L. Rokhlin

# SLEEP HYPNOSIS DREAMS

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*A Popular Exposition*
*by Prof. L. ROKHLIN*

FOREIGN LANGUAGES PUBLISHING HOUSE
Moscow

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TRANSLATED FROM THE RUSSIAN
BY MIRIAM KATZ

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## INTRODUCTION

It has been known for ages that sleep is a vital factor in human life. After a tiring day people go to bed as early as possible so as to restore their energy. A deep, sound sleep makes a person feel refreshed and vigorous, ready again for active work. When a seriously ill patient finally falls into a long and deep sleep after many restless nights this is rightly looked upon as a sign of recovery.

Sleep is spoken of in the warmest of words: it is healthy, sound, refreshing, restoring, calming, peaceful, sweet, enchanting.

Sleep that consoles and heals is the subject of many touching folk songs, and as such it is described at length in many works of fiction:

> *Sleep that knits up the ravelled sleeve of care,*
> *The death of each day's life, sore labour's bath,*
> *Balm of hurt minds, great nature's second course,*
> *Chief nourisher in life's feast,*

wrote William Shakespeare.

A poem by the great Russian poet Alexander Pushkin called "Sleep" contains the following words:

> *To sleep, Morpheus' precious gift, I sing,*
> *That ye then know how one in deep and pleasant*
> *Slumber midst silence should repose in calm.*

However, although sleep, as a state to which man returns day after day, was a subject of wide discussion, and many researchers studied the problem of sleep and dreams, its nature remained inexplicable for a long time.

Various mystical conceptions prevalent in the past have proved to be particularly persistent. The sources of false ideas, of superstition and prejudice go back to antiquity.

People do not react to external stimulation and lie passive when asleep, though in their dreams they may be busily active, find themselves in far-off places, meet many other people, witness and participate in many different events. All this seemed to primitive peoples to be due to the existence of a spirit, or soul, something distinct from the body, and this led to the idea of a supernatural, unearthly world. The naïve mind of primitive man could not differentiate between dreams and reality. Many scientists—Tyler, Lubbock, Spencer, Darwin—have in their time pointed out the part played by dreams in the origin of the conception of animate nature, "animism", among primitive peoples.

Frederick Engels wrote: "From the very early times when men, still completely ignorant of the structure of their own bodies, under the stimulus of dream apparitions came to believe that their thinking and sensations were not activities of their bodies, but of a distinct soul which inhabits the body and leaves it at death—from this time men have been driven to reflect about the relation between this soul and the outside world."

In primitive man, ignorant and helpless against the forces of nature, dreams gave rise to superstition and prejudice; however, the same is true of many of our contemporaries for whom dreams and associated phenomena are also a source of superstition and prejudice, darkly veiled in religious and mystical ideas.

In certain countries various occult "sciences" such as spiritualism, astrology, animal magnetism and other false teachings have not only been retained, but have even expanded in recent years; numerous "Dream Interpreters" are published, the number of people engaged in dubious professions—chiromancy, fortune-telling, magnetism, mesmerism—increases, as do the numbers of other quacks and frauds. However, research in the diverse fields of natural science and medicine, philosophy and psychology has led to the gradual formation of a true scientific conception of sleep and associated phenomena.

The solution of this complex problem was particularly furthered by the investigations of the Russian physiologist Ivan Pavlov who forwarded a general biological and physiological interpretation of the phenomena of sleep, hypnosis and dreams, of brilliant simplicity and exhaustive depth. The inquisitive, creative mind of Man could not fathom this riddle for thousands of years.

Pavlov, true to his principle of the close connection between physiology and medicine, made another signal discovery: he revealed the importance of sleep in health and pointed out that sleep

might be used in therapeutic aims for the treatment of various disorders.

Finally, it is noteworthy that Pavlov's studies of sleep, hypnosis, and dreams, based as they were on his teachings on the higher nervous activity, dealt an undermining blow to idealism and mysticism. The scientist himself considered his works in this field exceptionally important.

"We came up against the phenomena of sleep at an early stage in our research; we were obliged to consider it, to subject it to special investigation," wrote Pavlov. N. Krasnogorsky, Pavlov's closest disciple, who also devoted many of his works to the problem of sleep, recollects that not long before his end Pavlov spoke of his wish to write a special book on sleep. It is indeed regrettable that this wish was not realised.

