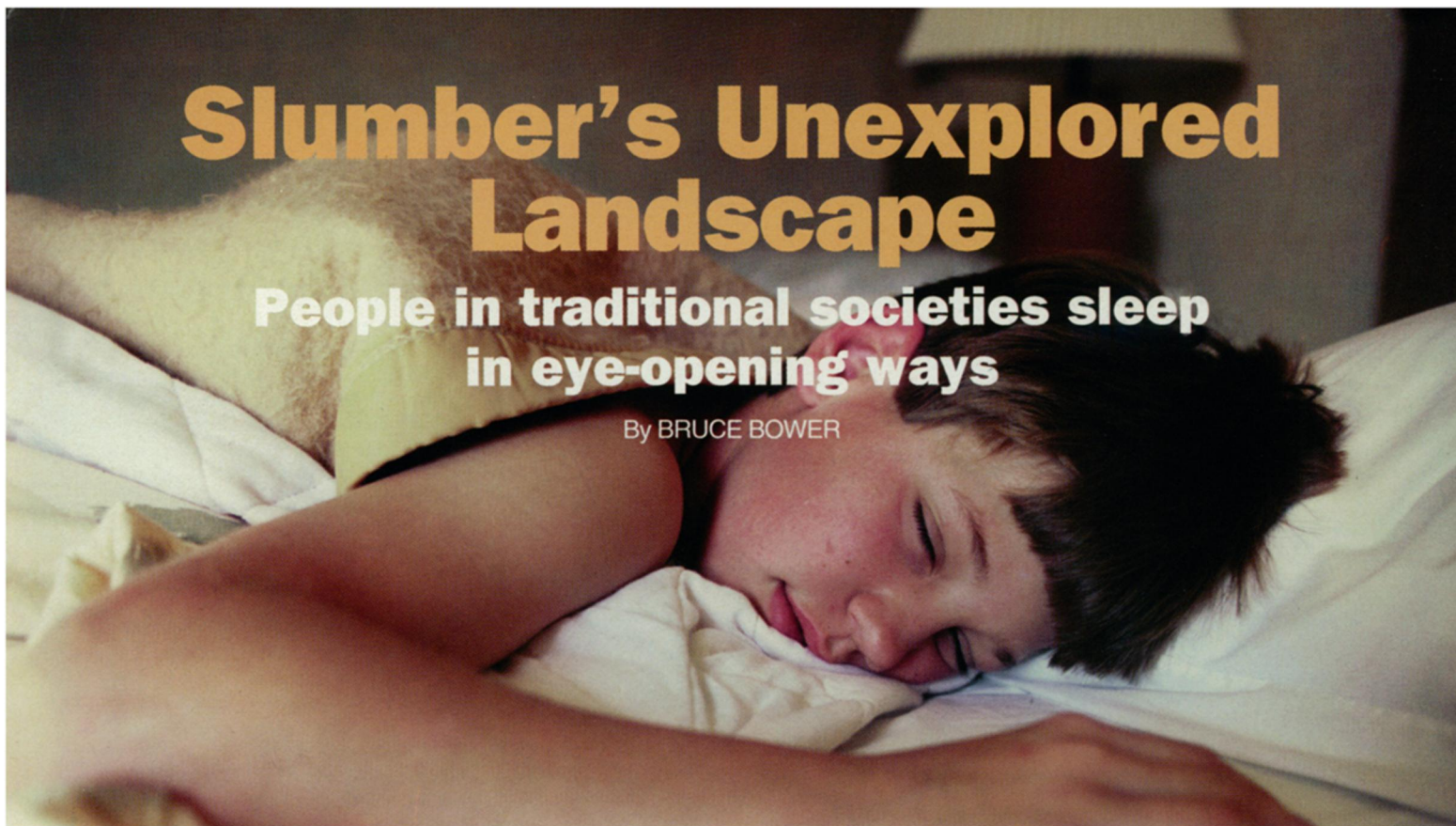


Slumber's Unexplored Landscape

People in traditional societies sleep in eye-opening ways

By BRUCE BOWER



Ah, the sweet simplicity of sleep. You tramp into your bedroom with sagging eyelids and stifle a yawn. After disrobing, you douse the lights and climb into bed. Maybe a little reading or television massages the nerves, loosening them up for slumber's velvet fingers. In a while, you nod off. Suddenly, an alarm clock's shrill blast breaks up the dozefest as the sun pokes over the horizon. You feel a bit drowsy but shake it off and face the new day. Images of a dream dissolve like sugar in the morning's first cup of coffee.

