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In The News

Self-fertilizing wheat

Scientists at the University of California, Davis have developed wheat that can help generate its own natural fertilizer, potentially reducing pollution and cutting farmers' costs. Led by professor Eduardo Blumwald, the team

used CRISPR gene editing to boost the plant's production of apigenin, a naturally occurring flavone. When released into the soil, the extra apigenin encourages beneficial bacteria to form biofilms—protective, low-oxygen layers that allow the enzyme nitrogenase to function. This enables the bacteria to convert atmospheric nitrogen into a form the wheat can use, a process known as nitrogen fixation. Unlike legumes, wheat cannot form root nodules to shelter nitrogen-fixing bacteria, so farmers largely rely on synthetic fertilizers. Yet plants typically absorb only 30–50% of applied nitrogen, with the rest contributing to water pollution, "dead zones," and greenhouse gas emissions. The modified wheat produced higher yields than standard plants even under very low fertilizer conditions, suggesting major potential benefits, especially in regions where farmers struggle to afford fertilizer. Wheat accounts for roughly 18% of global nitrogen fertilizer use, so even a modest reduction could save billions and lessen environmental harm. Researchers are also exploring similar approaches for other cereal crops. ◆

Decades-old chemical challenge solved

Researchers at the University of Santiago de Compostela's CiQUS center have developed a catalytic method that solves a long-standing challenge in converting natural gas into valuable chemicals. Natural gas is abundant

but largely underused in chemical manufacturing because its main components—methane, ethane, and propane—are highly unreactive. The new approach, led by Martín Fañanás and published in Science Advances, efficiently transforms methane and related gases into versatile chemical building blocks. The team focused on allylation, a reaction that adds an allyl group to the gas molecule, creating a flexible starting point for producing pharmaceuticals and industrial materials. A major obstacle had been the formation of unwanted chlorinated byproducts that derail the reaction. To address this, the researchers designed a supramolecular catalyst built around a tetrachloroferrate anion stabilized by collidinium cations. This structure forms a hydrogen-bonded environment that enables photocatalytic activation of the alkane while suppressing problematic chlorination. The method is sustainable as well, relying on abundant, low-toxicity iron and mild, LED-driven conditions. In a key demonstration, the team synthesized the bioactive compound dimestrol directly from methane. Together with related advances, this work highlights a path toward cleaner, more efficient use of natural gas in chemical production. ◆

Coral reefs could be overtaken by algae

A new study in Communications Biology examines rare coral reefs in Papua New Guinea to understand how rising ocean acidification may reshape reef ecosystems by 2100. As oceans absorb more atmospheric CO_2, seawater becomes increasingly acidic, weakening the limestone skeletons that support corals. To observe long-term, ecosystem-wide effects, researchers from the Australian Institute of Marine Science (AIMS) studied reef communities exposed to naturally high CO_2 near shallow volcanic seeps in Milne Bay. These sites act as real-world analogs of future ocean conditions. Senior author Dr. Katharina Fabricius explains that these "natural laboratories" reveal which species can endure persistent acidity. Surveys across 37 sites showed a clear trend: as CO_2 levels rise, corals decline while fleshy algae expand, ultimately smothering reefs. The team also documented steep reductions in baby corals, indicating slower reef growth and recovery—threatening the many species, including fish and humans, that depend on healthy reefs. Ocean acidity has already increased 30%, with pH projected to fall from 8.0 to about 7.8 by 2100. The findings show no sudden tipping point, but rather a steady shift toward algae-dominated ecosystems unless global CO_2 emissions fall significantly. ◆

Nasal nanodrops eradicate brain tumors

Researchers at Washington University School of Medicine and Northwestern University have developed a noninvasive nanomedicine strategy aimed at treating glioblastoma, one of the deadliest and fastest-growing brain cancers. The method uses engineered nanoscale structures called spherical nucleic acids (SNAs), delivered through simple nasal drops, to activate the brain's immune defenses. In mouse studies, the treatment successfully reached glioblastoma tumors and stimulated strong immune activity while avoiding invasive procedures normally required for similar therapies. The findings appear in PNAS. Glioblastoma is difficult to treat partly because therapeutic drugs struggle to cross into the brain, and because tumors are "cold," meaning they provoke little natural immune response. To address this, researchers designed SNAs with gold cores coated in DNA capable of activating the STING immune pathway, which helps the body detect and attack abnormal cells. When delivered intranasally, the SNAs traveled along nerves connecting the nasal passages to the brain, concentrated in tumor-associated immune cells, and triggered targeted immune activation without affecting other organs. When combined with drugs that stimulate T cells, the therapy eradicated tumors in mice and provided long-term protection against recurrence. The team is now exploring ways to expand the nanostructure's immune-activating capabilities for future clinical use. ◆