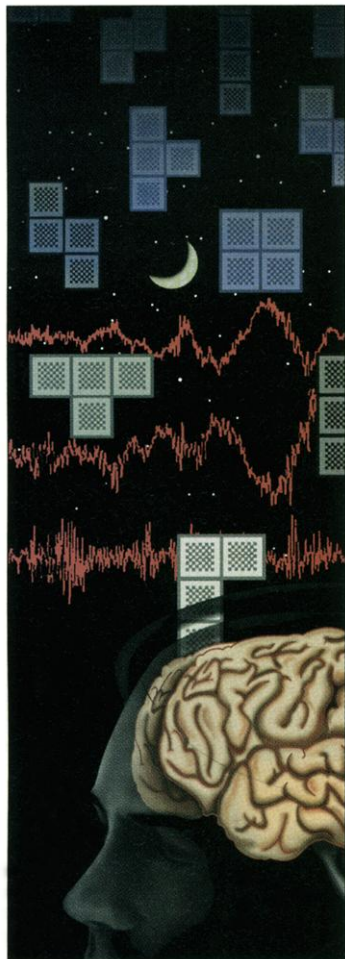


Sweet Dreams Are Made of This

Dreams have always fascinated humans, and throughout history there have been numerous hypotheses and speculations concerning their meaning and function. However, only in the second half of the 20th century, after the introduction of electroencephalographic recordings and the discovery of rapid eye movement (REM) sleep, have these phenomena been the subject of serious scientific investigation. It is amazing that we can make incredibly accurate predictions about the movement or the composition of stars in galaxies millions of light years away while,



much much closer to home, many crucial processes in our own heads remain shrouded in mystery. Every human being experiences the phenomena of sleep and dreams, and most people take them for granted without ever questioning what their biological purpose might be. There have always been teleological arguments for why we need to sleep, but they can mostly be dismissed as descriptive without any real explanatory value. Indeed, why do homeothermic animals need to rest and sleep at all, which makes them particularly vulnerable to predators? Wouldn't it be better and more efficient if they were up and running 24 hours a day? So it seems even more mysterious that during sleep we also experience periods of dreaming, with their sometimes bizarre, incoherent, and highly unpredictable contents.

A large body of literature about dreaming has been assembled over recent years. In this special issue of *Science*, we have tried to take stock and review the present state of our knowledge concerning sleep and dreams and their relation to memory, and we have also tried to indicate the blank spaces on our map. Maquet (p. 1048) reviews the recent literature on the role of sleep for memory formation and puts forward a testable hypothesis concerning the task of experience-dependent reactivation of neuronal populations. Stickgold *et al.* (p. 1052) deal with the function of sleep, particularly REM sleep, and dreaming for the consolidation of learning and memory tasks. They outline the requirements that should be expected for a comprehensive theory of dreaming. And finally, Siegel (p. 1058) critically reviews the available literature and questions the REM sleep-memory consolidation hypothesis. There is still a lot of conflicting evidence, as well as methodological difficulties, unproven assumptions, and neglected alternative interpretations. By highlighting the holes in the existing theories, we hope this review will be a challenge for scientists working in this field and will stimulate them to improve their experiments and reassess some assumptions and hypotheses they may have taken for granted. To sleep: perchance to query.

—PETER STERN

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See also *Science's STKE* (p. 951 and stke.sciencemag.org) and special *News Focus* on addictions beginning on p. 980.

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