

GLOW-WORMS

The glow-worm belongs to a family of beetles known as the Lampyridae or fireflies. The fireflies are a huge group containing over 2000 species, with new ones being discovered all the time. The feature which makes fireflies and glow-worms so appealing is their ability to produce an often dazzling display of light. The light is used by the adult fireflies as a signal to attract a mate, and

A each species must develop its own 'call-sign' to avoid being confused with other species glowing nearby. So within any one area each species will differ from its neighbours in some way, for example in the colour or pattern of its light, how long the pulses of light last, the interval between pulses and whether it displays in flight or from the ground.

The firefly's almost magical light has attracted human attention for generations. It is described in an ancient Chinese encyclopedia written over 2000 years ago by a pupil of Confucius. Fireflies often featured in Japanese and Arabian folk medicine. All over the world they have been the inspiration for countless poems, paintings and stories. In Britain, for example, there are plenty of anecdotes describing how glow-worms have been used to read by or used as emergency bicycle lamps when a cyclist's batteries have failed without warning. Early travellers in the New World

B came back with similar stories, of how the native people of Central America would collect a type of click beetle and release them indoors to light up their huts. Girls threaded them around their feet to illuminate the forest paths at night. Fireflies very similar to those we see today have been found fossilised in rocks which were formed about 30 million years ago, and their ancestors were probably glowing long before then. It is impossible to be sure exactly when and where the first firefly appeared. The highest concentrations of firefly species today are to be found in the tropics of South America, which may mean either that this is where they first evolved, or simply that they prefer the conditions there. Wherever they first arose, fireflies have since spread to almost every part of the globe. Today members of the firefly family can be found almost anywhere outside the Arctic and Antarctic circles.

As with many insects, the glow-worm's life is divided into four distinct stages: the egg, the larva (equivalent to the caterpillar of a butterfly), the pupa (or chrysalis) and the adult. The glow-worm begins its life in the autumn as a pale yellow egg. The freshly laid egg is extremely fragile but within a day its surface has hardened into a shell. The egg usually takes about 35 days to hatch, but the exact time varies according to the temperature, from about 27 days in hot weather to more than 45 days in cold weather. By the time it is due to hatch, the glow-worm's light organ is fully developed, and its glow signals that the egg will soon hatch. After it has left the egg, the larva slowly grows from a few millimetres into the size and shape of a matchstick. The larval stage is the only

C time the insect can feed. The larva devotes much of its life to feeding and building up its food reserves so that as an adult it will be free to concentrate all its efforts on the task of finding a mate and reproducing. Throughout its time as a larva, approximately 15 months, the glow-worm emits a bright light. The larva's light is much fainter than the adult female's but it can still be seen more than five metres away. In the final stage of a glow-worm's life, the larva encases itself in a pupa) skin while it changes from the simple larva to the more complex adult fly. When the adult fly emerges from the pupa the male seeks a female with whom it can mate. After mating, the female lays about 120 eggs. The adult flies have no mouth parts, can't eat and therefore only live a few days. When people talk of seeing a glow-worm they normally mean the brightly glowing adult female.

In some countries the numbers of glow-worms have been falling. Evidence suggests that there has been a steady decrease in the British glow-worm population since the 1950s and possibly before that. Possible causes for the decline include habitat destruction, pollution and changes in climate. Thousands of acres of grassland have been built upon and glow-worm sites have become

D increasingly isolated from each other. The widespread use of pesticides and fertilisers may also have endangered the glow-worm. Being at the top of a food chain it is likely to absorb any pollutants eaten by the snails on which it feeds. The effect of global warming on rainfall and other weather patterns may also be playing a part in the disappearance of glow-worms. A lot more research will be needed, however, before the causes of the glow-worm's gradual decline are clear.

Although glow-worms are found wherever conditions are damp, food is in good supply and there is an over-hanging wall, they are most spectacular in caves. For more than 100 years the glow-worm caves in New Zealand have attracted millions of people from all over the world. The caves were first explored in 1887 by a local Maori chief, Tane Tinorau, and an English surveyor, Fred Mace. They built a raft and, with candles as their only light, they floated into the cave where the stream goes underground. As their eyes adjusted to the darkness they saw myriad lights reflecting off the water. Looking up they discovered that the ceiling was dotted with the lights of thousands of glow-worms. They returned many times to explore further, and on an independent trip Tane discovered the upper level of the cave and an easier access. The authorities were advised and government surveyors mapped the caves. By 1888 Tane Tinorau had opened the cave to tourists.

E

Questions 8-13:

The reading passage has five sections labelled A-E.

Which section contains the following information

Write the correct letter A-E before questions 8-13.

NB You may use any letter more than once.