There's a surprising twist, however, at the heart of this familiar ritual. It simply doesn't apply to people currently living outside of the modern Western world—or even to inhabitants of Western Europe as recently as 200 years ago.

In such contexts, and probably throughout human evolution, solitary shut-eye organized around a regular bedtime and a single bout of sleep proves about as common as stock car racing or teleconferencing. Surprisingly, anthropologists have rarely scrutinized the sleep patterns and practices of different cultures, much less those of different classes and ethnic groups in the United States.

An initial attempt to draw back the veils of sleep in hunter-gatherer groups and other traditional societies has uncovered a wide variety of sleep customs, reports anthropologist Carol M. Worthman of Emory University in Atlanta. None of these snooze styles, however, looks anything like what modern Western folk take for granted.

This finding raises profound questions

for the burgeoning discipline of sleep research, Worthman says. Over the past 50 years, scientists have avidly delved into slumber's biology. Early research identified periods of rapid-eye-movement (REM) sleep, during which intense dreams often occur. Current efforts pursue genes involved in wakefulness and sleeping (SN: 8/14/99, p. 100). Researchers have also taken strides toward treating insomnia and other sleep disturbances.

While investigators readily concede that they don't yet know why people sleep and dream, they assume that they at least know how people should sleep: alone or with a partner for a solid chunk of the night. Sleep studies therefore take place in laboratories where individuals catch winks while hooked up to a bevy of brain and body monitors.

However, the distinctive sleep styles of non-Western groups may mold sleep's biology in ways undreamed of in sleep labs, Worthman suggests. They may influence factors ranging from sleep-related genes to the brain's electrical output during various sleep phases.

"It's time for scientists to get out into natural sleep environments," Worthman remarks. "It's embarrassing that anthropologists haven't done this, and the lack of such work is impeding sleep research."

A seemingly innocent question awakened Worthman to her discipline's ignorance of how people sleep. In 1994, she had a conversation with pediatrician Ronald E. Dahl of the University of Pittsburgh School of Medi-

cine, who studies the effects of mood disorders on sleep. He asked the Emory scientist to tell him what anthropologists know about the history and prehistory of sleep. "[My] bald, if somewhat overstated, answer was 'zero,'" she says.

Sleep scarcely figures in the literature on either cross-cultural differences or human evolution, Worthman realized. Investigators generally relegate slumber to the sidelines, treating it as a biological given with little potential for variation from one place to another, she holds.

A few researchers have bucked this trend. For instance, anthropologist James J. McKenna of the University of Notre Dame in Indiana has reported that babies in many countries outside the United States sleep next to or in the same room as their parents. Contact with a parent's body helps regulate an infant's breathing and other physiological functions, he asserts, perhaps lowering the risk for sudden infant death syndrome (SN: 12/4/93, p. 380).

McKenna's work should have roused investigators of traditional societies out of their sleep-related torpor, Worthman says. Yet, even seasoned field-workers have tended to ignore sleep—at least in their published works—while describing food production, sexual practices, and other facets of daily life.

So, Worthman contacted seven researchers who she knew had intimate knowledge of one or more traditional societies, including nomadic foragers, herders, and village-based farmers. Among these far-flung populations, none of the investigators, by their own admission, had systematically studied how people sleep. Af-

ter plumbing what the researchers had absorbed about nighttime activities, Worthman has assembled a preliminary picture of sleep practices in 10 non-Western populations.

