The Stubborn Scientist Who Unraveled a Mystery of the Night

Fifty years ago, Eugene Aserinsky discovered rapid eye movement and changed the way we think about sleep and dreaming

BY CHIP BROWN PORTRAITS BY BRIAN SMALE



IGHT AFTER NIGHT EugeneAserinsky had been working late. He'd dragged an ancient brain-wave machine, an Offner Dynograph, from the base-

ond floor of Abbott Hall at the Uni-

versity of Chicago. He had tinkered with it long enough to think it might not be totally unreliable. And now, late one December evening in 1951, his 8-year-old son, Armond, came over to the lab and sat patiently on an Army cot while his father scrubbed his scalp and the skin around his eyes with acetone, taped electrodes to the boy's head and plugged the leads into a switch box over the bed. From the adjacent room, Aserinsky calibrated the machine, telling Armond to look left, right, up and down. The ink pens jumped in concert with the boy's eyes. And then it was lights out, the sharp smell of acetone lingering in the darkness.

Armond fell asleep; his father tried not to. Sustained by pretzels and coffee, Aserinsky sat at a desk under the hellish red eyes of a gargoyle-shaped lamp. He was 30 years old, a trim, handsome man of medium height, with black hair, a mustache, blue eyes and the mien of a bullfighter. When he was not in his lab coat, he usually wore a bow tie and a dark suit. He was a graduate student in physiology, and his future was riding on this research. He had nothing but a highschool degree to fall back on. His wife, Sylvia, was pregnant with their second child. They lived on campus in a converted Army barracks heated by a kerosene stove. Money was so tight Aserinsky would eventually have to accept a small loan from his dissertation advisor, Nathaniel Kleitman, and then be obliged to feign enthusiasm for the distinguished man's suggestion that he economize by eating chicken necks.

The hours crept by in the spooky gray-stone gloom of Abbott Hall. While the long banner of graph paper unfurled, Aserinsky noticed that the pens tracking his son's eye movements—as well as the pens registering brain activity—were swinging back and forth, suggesting Armond was alert and looking around. Aserinsky went in to check on his son, expecting to find him wide awake. But Armond's eyes were closed; the boy was fast asleep.

What was going on? Yet another problem with the infernal machine? Aserinsky didn't know what to think, standing in bewildered excitement, on the threshold of a great discovery.

THE EXISTENCE OF rapid eye movement (REM) and its correlation with dreaming was announced 50 years ago last month in a brief, little-noted report in the journal *Science*. The twopage paper is a fine example of the maxim that the eye can see only what the mind knows: for thousands of years the physical clues of REM sleep were baldly visible to anyone who ever gazed at the eyelids of a napping child or studied the twitching paws of a sleeping dog. The association of a certain stage of sleep with dreaming might have been described by any number of observant cave men; in fact, if the 17,000-year-old Lascaux cave painting of a presumably

A self-described loner, Aserinsky (in his Philadelphia lab in the early 1960s) documented a "third state of being," REM sleep.

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dication, maybe it was.

eled the structure of DNA before virtually anything was known about the physiological condition in which people spend one-third of their lives. As Tom Roth, the former editor of the journal Sleep, put it: "It's analogous to going to Mars with a third of the Earth's surface still unexplored."The REM state is so important that some scientists have designated it a "third state of being" (after wakefulness and sleep), yet the phenomenon itself remained hidden in plain sight until September 1953, when the experiments conducted in Chicago by Aserinsky were published.

dreaming Cro-Magnon hunter with an erect penis is any in-

about the sleeping brain. It remains an astonishing anachro-

nism in the history of science that Watson and Crick unrav-

But scientists had long been blinkered by preconceptions

His now-classic paper, coauthored by advisor Kleitman, was less important for what it revealed than what it began.

