



SLEEPING IT OFF
If you prevent an animal from napping then they will slumber more deeply when they finally get the chance to sleep.

REST UP
The length of time that a dog sleeps each day depends on its age and breed.

THE SCIENCE OF SNOOZE

Sleep is one of the biggest mysteries in science.

Some people seem to function well on a little sleep; others crave more. The amount you get shapes your mood, reactions and sharpness, but not having enough of it drives you insane. Sleep can be dangerous, too; it leaves animals vulnerable. However, all animals seem to do it, so it must be important.

What is sleep?

Sleep is a behavioural shutdown, when all the things that you normally do come to a halt. While asleep, you (and most other animals) don't move, and you're unaware of what's happening around you. However, if you disturb a sleeping animal, it will wake up and respond. Sleep is also an altered brain state.

During sleep, mammals and birds flip between two very different episodes of brain activity – non-rapid eye movement (non-REM) and REM. If you were to look at your brainwaves now, you'd see that they are small (low voltage) and fast (high frequency). Your brain is awake. During non-REM sleep, brain activity shows big, slow waves. Brain waves during REM sleep go back to looking awake-like.

What sleeps?

So far, all animals studied by sleep scientists have been found to sleep. That includes

amphibians, birds, fish, mammals and reptiles. Even invertebrates (animals without backbones), such as honeybees and fruit flies, snails and squid, roundworms, flatworms, and jellyfish – all sleep. Since the practice of sleep is so widespread across distantly related animals, it suggests that (a) sleep probably appeared early in the evolution of animals and (b) it is doing something that is really important.



Half-brained sleep

When humans sleep, it is a whole-brain affair. In some animals, however, sleep can happen in one half of the brain at a time. Many birds and marine mammals, including dolphins, fur seals and manatees, can sleep in this way. While sleeping unihemispherically (with one side of the brain), the eye connected to the sleeping hemisphere (half) is closed, and the other eye – the one associated with the awake hemisphere – remains open. In this way, dolphins can keep an eye out for other animals while they get some zzzs. Dolphins can even swim continuously during half-brain sleep. Fur seals paddle with only the “awake” flipper to keep their nares (nostrils) above the water's surface to breathe. Frigate birds can sleep while flying with either one or both hemispheres at a time.



Manatees are half-brain sleepers.

Meet a sleep scientist

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Being a zoologist and a sleep scientist is a great job. I spend a lot of time seeing how animals sleep in the wild or extreme environments. For instance, how do animals sleep in the continuous daylight of the high Arctic summer? What about birds that undertake long-distance migrations lasting days, weeks or longer? Do animals with intense breeding seasons suppress sleep to secure mates? Understanding the diversity around sleep can inform us about the functions of sleep in ourselves. Being a sleep scientist also means that taking a daytime nap is homework.



TOP OF THE ZZZ-CHARTS

Adult humans sleep about eight hours every night. Not all mammals sleep for eight hours. The numbers below refer to adult mammals; younger animals sleep longer.



HORSE
3



ROCK HYRAX
5



HUMANS
8



LONG-NOSED POTOROO
11



FERRET
14



YELLOW-BELLIED MARMOT
17



LARGE HAIRY ARMADILLO
20

Why sleep?

Sleep probably does many things. While asleep, we save energy by lowering our metabolic rate and by not moving around. Some of this saved energy can be used for other things, like bolstering the immune system to keep you healthy.

Sleep is also very important for your brain. It helps your brain store and organise memories, and process information more efficiently, allowing you to perform better the next day. Without sleep, animals can't learn. Similarly, sleep allows songbirds to learn their song early in life. Night-

time sleep in honeybees is important to allow them to communicate the location of nectar to forager honeybees in the colony during the day.

When you don't get enough sleep, you probably have trouble focusing your attention, or you might just not want to do anything at all. If you stay awake for even a few hours longer than usual, you'll have difficulties remembering things the next day and you might feel miserable. So, even though it seems like a good idea at the time, the next time you feel like burning the midnight oil, perhaps it is best just to zzzzz.

