

MATTER

Down From the Trees, Humans Finally Got a Decent Night's Sleep

By Carl Zimmer

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Over the past few million years, the ancestors of modern humans became dramatically different from other primates. Our forebears began walking upright, and they lost much of their body hair; they gained precision-grip fingers and developed gigantic brains.

But early humans also may have evolved a less obvious but equally important advantage: a peculiar sleep pattern. “It’s really weird, compared to other primates,” said Dr. David R. Samson, a senior research scientist at Duke University.

In the journal *Evolutionary Anthropology*, Dr. Samson and Dr. Charles L. Nunn, an evolutionary biologist at Duke, reported that human sleep is exceptionally short and deep, a pattern that may have helped give rise to our powerful minds.

Until recently, scientists knew very little about how primates sleep. To document orangutan slumber, for example, Dr. Samson once rigged up infrared cameras at the Indianapolis Zoo and stayed up each night to watch the apes nod off.

By observing their movements, he tracked when the orangutans fell in and out of REM sleep, in which humans experience dreams.

“I became nocturnal for about seven months,” Dr. Samson said. “It takes someone who wants to get their Ph.D. to be motivated enough to do that.”

In the new study, Dr. Samson and Dr. Nunn combined that information with studies of 19 other primate species. The researchers found wide variations in how long the animals slept. Mouse lemurs doze for seventeen hours a day, for example, while humans sleep just seven hours or so a day — “the least of any primate on the planet,” said Dr. Samson.

The scientists looked for factors that could explain the differences. Compared with big mammals, for example, smaller species tend to sleep more during the day and in short bouts, perhaps because they need to eat many times a day.

Dr. Samson and Dr. Nunn found that the time each primate species spends asleep

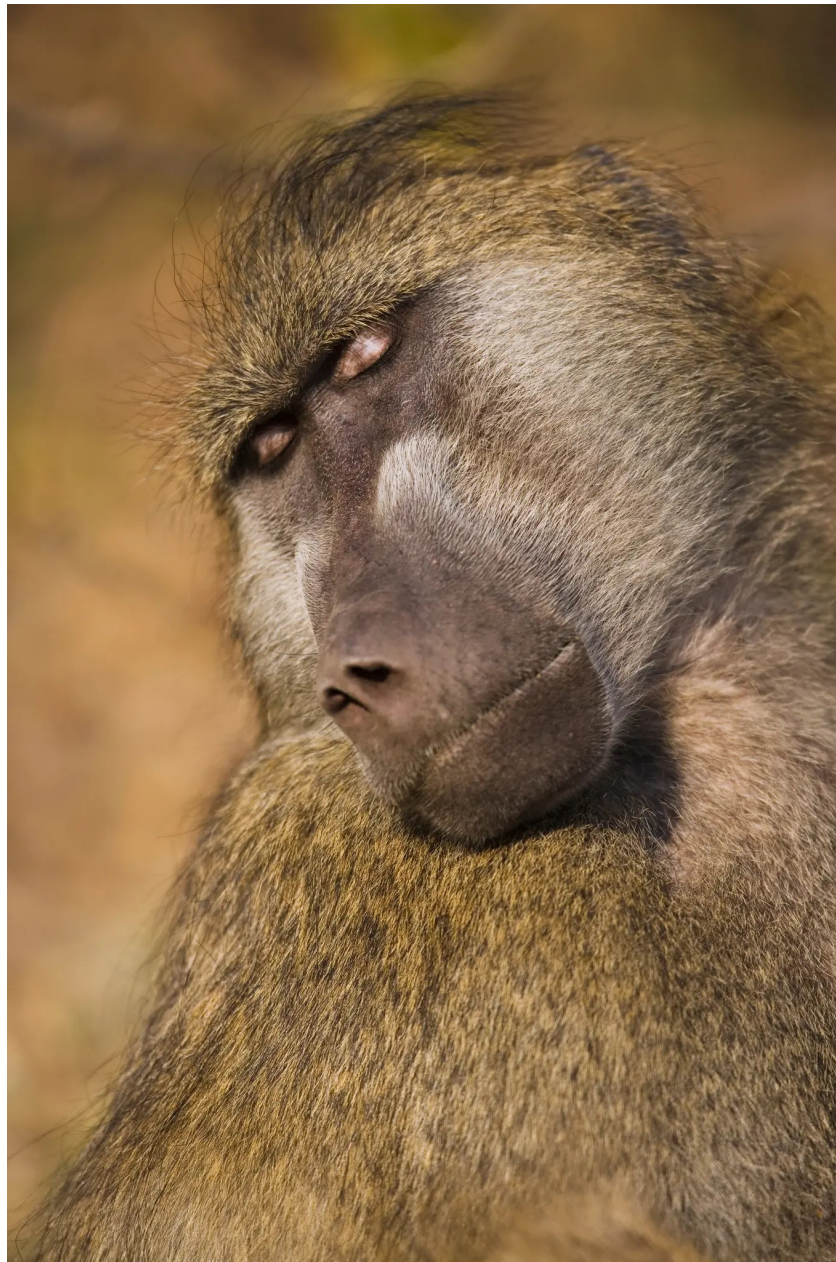
generally corresponded to its physical size, along with other factors, such as the average number of primates in a group.