REM opened the terra incognita of the sleeping brain to scientific exploration. Before REM, it was assumed that sleep was a passive state; absent stimulation, the brain simply switched off at night like a desk lamp. After REM, scientists saw that the sleeping brain actually cycled between two distinct electrical and biochemical climates-one characterized by deep, slow-wave sleep, which is sometimes called "quiet sleep" and is now known as non-REM or NREM sleep, and the other characterized by REM sleep, also sometimes called "active" or "paradoxical" sleep. The mind in REM sleep teems with vivid dreams; some brain structures consume oxygen and glucose at



rates equal to or higher than in Aserinsky (with wife Sylvia and children Jill and Armond in waking. The surprising implication is Chicago in 1953) was so poor he once stole potatoes.

that the brain, which generates and

evidently benefits from sleep, seems to be too busy to get any sleep itself.

The discovery of REM launched a new branch of medicine, leading to the diagnosis and treatment of sleep disorders that afflict tens of millions of people. It also changed the way we view our dreams and ourselves. It shifted scientists' focus from the dreaming person to the dreaming brain, and inspired new models in which the chimerical dramas of the night were said to reflect random neural fireworks rather than the hidden intentions of unconscious conflict or the escapades of dis-

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embodied souls. By showing that the brain cycles through various neurodynamic phases, the discovery of REM undescored the view that the "self" is not a fixed state but reflects fluctuating brain chemistry and electrical activity Many researchers continue to hope that REM may vet provide a link between the physical activity of the brain during a dream and the experience of dreaming itself.

It's hard to overestimate the importance of Aserinsky's breakthrough, said Bert States, an emeritus professor of dramatic arts at the University of California at Santa Barbara and the author of three books on dreams and dreaming: "The discovery of REM sleep was just about as significant to the study of cognition as the invention of the telescope was to the study of the stars."

IN 1950, when Aserinsky knocked on Nathaniel Kleitman's office door, Kleitman, then 55, was considered the "father of

> modern sleep research." A Russian emigre, he had received a doctorate from the University of Chicago in 1923 and joined the faculty two years later. There he set up the world's first sleep lab. The cot where research subjects slept was pitched under a metal hood formerly used to suck out noxious lab fumes.

At the time, few scientists were interested in the subject. Despite research on the electrical activity of the brain in the late 1920s, the understanding of sleep hadn't advanced much beyond the ancient Greeks, who viewed Hypnos, the god of sleep, as the brother of Thanatos, the god of death. Sleep was what happened when you turned out the lights and stopped the influx of sensation. Sleep was what

the brain lapsed into, not what it actively constructed. On the face of it, dull stuff.

Kleitman was intrigued nonetheless, and began to explore the physiology of the body's basic rest-activity cycle. A painstaking researcher, he once stayed up 180 hours straight to appraise the effects of sleep deprivation on himself. In 1938, he and fellow researcher Bruce Richardson moved into Mammoth Cave in Kentucky for more than a month to study fluctuations in their body temperatures and other darkness-engendered changes in their normal sleep-wake cycle-pioneering work in the now booming field of circadian rhythm research. Kleitman backed his fieldwork with formidable scholarship. When he published his landmark book Sleep and Wakefulness in 1939, he apologized for being

"I think he saw himself as a kind of Don Quixote," Aserinsky's daughter said. "Ninety percent of what drove Mm was curiosity."

unable to read in any language other than Russian, English, German, French and Italian.

At the office door, Aserinsky found a man with "a grey head, a grey complexion and a grey smock." As the younger scientist wrote years later, "there was no joy in this initial encounter for either of us. For my part I recognized Kleitman as the most distinguished sleep researcher in the world. Unfortunately sleep was perhaps the least desirable of the scientific areas I wished to pursue."