Worthman's findings rip the covers off any lingering suspicions that people everywhere sleep pretty much alike. Far from the wallpapered confines of middle-class bedrooms, sleep typically unfolds in shared spaces that feature constant background noise emanating from other sleepers, various domestic animals, fires maintained for warmth and protection from predators, and other people's nearby nighttime activities.

Groups in Worthman's analysis include Ache foragers in Paraguay, !Kung hunter-gatherers in Africa, Swat Pathan herders in Pakistan, and Balinese farmers in Indonesia. For all these groups and six others, communal sleep equals safe sleep, because sleepers can count on there being someone else up or easily awakened at all hours of the night to warn others of a threat or emergency.

Adult sleepers in traditional societies recline on skins, mats, wooden platforms, the ground, or just about anything except a thick, springy mattress. Pillows or head supports are rare, and people doze in whatever they happen to be wearing. Virtually no one, including children, keeps a regular bedtime. Individuals tend to slip in and out of slumber several times during the night. In these unplugged worlds, darkness greatly limits activity and determines the time allotted to sleep. Folks there frequently complain of getting too much sleep, not too little.

Many rituals occur at night and exploit the need to sleep. For instance, initiation rites often force participants to cope with sleep deprivation. In other ceremonies, individuals enter somnolent, or near-sleep, states in order to magnify an occasion's psychological impact and to induce spiritual visions.

Consider the communal sleep of the Gebusi, New Guinea, rainforest dwellers, who grow fruit in small gardens and occasionally hunt wild pigs. Women, girls, and babies crowd into a narrow section of a community longhouse to sleep on mats. Men and boys retreat to an adjacent, more spacious longhouse area, where they sleep on wooden platforms.

Gebusi females retire at dark for about 10 hours of rest and sleep. In contrast, the men stay up later and frequently conduct rituals. About once a month, everyone attends an all-night dance and feast, catching up on sleep the next day.

Each week or two, Gebusi men go to

séances led by a "spirit medium," at which they try to keep spirits awake throughout the night. Participants attempt to slip in and out of a near-sleep state as the medium, who's usually adept at operating in this half-conscious condition, sings about the spirit world and other matters.

As in most of the other studied societies, the Gebusi express concerns about exposure to ghosts, evil spirits, and witchcraft during sleep. They consider deep sleep risky, since a sleeper's spirit may wander off too far and fail to



A Gebusi woman in New Guinea, decked out in her dance costume, catches a few winks on a woodpile during a male initiation ceremony.

return. The Gebusi view group slumber as a way to lessen the danger of spirit loss, which they view as especially likely while a person dreams.

Whether or not one believes that sleeping puts a person's spirit at risk, slumber appears to have crucial effects on body and mind. A culture's sleeping style serves as a growing child's training ground for managing biologically based systems of attention and alertness, Worthman contends. Balinese farmers provide a striking example of this sleep-related tutoring.

Balinese infants are carried and held continuously by caregivers so that they learn to fall asleep even in hectic and noisy situations. This grooms them to exhibit what the Balinese call "fear sleep" later in life, Worthman says. Children and adults enter fear sleep by suddenly slumping over in a deep slumber when they or family members confront intense anxiety or an unexpected fright. They are literally scared into sleep.

Infants in middle-class American homes, who usually sleep alone, may not learn to ground their sleeping and waking cycles in a flow of sensations that include bodily contact, smells, and background noises, Worthman proposes. In fact, babies forced to bounce back and forth between the sensory overload of the wak-

ing world and the sensory barrenness of dark, quiet bedrooms may often find it difficult to relax, fall asleep, wake up, or concentrate, she theorizes.

Only cross-cultural studies of children's sleep and behavior can clarify such issues, Worthman says.

She described her findings and their implications in June at the annual meeting of the Associated Professional Sleep Societies in Orlando, Fla.

Sleep researchers at the meeting expressed considerable excitement about the potential for cross-cultural studies.

"Worthman is doing innovative and important work," comments neuroscientist Robert A. Stickgold of the Massachusetts Mental Health Center in Boston. "It's awakening us to the many different ways in which people organize sleep."

