of whose tragic demise we also learn. (Just when the reader begins to wonder how anyone can possibly sleep while all wired up in the laboratory, Lavie reveals that more than 15,000 people have been studied in the Technion Sleep Laboratory — and those who have failed to fall asleep can be num-

bered on the fingers of one's hands.)

Lavie is at his best when he profiles sleep researchers. We learn, for example, that Nathaniel Kleitman, born in Russia, found his way to the University of Chicago by way of Beirut, Rhodes, Columbia University and the University of Georgia. Kleitman's passionate investment in the study of sleep, if not academic suicide, certainly was not regarded by him as the academic fast track. The account of the seminal years at Kleitman's Chicago laboratory gives readers a front-row view of the discovery of rapid eye movement (REM) sleep.

The normal rhythms of sleep and wakefulness, the ebb and flow of REM and non-REM sleep, are given great salience by Lavie's descriptions of "sleep gates" and "forbidden zones" for sleep of the pineal gland, and of the "darkness hormone", melatonin. Lavie also describes his own theory that REM sleep functions to provide a "gateway to wakefulness" during the night, the glue that permits sleep to consolidate. We learn, too, of another REM theory, proposed by Francis Crick. It is delicious to read Lavie's description of his own patient — an Israeli defence-force veteran with a shrapnel wound to his brain stem who had no REM sleep — and to listen in on Lavie's conversations with Crick about the implications of this patient's condition for Crick's theory.

Lavie introduces the main sleep disorders, always giving a central example to aid understanding. Situational insomnia, for example, is made more meaningful by reading of the sleep problems many experienced during the Gulf War under the threat of Scud missile attacks. Then we learn of Lavie's creative population-wide cure for situational insomnia. And the psychological role that the persistence of a

Sweet dreams: the sleep laboratory unlocks the secrets of slumber.

sleep disorder plays for some patients is eloquently portrayed by citing Proust's aunt in *Remembrance of Things Past*. Lady Macbeth, Sancho Panza, Stephen Jay Gould, Constantin von Economo, Oliver Sacks, Holocaust victims, Robert Louis Stevenson, Lavie's mentors, colleagues and students, and many more populate these pages and enrich the work.

Lavie has produced a literate, informative and entertaining read for those who wish to delve into the mystic realms of sleep and dreams. □

Mary A. Carskadon is at Brown University School of Medicine and at the Sleep Research Laboratory, E. P. Bradley Hospital, 1011 Veterans Memorial Parkway, East Providence, Rhode Island 02915, USA.

... and writing, reading, talking

The World on Paper: The Conceptual and Cognitive Implications of Writing and Reading by David R. Olson. Cambridge University Press, £12.95 (pbk). Reviewing the hardback edition in these pages, John C. Marshall described the book as "fascinating (and infuriating).... [The author's] grandiose claim is that we 'read' both the book of nature and the book of humanity differently after the world has been put on paper". "On my reading of his text at least," Marshall concluded, "the counter-evidence far outweighs the corroboration". *Nature* **371**, 665 (1994).

Language, Learnability and Language Development by Steven Pinker. Harvard University Press, \$18.95, £12.50 (pbk). A classic study presenting a comprehensive theory of child language acquisition. First published in 1984, it is now reprinted with a new commentary by the author that updates every section.