

biological sciences

From our reporter at a symposium of the International Society for the Study of Biological Rhythms last week in Little Rock, Ark.

Sleep-wake patterns

Mounting evidence suggests that persons can alter their sleep-wake cycle without apparently harming their health. Over the past six years, for example, some 120 volunteers have moved into underground bunkers at the Max Planck Institute in Erling-Andechs, Germany, for periods of three weeks to three months. During their stay, their sleep-wake patterns were allowed to fluctuate freely. Some individuals switched to a 22-hour cycle, others to a cycle up to 48 hours; the mean oscillation was about 25 hours, Jürgen Kriebel, a neurologist at the institute and a study participant, reported. Michel Siffre of Nice, France, described similar studies he had participated in. One person changed to a 48-hour routine for three months, without apparent fatigue.

In both the German and French experiments, though, subjects tended to get the same amount of sleep over the long run as they did when above ground and adhering to the usual 24-hour cycle. This suggests that their sleep needs remained constant. Lothar Werthheimer of the New York Medical College in New York City, however, believes that a person can consciously cut back on his sleep without endangering his health. Over the years he has reduced his nightly sleep intake to three or four hours, with apparently no ill effects.

Male sex cycles and moods

Women are notorious for turning into witches at the time of menstruation. Indeed, Gerhard Mall of Landeck, West Germany, reported that acute psychiatric episodes in women have been linked with the menstrual cycle and that some of these episodes have been suppressed by giving patients ovulation-inhibiting drugs. Yet scant scientific attention has been directed to whether sex hormonal and cell fluctuations might turn a man into a warlock. It is now known, however, that various male hormones do follow rhythmic cycles, although these oscillations have not been pinned down well. Sperm cells mature in about 27 days, beard-hair follicles in about 16 to 20 days. However sperm cells, like hair cells, are not necessarily in phase with one another as they grow. Hence sperm maturation and beard growth are continuing processes—unlike ovulation and menstruation—and difficult to link with a male's moods. Nonetheless some scientists at the symposium believe there may be a correlation between these various cell and hormonal cycles and a man's emotional and behavioral states.

Jet lag and body rhythms

As jet travel becomes more and more prevalent, scientists are looking into its effects on man's various body rhythms—heartbeat, temperature, sleep patterns, mental alertness, biochemical hormonal excretion. Jet-travel upsets of biological cycles—dubbed jet lag—are well documented and, according to Karl Klein of the Institute for Flight Medicine, Bonn-Bad Godesberg, West Germany, they are due more to stress than to the time in flight.

Individuals recuperate at different rates, Klein says. Also various rhythmic cycles within an individual re-

cover at varying speeds. Some may recover within one or two days, others might take a week or two. Although temperature cycles are usually back to normal within a week, isolation of subjects after flights has kept their temperature from rephasing for 15 days. Thus Klein advises travelers to move into a new routine quickly after a flight, rather than stay in their hotel rooms, so that their rhythms might get back into phase quicker. Flying east is harder on body rhythms than flying west, Klein says, because a person loses more sleep flying east.

Saliva rhythms and toothbrushing

Saliva, one of the less elegant body fluids, is moving into the limelight as a diagnostic and preventive medicine tool. Saliva was recently discovered, for example, to contain more of the enzyme alkaline phosphatase immediately before a woman ovulates. As a result saliva samples are now being tested clinically as a birth control aid. Saliva is also being used to diagnose cystic fibrosis because the sodium content of the fluid seems to be higher in persons with the disease. Now Colin Dawes of the University of Manitoba dental school reports that saliva studies have given a boost to preventive dental care.

Persons swallow only 10 to 20 times while sleeping, Dawes says, and thus salivate very little. So if a person is going to brush his teeth only once a day, the best time is immediately before going to bed. Otherwise bacteria will have a heyday metabolizing food particles that saliva would probably dislodge from teeth during the daytime.

Drug effectiveness and biochemical rhythms

The hows and whens of drug effectiveness or drug toxicity in animals and man are far from understood. Some studies suggest, however, that fluctuations in natural body chemicals might at least partially explain drug activity and erraticism.

A case in point. When Alexander Friedman of Loyola University in Illinois examined amine compounds in brain cells, he found that histamine levels correlated with the animals' wakefulness. A common side effect of cold tablets and other antihistamine drugs is drowsiness. Thus Friedman concludes that the ability of antihistamines to cause drowsiness probably results from their dampening histamine's role in keeping an organism alert.

Similarly Friedman found that the content of glycine, an amino acid, in the lower brain stem fluctuates. These rhythmic patterns, he believes, might explain why the poison strychnine—a blocker of spinal cord glycine—is more effective (toxic) at certain times of the day.

Daily fluctuations in liver enzymes can influence the effectiveness of drugs, Velayudhan Nair of the Michael Reese Hospital Psychiatric Institute in Chicago reported. He has found the anesthetic hexobarbital to be more effective in rats in the daytime because their liver enzymes are more active at night. He assumes the opposite situation would exist for humans.