The one big exception: humans. We sleep a lot less than one would predict based on the patterns seen in other primates.

From time to time while sleeping, we slip into REM sleep and dream. All told, we spend about 22 percent of sleep in REM, the highest ratio of REM to total sleep in any primate, the researchers reported.

Dr. Samson and Dr. Nunn have an explanation for how humans ended up sleeping so little, and so often in REM.

Over tens of millions of years, they assert, changes in our ancestors' ecology drove the evolution of new sleeping patterns. Humans increasingly have been able to achieve a good night's sleep.



A Chacma Baboon. The researchers found that the time each primate species spends asleep generally corresponded to its physical size. Theo Allofs/Minden Pictures

A number of studies suggest that REM sleep benefits the brain. Some scientists argue that it sweeps out molecular debris, and others say it consolidates new memories into lasting impressions.

But it was not easy for our monkey-like ancestors to reach REM sleep. They slept on branches, and their nights were anything but easy. As monkeys try to sleep today, they get roused by winds, tree snakes and the jostling of their fellow primates.

“It’s like economy class on a plane,” said Dr. Samson. Monkeys, he believes, have to rest longer to get the benefits of REM sleep.

The fossil record suggests that 20 million years ago, the ancestors of humans and other apes changed their sleeping habits because they became too big for branches. Today, no primate that weighs over 60 pounds sleeps on a branch. Instead, chimpanzees, bonobos and their cousins build sleeping platforms each night from sticks and other materials.

Dr. Samson and his colleagues have found that apes take great care in choosing trees to sleep in and the materials to build their platforms. The reason, he suspects, is that apes aim to get the best night's rest they can.

Dr. Samson and the primatologist Robert W. Shumaker found that orangutans that got to make platforms of foam and other comfortable materials scored better on cognition tests the following day than apes that slept on straw.

Early human ancestors probably continued to sleep in trees until about two million years ago, Dr. Samson said. By 1.8 million years ago, new hominins like *Homo erectus* had left the trees. "I think we can be safe in saying *Homo erectus* slept on the ground," Dr. Samson said.

Early humans probably slept around fires in large groups, able to ward off predators. The result, said Dr. Samson and Dr. Nunn, was the chance to get an even better night's rest. Humans were able to fall more soundly asleep and to experience deeper bouts of REM sleep.

Since it took less time to get the benefits of REM sleep, humans were able to get by with less sleep over all than other primates. They gained a few extra waking hours each day, which they might have used to make new tools or share stories.

Dr. Patrick J. McNamara, a neurologist at Boston University School of Medicine, found the new study compelling. "We as a species have found a way to get more out of a shorter sleep span than other species," he said.

But he and other scientists also said that the study raises many puzzling questions.

Dr. Robert A. Barton, an evolutionary biologist at Durham University in the United Kingdom, noted that mouse lemurs are so tiny that they can sleep inside tree cavities. They ought to be able to enjoy short, efficient sleep as we do, but instead they are marathon dozers.

While our REM sleep may be unusual among primates, it is not so special among mammals. "The platypus is the champion," said Dr. Jerome M. Siegel, a sleep researcher at the University of California, Los Angeles. That creature spends half of its sleep in REM.

Dr. Samson replied that the evolution of sleep may be driven by different factors in

different groups of species. Figuring out what those factors are will take many more sleepless nights of research.

“These first studies are really exciting indicators that something really profound is going on here,” he said, “but I think the jury’s still out.”