Aserinsky had grown up in Brooklyn in a Yiddish- and Russian-speaking household. His mother died when he was 12, and he was left in the care of his father, Boris, a dentist who loved to gamble. Boris often had his son sit in on pinochle hands if the table was a player short. Meals were catch as catch can. Aserinsky's son, Armond, recalled:

"Dad once told me he said to his father, 'Pop, I'm hungry,' and his father said, 'I'm not hungry, how can you be hungry?" " Eugene graduated from public high school at the age of 16 and for the next 12 years knocked about in search of his metier. At Brooklyn College, he took courses in social science, Spanish and premedical studies but never received a degree. He enrolled at the University of Maryland dental school only to discover that he hated teeth. He kept the books for an ice company in Baltimore. He served as a social worker in the Maryland state employment office. Though he was legally blind in his right

as a high-explosives handler.

and with a 6-ycar-old son, was looking to take advantage of the G.I. Bill of Rights to launch a science career. He aced the entrance exams at the University of Chicago and, though he lacked an undergraduate degree, persuaded the admissions office to accept him as a graduate student. "My father was courtly intelligent and intensely driven," says Armond Aserinsky, 60, now a clinical psychologist in North Wales, Pennsylvania. "He could be extremely charming, and he had a fine scientific mind, but he had all kinds of conflicts with authority He always wore black suits. I once asked him, 'Dad, how come you never wear a sports jacket?' He looked at me and said, 'I'm not a sport.' "

KLEITMAN'S FIRST IDEA was to have Aserinsky test a recent claim that the rate of blinking could predict the onset of sleep. But after a number of vexing weeks trying to concoct a way to measure blink rates, Aserinsky confessed his lack of progress. Kleitman proposed that Aserinsky observe infants while they slept and study what their eyelids did. So he sat by cribs for hours but found that it was difficult to differentiate eyelid movements from eyeball movements. Once again he knocked on Kleitnian's door, something he was loath to do because of Kleitman's austere and formal air. (Ten years after their famous paper was published, Kleitman began a letter to his colleague and coauthor, "Dear Aserinsky")

Aserinsky had the idea of studying all eye movements in

sleeping infants, and with Kleitman's approval embarked on a new line of inquiry-one that, he would later confess, was "about as exciting as warm milk." Significantly, he did not at first "see" REM, which is obvious if you know to look for it. Over months of monotonous observations, he initially discerned a 20-minute period in each infant's sleep cycle in which there was no eye movement at all, after which the ba-bies usually woke up. He learned to exploit the observation. During such periods, the fatigued researcher was able to nap himself, certain he would not miss any important data. And he was also able to impress mothers hovering near the cribs by telling them when their babies would wake up.

Kleitman (getting wired for one of his own studies in his By 1949, Aserinsky, married Chicago lab around 1960) is the "father of sleep research."

"The mothers were invariably amazed at the accuracy of my prediction and equally pleased by my impending departure," he once wrote.

AT HOME, Aserinsky was under considerable pressure. His daughter, Jill, was born in April 1952. His wife, Sylvia, suffered from bouts of mania and depression. Aserinsky couldn't even afford the rent on the typewriter he leased to draft his dissertation. "We were so poor my father once stole some potatoes so we would have something to eat," recalls Jill Buckley, now 51 and a lawyer in Pismo Beach, California, for the American Society for the Prevention of Cruelty to Animals. "I think he saw himself as a kind of Don Quixote. Ninety percent of what drove him was curiosity-wanting to know. We had a set of



Collier's Encyclopedias, and my father read every volume."

After studying babies, Aserinsky set out to study sleeping adults. At the time, no scientist had ever made all-night continuous measurements of brain-wave activity Given the thinking of the era-that sleep was a featureless neurological desert-it was pointless to squander thousands of feet of expensive graph paper making electroencephalogram (EEG) recordings. Aserinsky's decision to do so, combined with his adapting the balky Offner Dynograph machine to register eye movements during sleep, led to the breakthrough.

His son, Armond, liked to hang out at the lab because it meant spending time with his father. "I remember going into the lab for the night," Armond says. "I knew the machine was harmless. I knew it didn't read my mind. The set up took a long time. We had to work out some things. It was a long schlep to the bathroom down the hall, so we kept a bottle by the bed."

