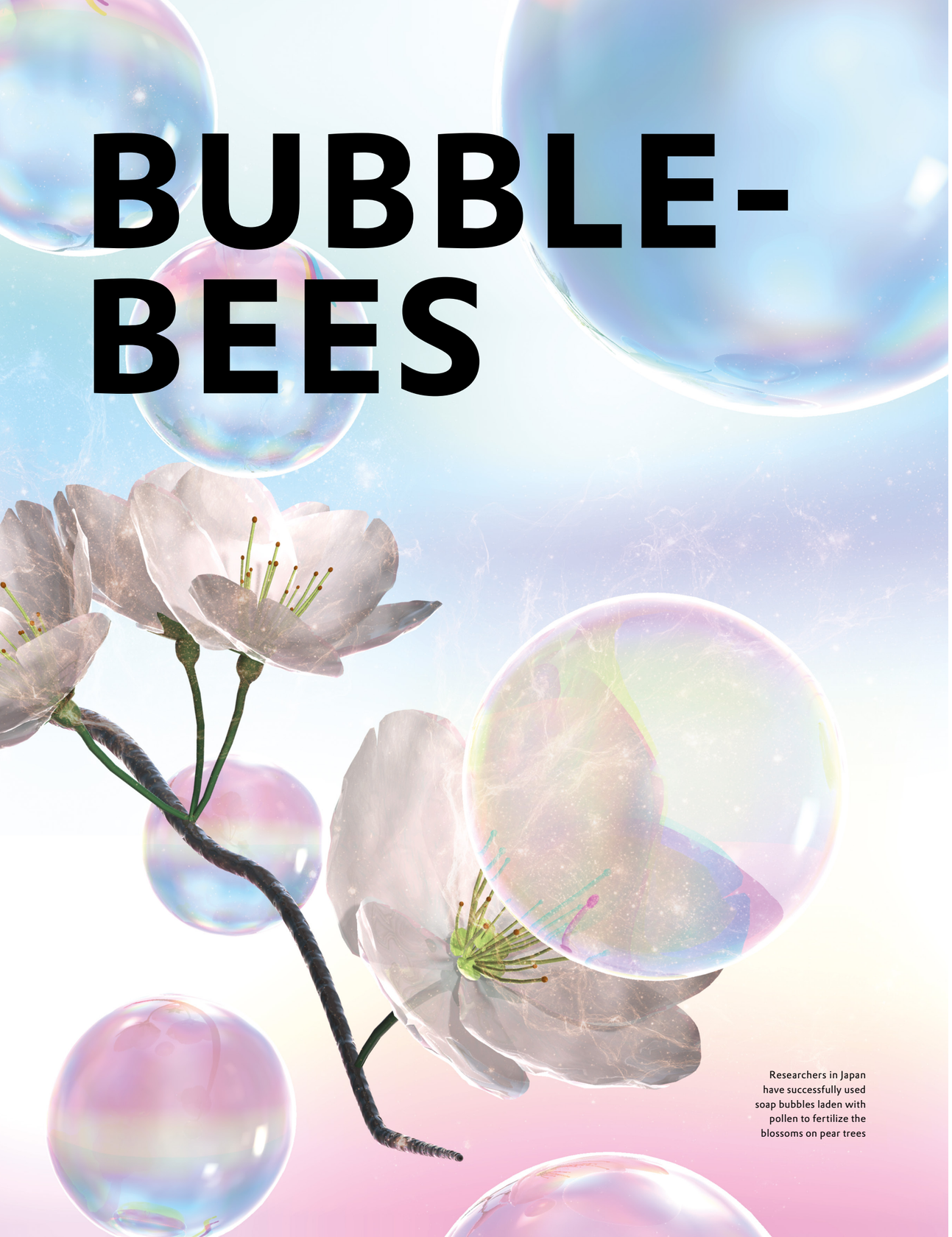
BUBBLE-BEES



Researchers in Japan have successfully used soap bubbles laden with pollen to fertilize the blossoms on pear trees

Without bees and other insects that pollinate blossoms, agriculture would be in deep trouble. Because insect populations are steadily decreasing, scientists are actively searching for technical alternatives that can support plant pollination

TEXT **BJÖRN THEIS**

Mama, Papa—where do babies come from? Parents caught off guard by this question like to tell their children the standard story about the birds and the bees. The popularity of this instructive metaphor is due to the German botanist Christian Konrad Sprengel. In 1793 he described the role played by insects in the propagation of plants for the first time in his book *The Secret of Nature in the Form and Fertilisation of Flowers Discovered*. Because of his research, Sprengel is regarded as not only the founder of flower ecology but also a source of ideas for Charles Darwin's theory of evolution.

Pollination is defined as the process by which pollen is transported from the male parts of a plant, or anthers, to the female parts, or stigmas, which are located at the top of a flower's pistil. Plants are pollinated not only by bees but also by many other insects, such as bumblebees and butterflies. Bats, birds, and rodents also transport pollen. And last but not least, wind and rain also play a part in the fertilization process. However, bees play the most important role. Thanks to their unpaid pollination services, they contribute approximately €200 billion annually to the global creation of added value.

However, in recent years people have observed a significant decrease in the numbers of pollinating insects. Intensive monoculture farming, the intensified use of insecticides, pollution by harmful chemicals, the increasing overdevelopment and sealing of land, light pollution, and the effects of climate change have had a severe impact on insect populations.

In Germany alone, about half of the 560 species of wild bees are at risk of extinction. Today, in some regions there are already not enough natural pollinators to ensure that the planned volumes of crops can be harvested. More and more farmers need to give nature a helping hand. One popular method is to bring in additional beehives. However, the imported bees may have negative effects on the local ecosystems. In some agricultural regions of China, fruit trees are already being pollinated by hand. It's a cost-intensive method that doesn't really solve the problem. That's why researchers all over the world are working to develop cost-effective pollination techniques in order to safeguard humankind's future food supply.

BUBBLE MEETS BLOSSOM

For example, scientists in Japan are conducting experiments that use soap bubbles for pollination. A team at the Japan Advanced Institute of Science and Technology in Nomi has successfully pollinated fruit trees with the help of soap bubbles. They used a kind of cannon mounted on a drone to shoot soap bubbles consisting of a 0.4% solution of lauramidopropyl betaine at pear trees. These bubbles are environmentally friendly, robust, and sticky enough to get up to 2,000 grains of pollen to adhere to them. If a blossom is hit by between two and ten bubbles, it is very likely to be fertilized.

The Israeli tech company Edete aims to fertilize plants with the help of electrostatic fields, and the Polybee startup in Singapore is testing microdrones that imitate the "buzz pollination" that is done by several types of bees. In this process, the pollen is shaken loose through vibrations in the air caused by the wingbeats of insects flying past.

THE FUTURE OF NUTRITION

If we want to feed the world in the future, we need to compensate for the loss of natural pollinators. That's a good reason for the Foresight team at Creavis to investigate this area as part of its Sustainable Food Futures 2040 program. Among other things, Evonik has wide-ranging skills in the area of interface chemistry—skills that can help to develop the pollination methods of the future. In addition, the Agricultural Solutions unit at Creavis is working to develop solutions for a more sustainable agriculture that can help to make bees and blossoms feel so comfortable once again that they no longer need human beings to do their pollination work for them.

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