## THE SIGNIFICANCE OF SLEEP

A change in the rhythm of vital activity is observed in all living things, not only in animals, but in plants, too. Thus the difference in plant respiration in the daytime and at night, the more powerful ascent of the nutritive juices at night. It is also known that the leaves of plants such as the mimosa and acacia fold and curl up for the night.

However, it is only in the higher animals and in man with their highly organised central nervous systems and particularly well-developed cerebral hemispheres, that a clear difference is noted between the sleeping and waking states, a distinct periodic rotation of these states.

There are many variations of normal sleep. Observations of animals have shown great diversity in the rotation of sleep and wakefulness. The peculiarities of the rhythm of sleep and waking in different species of animals is due to adaptation to conditions of life developed in the evolutionary process. Sleep is differentiated into two types: one-phase sleep, when the animal sleeps without break once in 24 hours, and multi-phase sleep, when sleep and vigil alternate many times in the course of 24 hours. Multi-phase sleep is observed in many domestic animals. A well-known picture is that of a kitten playing with a ball of wool and then curling up and purring in its sleep, or that of a dog now running around and barking, now peacefully asleep in the sun on a warm day.

Most animals are active in the daytime and sleep at night; however, some animals are active at night and sleep in the daytime, as, for instance, the owl and other so-called night birds.

In man the rhythm of activity and sleep is influenced by age, occupation and conditions of life. Multi-phase sleep is characteristic of very young children; infants sleep several times a day. In adults one-phase night sleep is commonly observed. However, in certain cases a person's professional occupation may necessitate the replacement of night sleep by several periods of sleep in the daytime (railroad employees, medical workers).

Besides one- and multi-phase sleep within 24 hours, there also exists another type of sleep, "seasonal" dormancy—prolonged torpidity during a certain time of the year, e.g., the hibernation of the hedgehog, bear, marmot, badger and dormouse, famed for its ability to sleep. A similar state of dormancy, estivation, is observed in certain tropical animals in the summer when the insufferable heat makes conditions particularly unfavourable. "Seasonal" dormancy—hibernation and estivation in animals—differs from natural periodic daily sleep both in duration and in the quality of changes that take place in the body. For instance, it is known that many animals lose the faculty of maintaining a constant body temperature during prolonged winter or summer torpidity; their temperature becomes the same as that of the air in their lair or burrow.

Deprivation of food is endured much easier than deprivation of sleep; without sleep both man and animals succumb sooner than in conditions of complete starvation. M. Manasseina, a pre-revolutionary Russian scientist, conducted a number of extremely illustrative experiments: puppies deprived of sleep succumbed within four to five days, adult dogs survived for 18-20 days. N. Fyodorov and A. Sokolovskaya recently performed a series of experiments in which the dogs were not allowed to sleep for eight days by means of various irritants; however, not-

withstanding all interference, they did fall asleep on the eighth day, while two of the animals succumbed.

Sleep should be distinguished from similar states that are defined by the words "syncope" (fainting or swooning), "shock", "coma".

What is common in these states with sleep is that the subject is inaccessible to external impressions and incapable of conscious activity. But these are morbid conditions caused by severe derangement of brain activity. Fainting fits, or syncope, are due to a sudden development of cerebral anemia, shock is a grave generalised disturbance of the bodily functions associated with respiratory and circulatory disfunction and decrease in blood pressure, coma is usually defined as deep cerebral intoxication.

But periodic sleep is a normal, healthy, natural state of the brain. People awake from sleep, even from the deepest, independently, while a person in syncope, shock or coma is only brought to his senses by special treatment that removes the cause of these morbid conditions. Moreover, natural sleep should be distinguished from sleep evoked by any agents that influence the human body and nervous system. For instance, during sleep induced by narcotics and anesthetics (chloroform, ether, etc.) the subject is insensible to pain, thus surgery performed on him is painless. Another type of artificial sleep is electronarcosis evoked by the effect a certain type of electric current produces on the nervous system. Various types of "artificial" sleep either approach natural sleep or are similar to the above-described sleep-like morbid conditions.

## CHANGES OCCURRING IN THE BODY DURING SLEEP

During the waking hours a human being reacts keenly to his environment: his eyes observe minute changes in the surroundings, his ears hear the slightest rustle, his body feels the most delicate touch, and even the slightest

changes in temperature. By the aid of the muscular-joint sense we perceive the position of our bodies in space and retain our equilibrium.