Aserinsky did a second nightlong sleep study of Armond with the same results -again the pens traced sharp jerky

wakeful-ness. As Aserinsky recruited other subjects, he was growing confident that his machine was not fabricating these phenomena, but could it be picking up activity from the nearby muscles of the inner ear? Was it possible the sleeping subjects were waking up but just not opening their eyes?

"In one of the earliest sleep sessions, I went into the sleep chamber and directly observed the eyes through the lids at the time that the sporadic eye movement deflections appeared on the polygraph record," he would recall in 1996 in the Jour-nal of the History of the

vigorously but the subject did not

moving

respond to my vocalization. There was no doubt whatsoever that the subject was asleep despite the EEG that suggested a waking state."

By the spring of 1952, a "flabbergasted" Aserinsky was certain he had stumbled onto something new and unknown. "The question was, what was triggering these eye movements. What do they mean?" he recalled in a 1992 interview with the Journal of NIH Research. In the fall of 1952, he began a series of studies with a more reliable EEG machine, running more than 50 sleep sessions on some two dozen subjects. The charts confirmed his initial findings. He thought of calling the phenomena "jerky eye movements," but decided against it. He didn't want critics to ridicule his findings by playing off the word "jerk."

Aserinsky went on to find that heart rates increased an average of 10 percent and respiration went up 20 percent during REM; the phase began a certain amount of time after the onset of sleep; and sleepers could have multiple periods of REM during the night. He linked REM interludes with increased body movement and particular brain waves that appear in waking. Most amazingly by rousing people from sleep during REM periods, he found that rapid eye movements were correlated with the recall of dreams ---with, as he noted in his dissertation, "remarkably vivid visual imagery."

He later wrote, "The possibility that these eye movements might be associated with dreaming did not arise as a lightning stroke of insight. . . . An association of the eyes with dreaming is deeply ingrained in the unscientific literature and can be categorized as common knowledge. It was Edgar Allan Poc who anthropomorphized the raven, 'and his eyes have all the seeming of a demon's that is dreaming."

Aserinsky had little pa-

tience for Freudian dream theory, but he wondered if the eyes moving during sleep were essentially watching dreams unfold. To test that possibility he persuaded a blind undergraduate to come into the lab for the night. The young man brought his Seeing Eye dog. "As the hours passed I noticed at one point that the eye channels were a little more active than previously and that conceivably he was in a REM state," Aserinsky wrote. "It was imperative that I examine his eyes directly while he slept. Very carefully I opened the door to the darkened sleeping chamber so as not to awaken the subject. Suddenly, there was a low menacing growl from near the bed followed by

a general commotion which

instantaneously reminded me that I had completely forgotten about the dog. By this time the animal took on the proportions of a wolf, and I immediately terminated the session, foreclosing any further exploration along this avenue." (Other researchers would later confirm that blind people do indeed experience REM.)

In any event, Aserinsky wasn't much interested in the meaning of dreams, said his daughter Jill, adding: "He was a pure research scientist. It always irritated him when people wanted him to interpret their dreams."

But a future colleague of Aserinsky's was intrigued. William Dement was a medical student at Chicago, and in the fall of 1952 Kleitman assigned him to help Aserinsky with his overnight sleep studies. Dement recounted his excite-

Neuro-sciences. "The eyes were Dement (at his Stanford research center) worked with Aserinsky before starting the world's first sleep clinic.



"My God, you're Aserinsky!" said sleep researchers a decade after the scientist discovered REM. "We thought you were dead!"

ment in his 1999 book, The Promise of Sleep. "Aserinsky told me about what he had been seeing in the sleep lab and then threw in the kicker that really hooked me: 'Dr. Kleitman and I think these eye movements might be related to dreaming.' For a student interested in psychiatry, this offhand comment was more stunning than if he had just offered me a winning lottery ticket. It was as if he told me, 'We found this old map to something called the Fountain of Youth.' "

By Aserinsky's account, Dement ran five overnight sessions for him starting in January 1953. With a camera Kleitman had obtained, Dement and Aserinsky took 16-millimeter movie footage of subjects in REM sleep, one of whom was a young medical student named Faylon Brunemeier, today a retired ophthalmologist living in Northern California. They were paying three dollars a night, he

recalled, "and that was a lot to impecunious medical an student."

