sleep-waking rhythm and that of body temperature. Circadian rhythms of several sleep variables in monkeys were described by Crowley, Kripke, Pegram, and Schildkraut. Like man, the monkey was diurnal. Acrophase of temperature (or fitted peak) led that of the awake stage by only ½ hour and the fitted nadir of temperature was almost exactly in phase with stage non-REM sleep.

Such rhythms have been shown by Stroebel to undergo change in period and amplitude when monkeys are subjected to behavioral stress, changes which are reversed by phenothiazine medication. Periodic sleep attacks in man have been studied by Passouant with respect to their ultradian rhythmicity. Both the periodicity and manifestations of these narcoleptic attacks suggest that they represent loss of control of a clocklike REM generator which is normally damped in waking and released only in sleep. Treatment with amphetamines, imipramine, or monoamine oxidase inhibitors may help control this disorder. The evidence for the continuous operation of this 90-minute ultradian rhythm in man, the "basic rest-activity cycle," was reviewed by Kleitman.

The ubiquity of rhythms in plant and animal life suggests the operation of primitive, relatively simple, probably chemical mechanisms, operating even in single cells, of which sleep may be a complex but partially derivative manifestation. Thus the study of rhythms in single neurons provides a model for the study of sleep. The responsiveness of cat brain stem neurons was found by the Scheibels to undergo cyclic variation over a 3- to 6-hour period; a 2- to 4-hour period of sensitivity to exteroceptive inputs was followed by a 1- to 2-hour period of nonresponsiveness during which several presumed interoceptively generated patterns were observed. Strumwasser described a circadian rhythm of impulse activity emitted by a neurosecretory neuron in the isolated parietovisceral ganglion of the sea hare *Aplysia*. It thus seems possible that nerve cells contain endogenous programs of activity which operate by cytoplasmic mechanisms that couple to the excitable membrane; these cellular clocks may be related to the circadian rest-activity cycle demonstrated by time-lapse cinematography of the intact organism.

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