In the waking state the active, clear and fine perception of all changes occurring in the environment is indivisible from the reaction to such changes. In the waking period the central nervous system is in constant activity, even if no external manifestations of this activity are noticeable. For instance, when a person is sitting quietly in an easy chair listening to music, or hearing a funny story it would seem that he is displaying no physical or mental exertion; however his central nervous system is still functioning actively. In this seemingly passive state the external organs of sense—the eyes, ears, skin—and the nerve endings in the muscles, tendons and all the visceral organs are continuously transmitting streams of diverse signals into the central nervous system, informing it of what is taking place in the external environment and in the body itself. The central nervous system receives all these signals and promptly reacts by sending corresponding impulses to the different executive organs, thus controlling and coordinating their work, and adapting the reactions of the body to the continuously changing environment. Hence the central nervous system is in a state of constant activity.

A sleeping individual presents quite another picture. His perceptions, feelings and reaction to external stimuli are either sharply inhibited or, depending on the depth of his slumber, health, age, etc., disappear almost completely. All manner of low sounds, light touches or stimulation of other sensory organs, if not strong enough to awaken the sleeper, are either attended by no sensations, or call forth only very weak, vague ones. Such stimulation either evokes no motor reflexes at all, or causes only very slight ones. Thus the activity of the central nervous system undergoes a sharp change during sleep. It is a known fact that one of the symptoms of the approach of sleep is the relaxation of almost all the muscles. This

relaxation begins with the muscles of the neck, when a person begins nodding, his head falling either forward or sideways. As sleep becomes deeper the other muscles of the body relax, except for certain muscles the tension of which is essential for the proper functioning of the body in sleep. An example of this is the orbicular muscle of the eye: its contraction shuts the eye tightly, thus protecting it against light, contamination, and injury. Tension is also retained in the muscles of the urinary bladder and rectum that "lock" these hollow organs and thus exclude involuntary passage of their contents during sleep. The activities of all the other organs and systems of the body also alter during sleep. The heartbeats are weaker and slower, pauses between them longer. Blood pressure falls by 20 to 25 mm mercury. The blood stream flows slower, particularly in such vital organs as the brain, liver, kidneys. The vessels in the skin dilate, the amount of blood in them increases, and the skin feels warmer, although the bodily temperature in general falls. Breathing becomes slower, deeper, evener. Sometimes it grows noisy owing to the loosening of the soft palate, the edge of which hangs freely and vibrates during inhalation and exhalation. Oxidation processes and metabolism decrease. During sleep the kidneys secrete 2 to 4 times less urine. The activity of a number of glands also decreases, particularly of the glands in the facial area. This explains the cause of the disappearance of rhinitis in the morning after a good night's sleep, the dryness that may be present in the mouth, the burning sensation in the eyelids—"sand in the eyes". It is commonly known that little children rub their eyes with their fists when falling asleep or waking up; they do this to increase the secretion of the tear glands that moisten the eyes. At the same time the activity of the glands of the digestive organs, liver, and pancreas is but slightly altered during sleep, while the sweat glands even increase their activity. Often the faces of sleeping children are covered with tiny drops of perspiration.

The vital activity of the organism as a whole during sleep may be characterised as being aimed at providing the prevalence of income over expenditure in the processes of interchange of substances and energy that proceed continuously between the organism and its environment. The lowering of temperature observed during sleep, changes in metabolic processes and oxygen supply delivered to the tissues, as well as a slackening in the activity of the circulatory organs, relaxation of the musculature and complete muscular repose—all this undoubtedly helps to restore and replenish the material resources of the body expended in the active period during the waking hours.

As we shall see further, such restoration processes are of especial importance for the central nervous system, particularly for its highest section, the cortex of the cerebral hemispheres. To comprehend what takes place during sleep in the nervous system it is important to understand the following circumstances.

E. Asratyan, a leading Soviet physiologist and a pupil of Ivan Pavlov, points out that the highly active cells of the central nervous system are very tender and fragile. While the muscular and glandular cells have local resources of nutrition the cells of the central nervous system are almost totally deprived of such resources. However, the metabolic processes in them are very vigorous. Nerve cells require several dozen times more oxygen than do muscular or glandular cells. The same is true of requirements in glucose, that particular kind of sugar that is the essential food of all the cells in our body and the source of their energy.

The long evolutionary process of development of the animal world has evolved a number of complex adaptational features the aggregate of which creates particularly favourable conditions for the viability and work of the delicate, vigorous, and extremely important nerve cells. The extensive network of blood vessels in the brain provides its cells with necessary nutrition and oxygen, and is