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18 COSMOLOGY

The Dark Sides of the Universe

18 The Architecture of Space

The universe resembles an unfathomably large honeycomb. Gigantic galaxy clusters occupy the nodes of the waxy walls surrounding the cells composed of empty space. When scientists study these distant conglomerations of galaxies, they learn a lot about the structure of the universe. And they encounter its invisible aspects.

26 Star Factories at the End of the World

When the universe came into being 13.7 billion years ago, there was initially only radiation. A few hundred million years later, however, the space was filled with galaxies – tremendously productive star factories that don't fit quite so well with the image of a gradual cosmic evolution. Researchers are attempting to illuminate a dark epoch of the universe.

34 Hunting Down the Invisible

If cosmologists are correct, there is a form of matter in the universe that is six times more abundant than the matter we know. It is invisible, which is why it's called dark matter. Postulated for the first time 80 years ago, it has yet to be detected directly. Astrophysicists are working relentlessly to solve this cosmic mystery in the next few years.

ON THE COVER: "Those in the darkness you don't see." Modern cosmology lends this line from "The Ballad of Mack the Knife" in Brecht's *Threepenny Opera* an unexpected currency: the universe lies largely in darkness. This doesn't refer to the fact that the night sky is black, but rather that dark energy and dark matter – two previously completely unknown substances – account for 96 percent of the total cosmic mass.



12 Discredited: Many arguments against genetically modified rice lack any scientific basis.

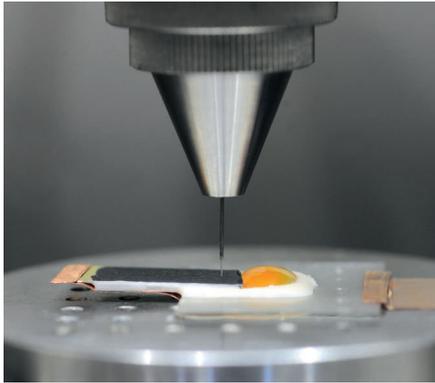
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VIEWPOINT

12 Cultural War over Genetic Engineering

The debate surrounding the dangers posed by genetically modified organisms is becoming emotional and increasingly removed from the scientific context – particularly when it comes to the use of these organisms in agriculture. According to Diethard Tautz, it is time to start the debate anew.



64 Disclosed: A Kelvin probe can be used to determine whether rust is eating away the material underneath the varnish.



72 Dissuaded: Ever more birds are giving up the country life and moving to the city.



80 De-stressed: Residents of Shanghai are reflecting on old traditions and start their day with tai chi.

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Patients with osteoporosis stand to gain just as much from artificial bone as those with serious injuries and bone cancer. But research is still needed to determine the optimum conditions for generating bone tissue.
- 56** **The Source Code of Life**
Personal Portrait: Eugene W. Myers

MATERIAL & TECHNOLOGY

- 64** **Skin with High Rust Protection Factor**
Corrosion incurs immense costs. An environmentally compatible protective layer that heals itself is designed to stop the rust and could open up a new chapter in metalworking.

ENVIRONMENT & CLIMATE

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Many animal species have made their homes in towns and cities. There, they have to adapt to unnatural living conditions. For instance, noise and light force behavioral changes in songbirds.

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Spirituality as we know it today arose in interaction between Western and Eastern cultures – and it is still in a process of change.

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