Kleitman had barred women as sleep study subjects, fearing the possibility of scandal, but Dement wheedled permission to wire up his sweetheart, a student named Pamela Vickers. The only provision was that Aserinsky had to be on hand to "chaperon" the session. While the sleep-deprived Aserinsky passed out on the lab couch, Dement documented that Vickers, too, experienced REM. Next, Dement says he recruited three other female subjects, including Elaine May, then a student at the University of Chicago. Even Hobson (at his Harvard office) made waves with evidence that contend with. Let us hope that

years later as part of the comedy dreaming reflects brain chemistry, not hidden wishes. team Nichols and May,

and had not gone on to write Heaven Can Wait and other movies, she would still have a measure of fame, in the annals of sleep science.

From 1955 to 1957, Dement published studies with Kleitman establishing the correlation between REM sleep and dreaming. Dement went on to help organize the first sleep research society and started the world's first sleep clinic at Stanford in 1970. With a collaborator, Howard Roffwarg, a psychiatrist now at the University of Mississippi Medical Center, Dement showed that even a 7-month-old premature infant experiences REM, suggesting that REM may occur in the womb. Dement's colony of dogs with narcolepsy- a condition of uncontrollable sleep-shed light on the physiological basis of the disorder, which in people had long been attributed to psychological disturbances. Dement became such an evangelist about the dangers of undiagnosed sleep disorders that he once approached the managers of the rock band R.E.M., seeking to enlist the group for a fundraising concert. The musicians brushed him off with a shaggy story about the acronym standing for retired english majors.

WHEN ASERINSKY LEFT the University of Chicago, in 1953, he turned his back on sleep research. He went to the University of Washington in Seattle and for a year studied the effects of electrical currents on salmon. Then he landed a faculty position at Jefferson Medical College in Philadelphia, where he explored high-frequency brain waves and studied animal respiration. In 1957, his wife's depression came to a tragic conclusion; while staying at a mental hospital in Pennsylvania,

> Sylvia committed suicide. Two years later, Aserinsky married Rita Roseman, a widow, and became stepfather to her young daughter, Iris; the couple remained together until Rita's death in 1994.

> In the early 1960s, Armond Aserinsky urged his father, then in his 40s, to return to the field he had helped start. Aserinsky finally wrote to Kleitman, who had retired from the University of Chicago. Kleitman replied, "It was good to learn that you have renewed work on rapid eye movements during sleep. The literature on the subject is quite extensive now . . . I believe that you have ability and perseverance but have had . . . personal hard knocks to

things will be better for you in the future." Kleitman also took the

opportunity to remind his former student that he still owed him a hundred dollars.

In March 1963, Aserinsky went home to Brooklyn to attend a meeting of sleep researchers. "People were shocked," his son recalled. "They looked at him and said, 'My God, you're Aserinsky! We thought you were dead!' "

Delving into the night again in an unused operating room at the Eastern Pennsylvania Psychiatric Institute in Philadelphia, Aserinsky worked on the physiology of REM and non-REM sleep, but he had prickly encounters with colleagues. He took offense when he did not receive an invitation to a prestigious dinner at a 1972 meeting of sleep researchers. He was often stung when Dement and Kleitman got credit he

felt belonged to him. (For his part, Dement said he resented that Aserinsky never acknowledged all the work he did as low man on the lab totem pole. "I was so naive," he told me.) In 1976, after more than two decades at Jefferson Medical College, Aserinsky was passed over for the chairmanship of the physiology department. He left, becoming chairman of physiology at Marshall University in Huntington, West Virginia. He retired in 1987. "He could be a deeply suspicious and impolitic person," Armond Aserinsky said.