- 8. threats to the glow-worm
- 9. ways in which glow-worms have been used
- 10. variations in type of glow-worm
- 11. glow-worm distribution
- 12. glow-worms becoming an attraction
- 13. the life-cycle of a glow-worm

The Lack Of Sleep

Section A

It is estimated that the average man or woman needs between seven-and-a-half and eight hours' sleep a night. Some can manage on a lot less. Baroness Thatcher, for example, was reported to be able to get by on four hours' sleep a night when she was Prime Minister of Britain. Dr Jill Wilkinson, senior lecturer in psychology at Surrey University and co-author of 'Psychology in Counselling and Therapeutic Practice', states that healthy individuals sleeping less than five hours or even as little as two hours in every 24 hours are rare, but represent a sizeable minority.

Section B

The latest beliefs are that the main purposes of sleep are to enable the body to rest and replenish, allowing time for repairs to take place and for tissue to be regenerated. One supporting piece of evidence for this rest-and-repair theory is that production of the growth hormone somatotropin, which helps tissue to regenerate, peaks while we are asleep. Lack of sleep, however, can compromise the immune system, muddle thinking, cause depression, promote anxiety and encourage irritability.

Section C

Researchers in San Diego deprived a group of men of sleep between 1am and 5am on just one night, and found that levels of their bodies' natural defences against viral infections had fallen significantly when measured the following morning. 'Sleep is essential for our physical and emotional well-being and there are few aspects of daily living that are not disrupted by the lack of it', says Professor William Regelson of Virginia University, a specialist in insomnia. 'Because it can seriously undermine the functioning of the immune system, sufferers are vulnerable to infection.'

Section D

For many people, lack of sleep is rarely a matter of choice. Some have problems getting to sleep, others with staying asleep until the morning. Despite popular belief that sleep is one long event, research shows that, in an average night, there are five stages of sleep and four cycles, during which the sequence of stages is repeated. In the first light phase, the heart rate and blood pressure go down and the muscles relax. In the next two stages, sleep gets progressively deeper. In stage four, usually reached after an hour, the slumber is so deep that, if awoken, the sleeper would be confused and disorientated. It is in this phase that sleep-walking can occur, with an average episode lasting no more than 15 minutes. In the fifth stage, the rapid eye movement (REM) stage, the heartbeat quickly gets back to normal levels, brain activity accelerates to daytime heights and above and the eyes move constantly beneath closed lids as if the sleeper is looking at something. During this stage, the body is almost paralysed. This REM phase is also the time when we dream.

Section E

Sleeping patterns change with age, which is why many people over 60 develop insomnia. In America, that age group consumes almost half the sleep medication on the market. One theory for the age-related change is that it is due to hormonal changes. The temperature rise occurs at daybreak in the young, but at three or four in the morning in the elderly. Age aside, it is estimated that roughly one in three people suffer some kind of sleep disturbance. Causes can be anything from pregnancy and stress to alcohol and heart disease. Smoking is a known handicap to sleep, with one survey showing that ex-smokers got to sleep in 18 minutes rather than their earlier average of 52 minutes.

Section F

Apart from self-help therapy such as regular exercise, there are psychological treatments, including relaxation training and therapy aimed at getting rid of pre-sleep worries and anxieties. There is also sleep reduction therapy, where the aim is to improve sleep quality by strictly regulating the time people go to bed and when they get up. Medication is regarded by many as a last resort and often takes the form of sleeping pills, normally benzodiazepines, which are minor tranquilizers.

Section G

Professor Regelson advocates the use of melatonin for treating sleep disorders. Melatonin is a naturally secreted hormone, located in the pineal gland deep inside the brain. The main function of the hormone is to control the body's biological clock, so we know when to sleep and when to wake. The gland detects light reaching it through the eye; when there is no light, it secretes the melatonin into the bloodstream, lowering the body temperature and helping to induce sleep. Melatonin pills contain a synthetic version of the hormone and are commonly used for jet lag as well as for sleep disturbance. John Nicholls, sales manager of one of America's largest health food shops, claims that sales of the pill have increased dramatically. He explains that it is sold in capsules, tablets, lozenges and mixed with herbs. It is not effective for all insomniacs, but many users have weaned themselves off sleeping tablets as a result of its application.

Questions 14-21:

The passage has seven sections labelled A-G.

Which section contains the following information?

Write the correct letter A-G in boxes 14-21 on your answer sheet.

NB You may use any letter more than once.

- 14. the different amounts of sleep that people require
- 15. an investigation into the results of sleep deprivation
- 16. some reasons why people may suffer from sleep disorders
- 17. lifestyle changes which can help overcome sleep-related problems
- 18. a process by which sleep helps us to remain mentally and physically healthy
- 19. claims about a commercialised man-made product for sleeplessness
- 20. the role of physical changes in sleeping habits
- 21. the processes involved during sleep