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18 SLEEP

10 Freed: In the age of open access, publishers need to restructure their business models.

18 Snoozing between Heaven and Earth

Frigatebirds can easily snooze while cruising through the air without crashing to the ground. What's more, they generally get by on very little sleep during their long flights over the open ocean. A team of scientists working with Niels Rattenborg at the Max Planck Institute for Ornithology has demonstrated for the first time that birds can fly in sleep mode.

26 Metronomes that Regulate the Day

Ludwig II of Bavaria conducted his government business at night and slept during the day. Did the Fairy Tale King have a disorder that disrupted his sleep-wake rhythm? Even Gregor Eichele can only speculate, but he and his team at the Max Planck Institute for Biophysical Chemistry have gained much new insight into the body's natural timekeepers.

32 When the Brain Switches to Standby

People who haven't gotten enough sleep often see the world as a fairly sad place. If their tiredness lasts for weeks or even months, their dark mood may become chronic and develop into depression. Conversely, depression is frequently also associated with severe sleep disorders. Axel Steiger and his team at the Max Planck Institute of Psychiatry in Munich are studying the connection between disturbed sleep and depression.

ON THE COVER Sleep is a basic need and is vital to such functions as learning and remembering. Internal clocks in the body control the day-night rhythm and influence the need for rest – both in humans and in many animals.

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The publishing world has changed dramatically with the relentless progress of the internet. It's time for publishers rethink their business models.

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Using microfighters or even nanofighters to transport drugs directly to a diseased area could make some medical treatments more efficient. Researchers are developing tiny robots that are expected to one day make this possible.

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The Middle East and North Africa are being torn apart by armed conflicts and political crises. But even if these were to be resolved, many people there will likely be forced to leave their homes in the coming decades: scientists are predicting dramatic climate change and an increase in air pollution there.

CULTURE & SOCIETY

- 70** **An Ocean of Connectivity**
Ships were long the fastest means of transportation, capable of carrying people and goods in large quantities. As a result, the seas became a medium through which a variety of nations made contact and carried out trade, and diverse networks developed across the waters.

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