Narrating his version of events in the *Journal of the History of the Neurosciences*, Aserinsky criticized Dement's contention that the discovery of REM was a "team effort," saying, "If anything is characteristic about the REM discovery, it was that there was no teamwork at all. In the first place, Kleitman was reserved, almost reclusive, and had little contact with me. Secondly, I myself am extremely stubborn and have never taken kindly to working with others. This negative virtue carried on throughout my career as evidenced by my resume, which re-

veals that I was either the sole or senior author in my first thirty publications, encompassing a period of twenty-five years." That stubbornness spilled into his family relations as well, Years passed in which he had no contact with Armond.

To younger sleep scientists, Aserinsky was only a name on a famous paper, an abstraction from another time. And such he might have remained if not for a license plate and a chance encounter in 1989.

Peter Shiromani, then an assistant professor of psychiatry at the University of California at San Diego, had just nosed his Datsun 310 into the parking lot of aTarget department store in

license plates advertised what had been his scientific obsession since

his undergraduate days at City College in New York City: REM SLEP.

"A woman walked up to me and said, 'I really love your plates! Did you know my father discovered REM sleep?' " Shiromani recalled. "I said, 'You must be Eugene Aserinsky's daughter!' She was very pleased. I think she felt a lot of pride in her father's accomplishment, and here was someone who recognized her father's name. We chatted briefly with much enthusiasm about REM sleep. Fortunately, I had the presence of mind to ask for her father's address."

Shiromani passed the address along to Jerry Siegel, a sleep researcher at UCLA and the Sepulveda Veterans Affairs medical center in suburban Los Angeles, who invited Aserinsky to address the June 1995 meeting of the Associated Professional Sleep Societies in Nashville. Siegel was organizing a symposium in honor of Kleitman, who had recently turned 100. "It was very difficult to get Aserinsky to come," Siegel recalls. "People who knew him in the early days said, 'Don't invite him.' But my dealings with him were very pleasant."

Despite their rivalry, it was Dement who introduced Aserinsky to the crowd of 2,000 people in the ballroom at the OpryLand Hotel. They gave him a standing ovation. And when he finished a witty wide-ranging talk on the history of REM, the audience again rose to its feet. "It was one of the high points of his life," recalls his daughter Jill, who had accompanied her father to the meeting along with his stepdaughter, Iris Carter. "He wore a name tag, and people would stop and point and say, 'There's Aserinsky!" " says Carter.

One July day three years later, Aserinsky, driving down a hill in Carlsbad, California, collided with a tree and was

> killed. He was 77. An autopsy could not determine the cause of the accident. It's possible he fell asleep at the wheel.

TODAY it's well established that normal sleep in human adults includes between four and six REM periods a night. The first starts about 90 minutes after sleep begins; it usually lasts several minutes. Each subsequent REM period is longer. REM sleep is characterized by not only brainwave activity typical of waking but also a sort of muscle paralysis, which renders one incapable of acting on motor impulses. (Sleepwalking most often occurs during non-REM sleep.) In men and women, blood flow to the genitals is increased. Parts of the brain burn more energy

The heart may beat faster. Adults spend about two hours a night in

REM, or 25 percent of their total sleep. Newborns spend 50 percent of their sleep in REM, upwards of eight hours a day and they are much more active than adults during REM sleep, sighing and smiling and grimacing.

After 50 years, researchers have learned a great deal about what REM isn't. For example, it was once thought that people prevented from dreaming would become psychotic. That proved not to be the case; patients with injuries to the brainstem, which controls REM, do not go nuts without it. Still, if you deprive a person of REM sleep, they'll recoup it at the first chance, plunging directly into the REM phase—a phenomenon discovered by Dement and called REM rebound. Studies of animals have yielded insights into REM, some-

Sleep specialist Siegel (at his lab in suburban Los Angeles) aided Aserinsky's return to the research limelight.