Stickgold has developed snug-fitting, electrode-studded caps that people can wear in their own beds to measure brain activity linked to REM and other sleep stages. Worthman plans to take these "nightcaps," which hook up to mobile recorders, into the field to study sleep biology in traditional societies.

"I've been hoping anthropologists would examine sleep cross-culturally for the past 20 years," remarks psychologist Mary A. Carskadon of the Brown University School of Medicine in Providence, R.I.

Carskadon has directed studies that indicate that the body's so-called biological clock gets pushed back during adolescence. Teenagers may require more sleep than adults and may have a natural tendency to go to sleep later and wake up later than at other ages, she says.

A related study, directed by neuroscientist Louis J. Ptáček of the University of Utah in Salt Lake City, finds that a specific gene yanks the biological clock forward in some adults. People who have this gene tend to fall asleep by 8:30 p.m. and to awaken before 5:30 a.m., the researchers report in the September *NATURE MEDICINE*.

In modern Western cultures, teens' backward shift in sleep timing is considered a nuisance or a sign of rebellion, while extreme early birds get diagnosed as sleep disordered. In traditional settings, however, highly variable sleep schedules among individuals and age groups prove invaluable, since they allow for someone to be awake or easily roused at all times should danger arise, Worthman holds.

If sleeping patterns in traditional societies remain little known, those of prehistoric humans are a total mystery. Still, in settings that roughly mimic ancient nighttime conditions, sleep undergoes an intriguing shift, says psychiatrist Thomas A. Wehr

of the National Institute of Mental Health (NIMH) in Bethesda, Md.

When prohibited from using artificial light from dusk until dawn, people who formerly slumbered in solid blocks of time begin to sleep in two periods separated by an hour or two of quiet rest and reflection.

Wehr and his coworkers asked 15 healthy adults to rest and sleep in darkness for 14 hours (6 p.m. to 8 a.m.) each night for several weeks. Volunteers slept for 11 hours each of the first few nights, apparently to catch up on their sleep. They then settled into a pattern of lying awake for a couple of hours before falling asleep for 3 to 5 hours in the evening. An hour or so of quiet wakefulness ensued, followed by about 4 more hours of sleep in the early morning.

Many mammals sleep in two major bouts during the night or day, Wehr says. Animals from rodents to giraffes and the experimental human sleepers secrete elevated amounts of the hormone prolactin when they rest quietly, even if they are not asleep. Prolactin may promote a state of calmness that accompanies sleep, the NIMH scientist suggests.

Participants in Wehr's study usually awoke out of REM sleep to end their first slumber session. During REM sleep, the

brain becomes about as active as it is when wide awake. One function of this sleep phase may be to set the stage for waking up, Wehr holds.

If prehistoric people slept in two nightly periods, then regularly awakening out of REM sleep may have allowed them to reflect on and remember their dreams in a semiconscious state that's generally unavailable to modern sleepers. Sleep compressed into a single stint may thus encourage modern humans to lose touch with dreams, myths, and fantasies, Wehr argues.

These results, first reported in 1993, also raise the possibility that people who wake up once or twice each night don't necessarily suffer from insomnia. "A natural human sleep pattern may reassert itself in an unwelcome world and get labeled as a disorder," Wehr says.

The two-phase sleep pattern observed by Wehr corresponds remarkably closely to the way in which most Western Europeans slept between 500 and 200 years ago, according to historian A. Roger Ekirch of Virginia Polytechnic Institute and State University in Blacksburg. While doing research for a book on nighttime behaviors during that era, Ekirch came across several hundred references to what he identifies as "segmented sleep."

From country farms and villages to city apartments, early modern Europeans usually sank each evening into what they called a "first sleep," which lasted for several hours. Shortly after midnight, they awoke and spent 1 or 2 hours in a "watching period." A "second," or "morning," sleep followed.

The watching period presented many opportunities, Ekirch notes. People coming out of their first sleep often stayed in bed to pray, converse with a bedfellow, contemplate the day's events or the meaning of a dream, or simply let their minds wander in a semiconscious state of contentment that was prized at the time.

