

What are our brains up to while we sleep?

William Wordsworth commented that "Our birth is but a sleep and a forgetting", and Samuel Taylor Coleridge talked of sleep as a gentle thing "beloved from pole to pole". There is an enormous amount of literature concerning the phenomenon, but many of its characteristics continue to evade us and we are unable to define it closely.

One suggested definition calls sleep a state in which warm-blooded animals show characteristic changes in posture, sensory thresholds and distinctive electrographic signs indicating nervous alterations. In general, sleep is associated with a marked diminution of motor activity and the assumption of a recumbent posture. The eyes close and the muscles become relaxed. As sleep deepens, response to stimuli decreases.

In the higher vertebrate mammal, critical changes can be observed in the cerebral cortex and thalamus. Two distinct patterns emerge during sleep — non-rapid eye movement and rapid eye movement. However, as a comment in the 9 March issue of *Science* observes, even sound sleepers have restless brains.

Although the body may be relaxed during sleep, the brain, in fact, grows more active at the same time. It is replaying the experiences of the recent past and, in addition to this, it is extracting meaning that was previously lacking from the experience itself.

Regions of the hippocampus are active during slow-wave sleep. Positron emission tomography studies have shown that the more intense hippocampal activity an individual develops during slow-wave sleep the better

the recall of experiences the next day. For example, when a subject was submitted to a floral odour it was better recalled after slow-wave sleep than after rapid eye movement sleep.

There is evidence that the different stages of sleep are involved in consolidation of different kinds of memory. Memories with a strong emotional content have a closer connection with rapid eye movement sleep than others. Volunteers deprived of a night's sleep have shown less ability to learn word pairs next day than well-rested controls, but declarative memory (the aspect of human memory that stores facts and experiences) has been less impaired by sleep abstinence than has been associative memory. Sleep is a strange thing indeed.

How chimpanzees used stone hammers to crack nuts 4,000 years ago

A revealing annotation in the 12 February issue of *New Scientist* draws attention to the relation between our own culture and that of chimpanzees some 4,000 years ago. It has been found that in that remote period chimpanzees in the West African rainforest were in the habit of adapting stone tools in the habit of adapting stone tools to break open nuts for food. The technology is believed to be an indication that we and the chimpanzee share a common ancestor.

Anthropologists at the University of Calgary excavated a site in Tai National Park on the Ivory Coast dated at 4,300 years before present and uncovered a collection of worked stones. A few of these, evidently trimmed to an edge, were clearly of human origin, but others suggested a hammering and crushing effort characteristic of the use of stones for cracking nuts. When these hammer fragments were assembled to reconstruct the



original implements, most were found to be large, weighing some 700g on average. This is heavier than tools wielded by Stone Age humans but similar to the hammer-stones used by modern chimpanzees.

Starch grains found in crevices in the fragments appeared to be from nuts rather than legumes or tubers. Among the nut species were many that are eaten by modern chimpanzees but not known to have been eaten by ancient human hunter-gatherers. The spot was therefore judged to be an ancient feeding area frequented by chimpanzees. It is possible therefore that both humans and chimpanzees inherited their use of stone tools from a common ancestor. Some critics believe that there may have been prehistoric cultures that used heavier hammer stones and ate a wider range of nut species than we generally assume. Whatever the truth, it is intriguing to speculate on the early use of everyday tools.

Hot air on the agenda: can the EU agree an energy policy for Europe?

An editorial in the 8 March issue of *Nature* considers the arguments at present raging in Brussels over the looming problem of climate change and what can be done to meet the challenge. Twenty-seven European heads of state are to endorse an energy policy for the continent, the implementation of which will test the calibre of those making the choice — for good or evil.

The probability of global warming, with all its possible consequences for enormous populations, dictates action. There are still sceptics who deny that the range and scale of human activity is having an adverse effect on climate in general and therefore that society needs immediate protective measures if it is

to survive, let alone thrive, but the call for an agreed policy, backed by a wealth of expert scientific evidence has become irresistible.

Most Europeans now understand the need for making new lifestyle choices. These include choosing to drive more environmentally friendly cars and reducing the amount of energy wasted in running homes and businesses.

The great problem lies in persuading people that conservation measures are being fairly shared throughout different social groups. The European Commission as a whole is committed to achieving reductions of 20 to 30 per cent in greenhouse gas emissions from their 1990 levels by the year 2020. If heavily industrialised countries such as the

US undertake such moves it might be possible to achieve the target, provided some lesser measures such as moving to the generation of 20 per cent of electricity from renewable sources by 2020 are followed through. Some countries — Italy, Spain and Portugal included — are failing to meet the modest undertaking of the Kyoto protocol because of moves to achieve air conditioning by increasing electricity consumption. The result is that the greater part of the burden is being thrust upon Germany, France and Britain.

The climate challenge offers the EU the chance to show the world that it can lead in an issue of global importance.