The prize research subject—a penguin—was released into the sea, only to be promptly gobbled up by a killer whale.

times. In the early 1960s, Michel Jouvet, a giant of sleep research and a neurophysiologist at the University Claude Bernard in Lyon, France, mapped the brain structures that generate REM sleep and produce the attendant muscle paralysis. Jouvet, who coined the term "paradoxical sleep" as a substitute for REM sleep, also discovered that cats with lesions in one part of the brainstem were "disinhibited" and would act out their dreams, as it were, jumping up and arching their backs. (More recently, University of Minnesota researchers have documented a not-dissimilar condition in people; REM sleep behavior disorder, as it's called, mainly affects men over 50, who kick, punch and otherwise act out aggressive dream scenarios while they sleep. Researchers believe that REM sleep disorder may be a harbinger of Parkinson's disease in some people.) Paradoxical sleep has been found in almost all mammals tested so far except for some marine mammals, including dolphins. Many bird species appear to have short bursts of paradoxical sleep, but reptiles, at least the few that have been assessed, do not. Jouvet was especially interested in penguins, because they stay awake for long periods during the brooding season. Hoping to learn plant a costly radio-telemetry chip in an emperor penguin in Antarctica. The prize research subject was released into the sea, only to be promptly gobbled up by a killer whale.

In 1975, Harvard's Allan Hobson and Robert McCarley proposed that many properties of dreams — the vivid imagery, the bizarre events, the difficulty remembering them— could be explained by neurochemical conditions of the brain in REM sleep, including the ebb and flow of the neurotransmitters norepinephrine, serotonin and acetylcholine. Their theory stunned proponents of the idea that dreams were rooted not in neurochemistry but psychology, and it has been a starting point of dream theorizing for the past 25 years.

The once-popular description of REM as "dream sleep" is now considered an oversimplification, and debate rages over questions of what can be properly claimed about the relation of dreaming to the physiology of REM sleep. (In 2000, an entire volume of the journal *Behavioral and Brain Sciences* was devoted to the debate.) To be sure, you can have REM without dreaming, and you can dream without experiencing REM. But most researchers say that dreaming is probably influenced and may be facilitated by REM. Still, dissenters, some of whom adhere to psychoanalytic theory, say that REM and dreaming have little connection with each other, as suggested by clinical evidence that different brain structures control the two phenomena. In the years to come, new approaches may help clarify these disagreements. In a sort of echo of Aserinsky's first efforts to probe the sleeping brain with EEG, some researchers have used powerful positron brain-scanning technology to focus on parts of the brain activated during REM.

This past June, more than 4,800 people attended the Associated Professional Sleep Societies' annual meeting in Chicago. The scientists took time out to mark REM's golden anniversary With mock solemnity, Dement echoed the Gettysburg Address in his lecture: "Two score and ten years ago Aserinsky and Kleitman brought forth on this continent a new discipline conceived at night and dedicated to the proposition that sleep is equal to waking."

But to paraphrase the physicist Max Planck, science advances funeral by funeral. Kleitman died in 1999 at the age of 104, and though he was a coauthor of the milestone REM study, he never really accepted that REM was anything other than a phase of especially shallow sleep. "Kleitman died still believing there was only one state of sleep," Dement told me. Aserinsky had his own blind spots; he never relinquished his doubts that sleeping infants exhibit REM.

To honor the research done in Kleitman's lab five decades ago, the Sleep Re search Society commissioned a 65pound zinc plaque. It now hangs in the psychiatry department at the University of Chicago Medical Center, adjacent to Abbott Hall. To be sure, the inscrip tion-"Commemorating the 5oth An niversary of the Discovery of REM Sleep by Eugene Aserinsky, Ph.D., and Nathaniel Kleitman, Ph.D, at the Uni versity of Chicago"-doesn't speak to the poetry of a lyric moment in the his tory of science, a moment when, as Michel Jouvet once said, humanity came upon "a new continent in the brain." But then, what do you expect from a plaque? If it's the poetry of REM you want, you need wait only until tonight.

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