A 16th-century physician wrote that many laborers dozed off exhausted at the start of each night. Sexual intercourse with their wives typically occurred in the watching period, after a recuperative first sleep.

These days, Western societies treat sleep more as an unavoidable stretch of downtime than as a prelude to sex or a time for inner reflection. Only intensive investigations across cultures and classes will illuminate the lushness of sleep's landscape, Worthman predicts.

Adds Wehr, "We're going to have to reconceptualize what it means to sleep normally." □

Environment

Plastic mulch's dirty secrets

In many areas of the country and for many crops, mulching fields with sheets of plastic has become de rigueur. Not only do these impermeable blankets help retain moisture, but they also warm the soil. As a result, mulched crops tend to ripen sooner (SN: 12/13/97, p. 376), a boon to many farmers.

These benefits, however, come at some expense to the environment, a new Agriculture Department study finds. The practice increases both erosion and runoff of toxic pesticides.

Many farmers had noticed that more rain flows from plastic-mulched fields, via dirt furrows between the covered rows, than from fields covered with plant-stubble mulch. However, "nobody had bothered to ask how much more [water runs off]," notes Cathleen J. Hapeman, an inorganic chemist at the Beltsville (Md.) Agricultural Research Center (BARC). So, during 2 years, she and her colleagues collected all the rainwater flowing from tomato fields and measured the amount, as well as any contaminants in it.

In 1998, the year with the more dramatic results, they found that an average of 63 liters of water ran off each square meter of the plastic-mulched soil. That's four times the runoff from a field mulched with material from a plant known as hairy vetch. Even "more disturbing," Hapeman reported at the American Chemical Society meeting last month in New Orleans, is that the plastic-covered field lost 4,950 kilograms of dirt per hectare that year—almost 15 times as much as the vetch-mulched field. Clearly, she observes, with such a slowly renewing resource as soil, "you cannot sustain such losses for very long."

Then, she looked at chemical runoff. Each of the two test fields had been sprayed with the same amount of the fungicide chlorthalonil and the insecticide endosulfan. Because the plastic-mulched field has less exposed soil that can bind the pesticides, rain washed away 19 times as much of the chemicals from it as from vetch-covered rows. The researchers then added this runoff to containers holding local aquatic inhabitants, including hard

clams and diatoms. The plastic mulch's runoff was usually much more toxic than the vetch's, says Hapeman.

Using plastic mulch enables farmers to harvest crops 3 or 4 weeks early. Such vegetables can command high market prices. "However, I'm having a hard time justifying that 3-week-earlier harvest in exchange for this loss of soil and pesticides," Hapeman says. —J.R.

Lousy news: Pesticide resistance

Head lice plague children the world over. These parasitic bugs, however, are not equally vulnerable to some modern delousing shampoos. U.S. lice are more likely to survive a delousing than are the parasites in Sabah, Malaysia, a new study finds. This suggests the Western bugs are becoming resistant to at least one of the most popular delousing pesticides.

Richard J. Pollack of the Harvard School of Public Health in Boston and his colleagues collected lice from the heads of 75 U.S. children, most of whom had been unsuccessfully treated, and another 58 kids in Malaysia. The researchers then housed the critters in dishes lined with permethrin-impregnated paper. Shampoos containing this relatively nontoxic pesticide have become popular delousing treatments in the United States but are not used in Sabah.

While virtually all Malaysian lice quickly succumbed to both small and large doses of the pesticide, almost none of the lice from the U.S. children did. Indeed, Pollack says, for the U.S. lice, "if a little permethrin wasn't effective, neither was a larger dose." The message for parents, he and his colleagues report in the Sept. 15 ARCHIVES OF PEDIATRIC AND ADOLESCENT MEDICINE, is to be ready to switch shampoos. If one doesn't rout the bugs, change to a treatment with a different active ingredient. Also, when possible, parents should religiously groom infested hair with louse-catching combs, the researchers say. —J.R.