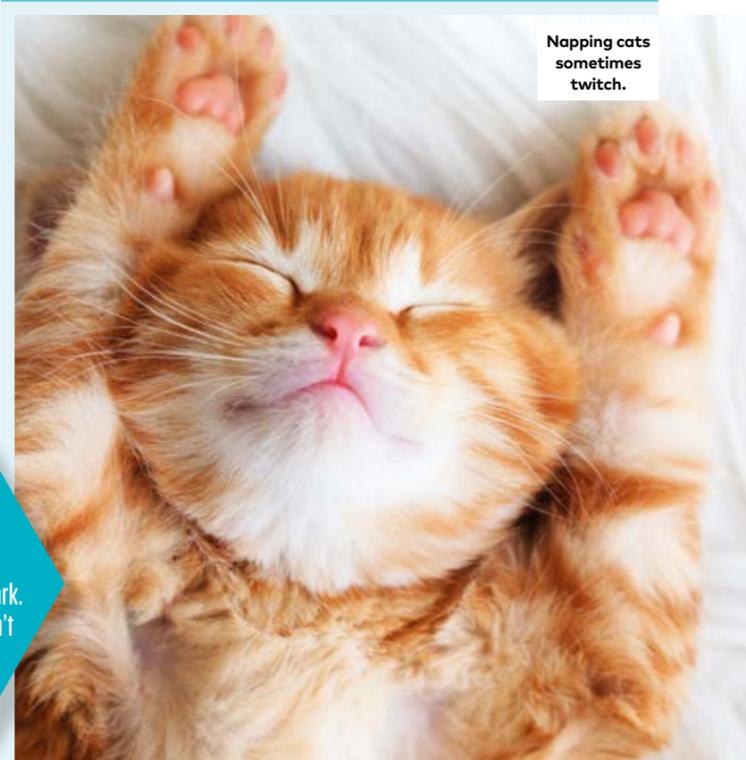
DID YOU KNOW?

Most birds in the UK (apart from owls) are active during daylight hours and rest after dark. This is because their eyes don't work well in low light so it is harder to find food at night.

Sleep helps birds remember their songs.



Do animals dream?



Napping cats sometimes twitch.

It's hard to know for certain whether animals dream, but there are clues that they do. In humans the most vivid dreams occur during REM sleep. REM stands for rapid eye movement and describes a stage of sleep during which the eyes move around, breathing is more rapid and the body

is more likely to move. Birds and mammals also engage in REM sleep, raising the possibility that they also dream. During REM sleep, mammals twitch. Sometimes the twitching looks as if they are running. Perhaps your pets are dreaming about chasing animals.

Studying sleeping animals

There is a good reason why wildlife documentaries focus on awake animals. Awake animals are often out in the open, but typically retreat to safe places that are hidden from view to sleep. Many animals make their bed underground in burrows, inside logs or in tree hollows.

When sleep scientist John Lesku wants to study sleep in an animal in the wild, he uses technology to record how much the animal is moving without the need to actually see it himself. This doesn't always work, however. Some animals, such as dolphins, can move while sleeping. Other animals, like sloths, might sit in the trees inactive, but remain awake. Therefore, Lesku also studies the brainwaves of wild animals.

So, which animals sleep the most? Sloths are probably on your list. After all, sloth is another word for lazy. The amount that brown-throated three-toed sloths (*Bradypus variegatus*) sleep was measured in Lesku's laboratory. They were found to snooze for 16 hours per day. However, the laboratory is a pretty comfortable place. Animals in the lab don't need to look for food and water. They don't have to worry about being eaten. How much sleep an animal gets in the lab might be different to how much they would get in the wild. Indeed, when sloth sleep was measured in a Panamanian rainforest, they slept at least six hours less than in the lab-based study. Perhaps sloths are not as slothful as was once thought.



SUPER SLOTH

Megatherium was a kind of sloth that could grow as large as an Asian elephant. They became extinct around 10,000 years ago.

Strange sleeping habits



1

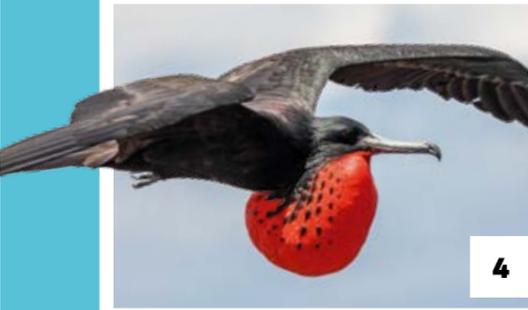
1 Cows and other ruminants such as sheep, deer and giraffes stand during non-REM sleep and can even continue to chew their cud.

2 Ostriches sit in an upright posture during non-REM sleep, with both eyes open and head held high above the ground. Only during REM sleep do they close their eyes and relax.

3 Parrotfish sleep in a bag of mucus they secrete at night.



3



4

4 Frigate birds, a kind of seabird, can sleep on the wing while they soar over the ocean. Although you sleep in one go each night, birds can have 1,000 sleep bouts every 24 hours, each just seconds long.

5 Bats sleep upside-down while hanging from cave ceilings, tree hollows or branches.

6 Dolphins swim while sleeping, using only one half of their brain at a time.



6



2



5

DONT DRIFT OFF!

Sea otters sleep on their backs on the water's surface, wrapping themselves in seaweed, which acts like an anchor.